REPORT

Australian Foundation for Disability

61-79 Henry Street, Penrith

Utilities Infrastructure Report

December 2019

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CONSULTING CIVIL INFRASTRUCTURE ENGINEERS
& PROJECT MANAGERS

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1. EXECUTIVE SUMMARY

The site at 61 - 79 Henry St, Penrith has an existing use of mostly single or double storey commercial with a large open area car park. It is a prime site for redevelopment and the Australian Foundation for Disability (AFFORD) masterplan for redevelopment is viable from a utility servicing perspective.

The masterplan that forms part of the current utilities assessment is one of many that have and may form part of the planning approval process. The utilities assessment within this report demonstrate that the Henry Lawson Centre development can be serviced effectively but capacity implementation is required for water, sewer and electricity. Whilst the masterplan within this report may be different to that presented within the planning application, the principle of utilities servicing is what is important in obtaining the relevant planning approval for this site.

Upgrade of sewer and water infrastructure is needed and this requires some network changes which are yet to be confirmed with Sydney Water in February 2020 following completion of their Local Area Scheme Plan for the Penrith central business district. Indicative sizing and alignments expected have been provided within this report.

Electrical servicing is feasible via a new 11 kV feeder from the Penrith Zone substation to the site. Powerline Design has provided the electrical servicing assessment and their electrical report is included as an appendix to this utilities servicing report. The key items from electrical servicing are copied in this utilities report. There are other considerations with electrical servicing and hence the report from Powerline Design needs to be considered in entirety for project development.

No concerns are seen for telecommunications or gas as services are available with minimal undertaking.

Allowances for utilities with the planned stages of development can be determined once planning approval has been obtained though it should be expected that most of the utility upgrades would be in the first or second stages.

This report outlines the likely availability and approaches for utility servicing to support the Henry Lawson Centre development. Servicing approaches may be adjusted at any time and will need confirmation by the respective utility authority before undertaking any utility design.

2. INTRODUCTION

The site at 61 - 79 Henry St, Penrith has an existing use of mostly single or double storey commercial with a large open area car park. It is proposed to be redeveloped by the Australian Foundation for Disability (AFFORD) as a mixed use project with 6 to 14 storey buildings, and one 25 storey building, containing commercial and retail from ground level to level 3 then residential in levels above. A 20 storey hotel is also included. BCM Property are managing the redevelopment on behalf of AFFORD.

This report has been prepared to provide a high level assessment of utility services for the proposed redevelopment (called Henry Lawson Centre) suitable for a planning proposal aimed at achieving approval for the redevelopment and obtaining a change of use to allow residential. The assessment is based on architectural plans (Revision X dated 29/11/2019) of the redevelopment prepared by Environa Studios.

The site is approximately 1.5Ha in size and has good access to transport and surrounding retail and falls within the jurisdiction of the Penrith City Council. Figure 1 shows the location and Figure 2 the site viewed from a high angle looking west.

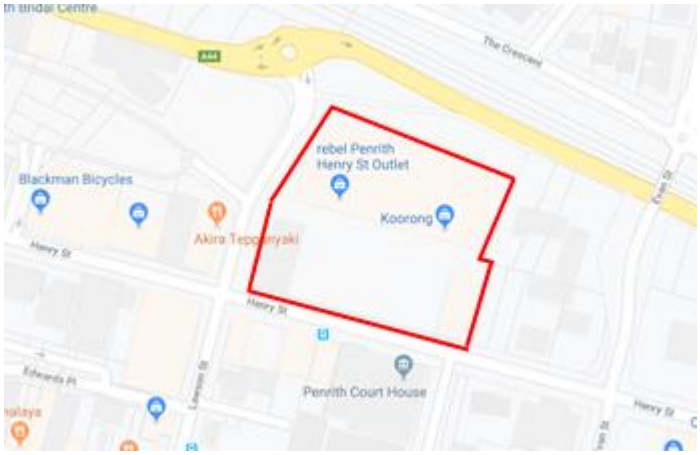


Figure 1 - Site location in Penrith (Google Maps, 2019)

Figure 2 - Development Site (Google Maps, 2019)

Figure 3 below shows an aerial image highlighting existing land uses and surrounding locality. The existing surrounding land uses are generally either ground level or 1 – 3 storey commercial mixed with open space car parks. These uses are clearly visible with site inspection.

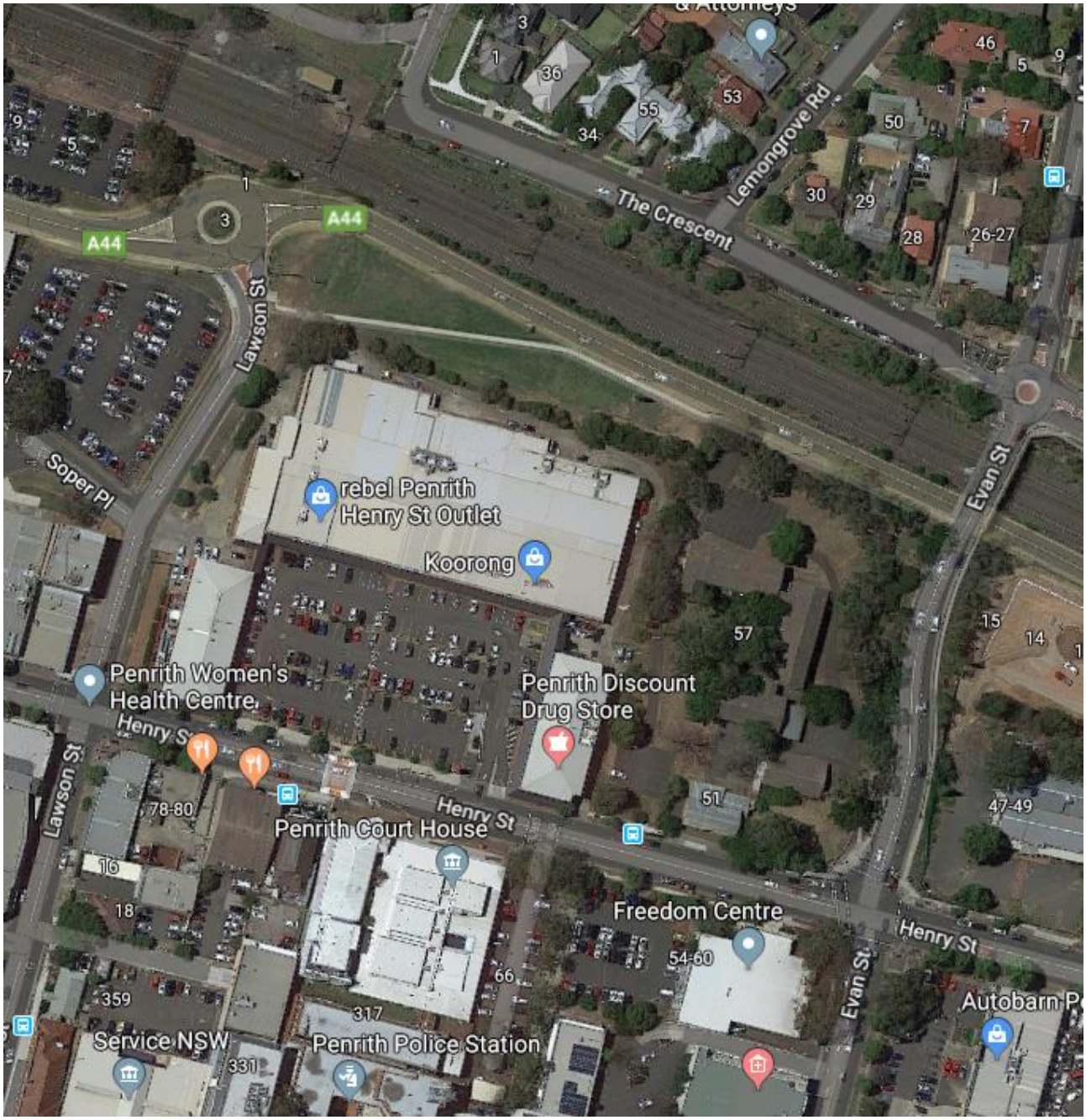


Figure 3 - Existing land uses and surrounding locality (Google Maps, 2019)

Figure 4 below shows an aerial image taken on 4 September 2019 with site boundary highlighted.

Figure 4 - Henry Lawson Centre site (Nearmap, 2019)

3. UTILITIES

The proposed Henry Lawson Centre is generally close to or adjoining a wide range of useful utilities. These utilities include potable water, sewer, electricity, National Broadband Network (NBN) and other telecommunication networks such as Telstra and Optus. The site also includes excellent mobile coverage from Telstra and Optus which is quite beneficial for this development. In addition, satellite services can also be utilised if required.

3.1. Sewer

There is an existing live 225mm dia gravity based sewer main through the middle of the site which is currently being utilised to service the site and neighbouring lots. The existing sewer main will require relocation as it will need to be installed within the stormwater easement to avoid clashes with the proposed basement carpark. The alignment of this main is shown in Figure 5 using an aerial image taken on 4 September 2019. The proposed stormwater easement is displayed in Figure 6.

Figure 5 - Existing sewer alignment through site (Nearmap, 2019)

This 225mm dia main through the site connects to a downstream smaller 150mm dia main further west then further downstream connects to a 225mm dia main before finally connecting to a 300mm dia main at Woodriff St area. It appears this section of 150mm dia may be an older line which has not yet been upgraded. The sizes and locations are shown in Figure 7.

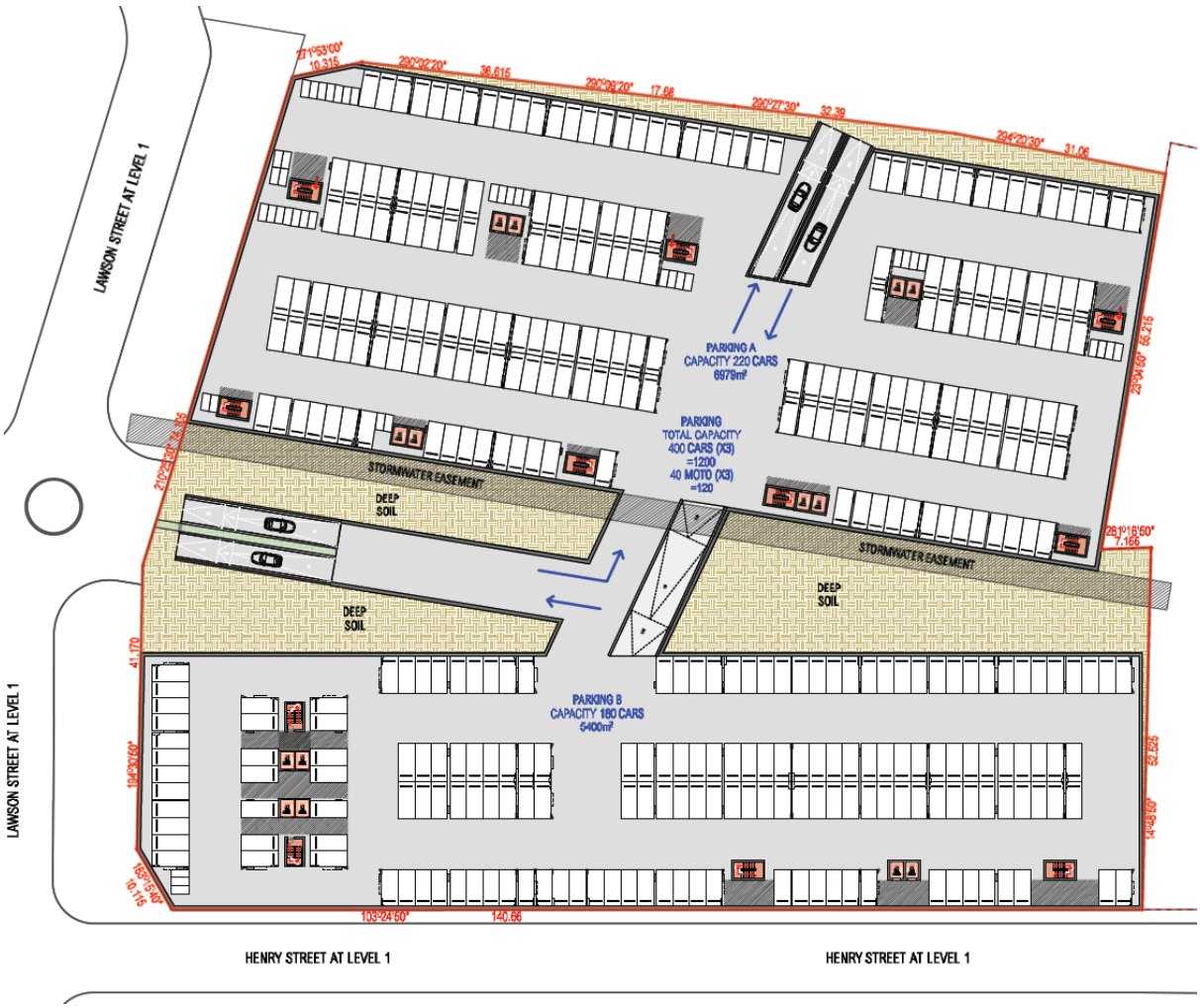


Figure 6 - Basement carpark and stormwater easement (Architectural Plan Rev X, 29/11/19)

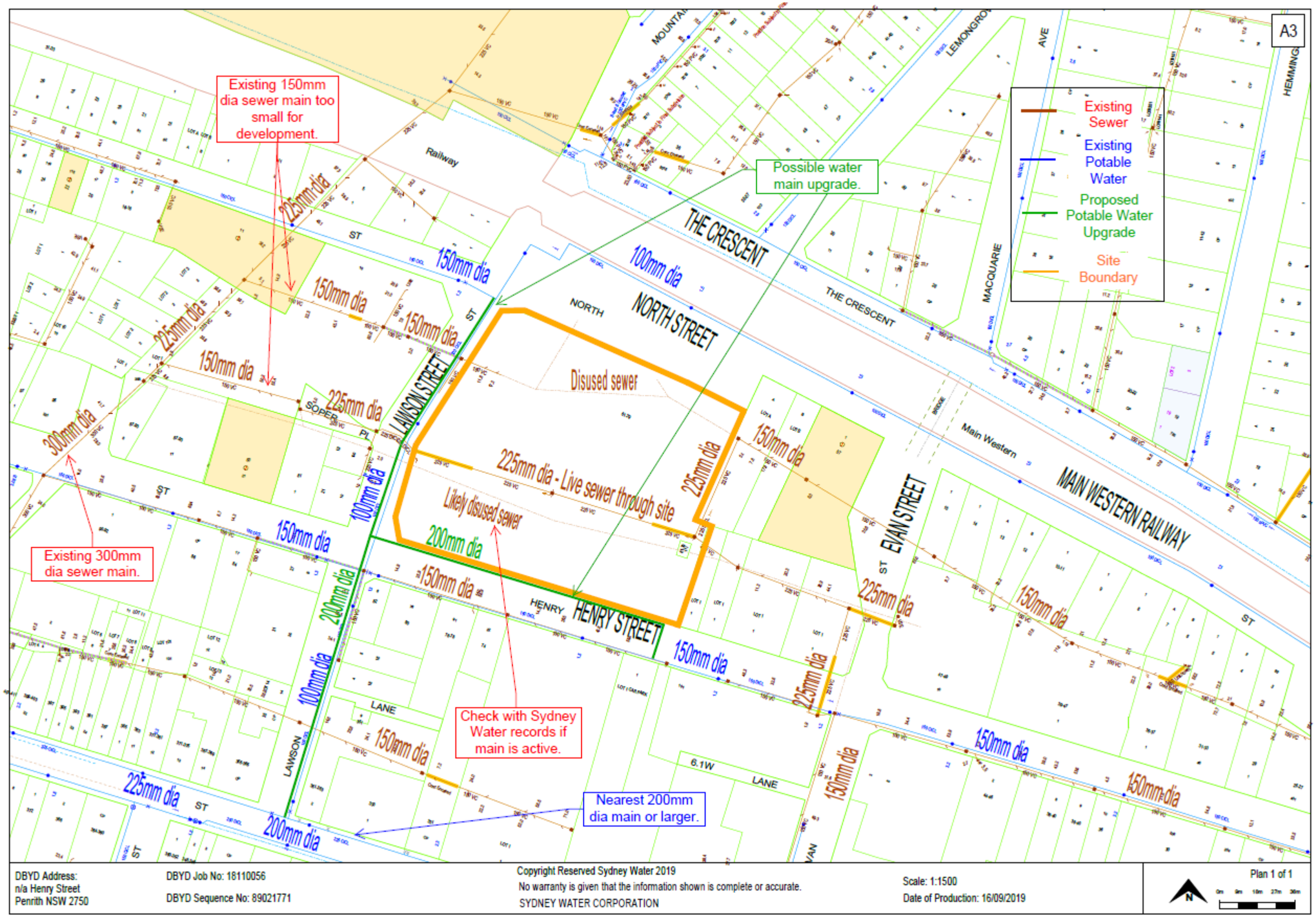


Figure 7 - Existing potable water and sewer, and proposed potable water servicing

Considering the scale of the proposed development and existing sewer sizes of 225mm then 150mm then 225mm dia there is a significant capacity problem which needs to be overcome. As part of the assessment of capacity required, a feasibility assessment application was made to Sydney Water via Water Servicing Coordinator, Qalchek. A copy of Sydney Water's response is provided in Appendix A.

In summary, Sydney Water have advised they are undertaking a Penrith Central Business District assessment and will produce a Local Area Scheme Plan around February 2020 for both water and wastewater. The outcomes of this Scheme Plan will be required to provide an assessment on sewer (and potable water) particular to the Henry Lawson Centre project.

In the interim to assist AFFORD and BCM Property, advice was obtained from Qalchek about the likely upgrade to sewer. It is expected that a sewer main of at least 300mm dia is required. The proposed upgrade would be to replace the gravity based combination of 225mm then 150mm then 225mm dia pipes with a 300mm dia pipe from the site to the existing 300mm dia main at Woodriff St via the alignment displayed in Figure 8. This replacement (upgrade) should provide sufficient capacity to service this development.

Additionally, there is currently a disused sewer main and an unconfirmed disused sewer main within the site. These sewer mains will need to be removed during construction for the underground carpark. The disused sewer mains are presented in Figure 7.

Figure 8 - Sewer alignment for new 300mm dia main (Nearmap, 2019)

3.2. Potable Water

The existing potable water supply lines in the area of the site currently service the site and neighbouring commercial and residential lots. Existing watermains (refer Figure 7) are only 100mm dia in Lawson St and North St. In Henry St there is a 150mm dia watermain in the southern road verge. These watermains are insufficient to service this development and upgrade capacity is required.

As part of the assessment of capacity required, a feasibility assessment application was made to Sydney Water via Water Servicing Coordinator, Qalchek. A copy of their response is provided in Appendix A.

In summary, Sydney Water have advised they are undertaking a Penrith Central Business District assessment and will produce a Local Area Scheme Plan around February 2020 for both water and wastewater. The outcomes of this Scheme Plan will be required to provide an assessment on potable water (and sewer) particular to the Henry Lawson Centre project. It could be possible that Sydney Water are able to provide confirmation of required water alignments and sizing around that time or slightly after.

In the interim to assist AFFORD and BCM Property, advice was obtained from Qalchek about the likely upgrade to watermains and their alignment. The nearest watermain with potential capacity is located in High St which is a 225mm dia main. The existing 100mm dia main in Lawson St would be replaced with a 200mm dia main in most likely the same location/alignment on the eastern side and connected to the 225mm main in High St.

To supplement supply there would also need to be a connection from the 150mm dia main in Henry St. These upgrades are shown in Figure 7 and to assist with clarity relative to the physical site are also shown in Figure 9 using aerial imagery from Nearmap. It should be noted however, that Sydney Water might have slightly different upgrade plans based on the broader Penrith central business district and area needs.

All upgrades are feasible though it is possible that the new 200mm dia watermain along Lawson St might need to be located on the western side due to practicalties of constructing a new watermain whilst retaining existing supply plus consideration of available space relative to other utilities. Should this happen a connection across Lawson St to the site would then be provided.

Figure 9 - Watermains servicing (Nearmap, 2019)

3.3. Electricity

With electrical servicing there are two entities that require consideration for the development namely Endeavour Energy for supply and Transgrid for protection of their assets.

3.3.1 Endeavour Energy and Supply Requirements

To provide an electrical servicing assessment, assistance was obtained from Powerline Design being a specialist in electricity infrastructure. Their electrical report is contained in Appendix B. The key items copied from their report are copied below in this utilities report. There are other considerations with electrical servicing and hence the report from Powerline Design needs to be considered in entirety for project development. Their guidance is as follows.

The current planning proposal for the mixed-use development of 61-79 Henry St, Penrith is planned to be developed in 4 separate stages as per the below extract from design plans from Environa Studio.

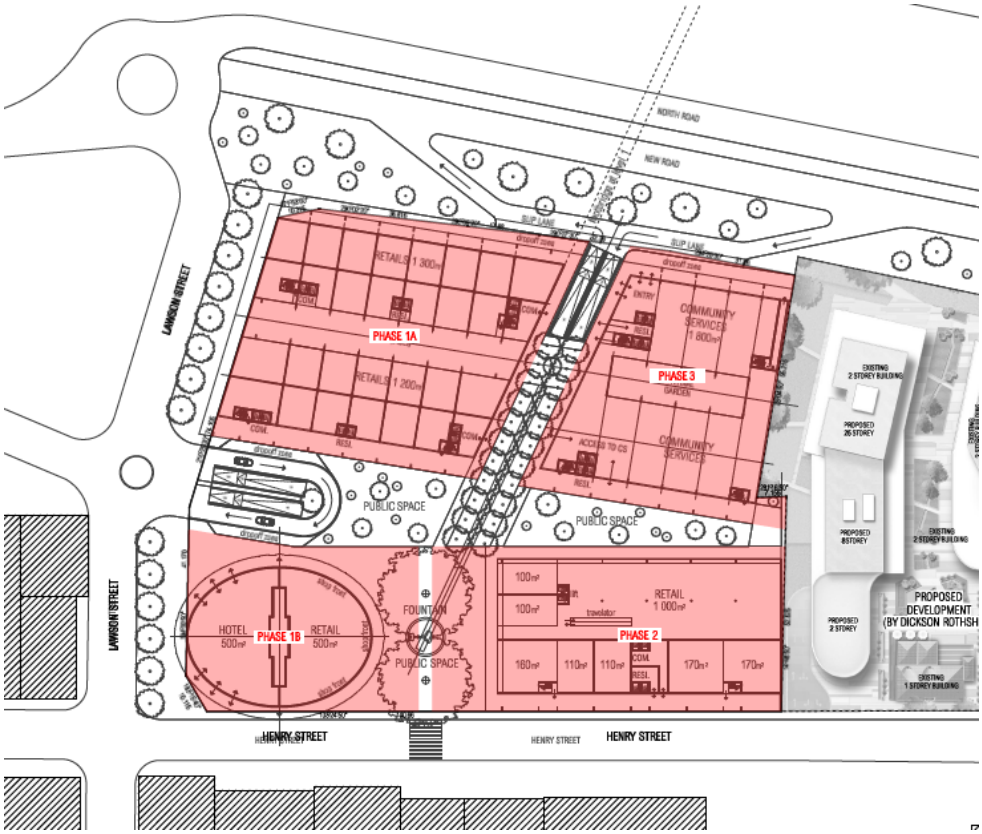


Figure 10 - Development Staging (Architectural Plan Rev X, 29/11/19)

The first stage that is expected to be constructed is the mixed-use retail and residential building designated PHASE 1A. This is located on the north west corner of the development and is estimated to have a maximum demand of approximately 1100 kVA from the proposed mix of retail, commercial and residential areas. The estimated maximum demand of this building would require a 1500kVA pad mount substation be installed adjacent to the building. A step-down transformer located within the pad mount substation will be the point of supply. This building is expected to require supply connection to be made available in 2022.

The second stage is designated PHASE 1B and is planned to be a hotel and retail building on the corner of the Lawson & Henry Street intersection [3]. This building is estimated to have a maximum demand of approximately 1800 kVA from the proposed mix of retail, commercial and residential areas. This estimated maximum demand would require multiple transformers to be installed to supply this building, an indoor substation could be constructed within the building (subject to Endeavour Energy's approval). Alternatively, two (2) 1000kVA pad mount substations installed beside the building could provide supply. A step-down transformer located within the pad mount substation will be the point of supply. This building is expected to require supply connection to be made available in 2022.

The third stage is designated PHASE 2 and is planned to be a retail, commercial and residential building on the south east corner of the lot [3]. This building is estimated to have a maximum demand of approximately 1600kVA from the proposed mix of retail, commercial and residential areas. This estimated maximum

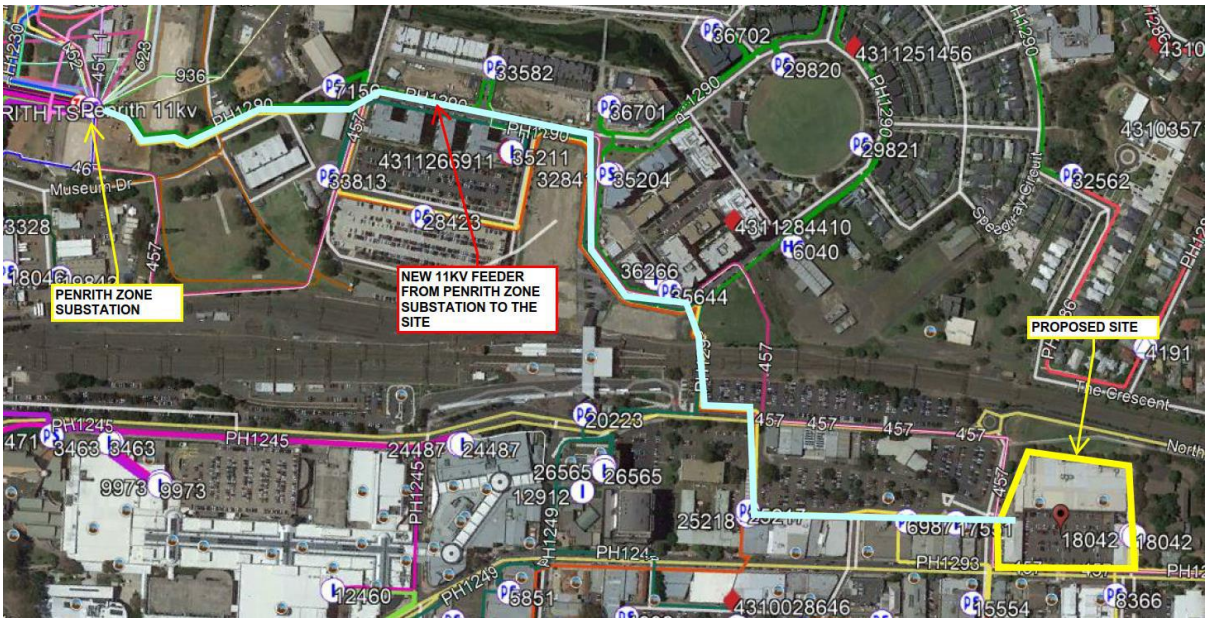
demand would require multiple transformers to be installed to supply this building, an indoor substation could be constructed within the building (subject to Endeavour Energy's approval). Alternatively, two (2) 1000kVA pad mount substations installed adjacent to the building. A step-down transformer located within the pad mount substation will be the point of supply. This building is expected to require supply connection to be made available in 2023.

The fourth stage is designated PHASE 3 and is planned to be a mixed-use building located on the north east corner of the development. This building is expected to contain areas for community services and residential units [3]. The building is estimated to have a maximum demand of approximately 540kVA from the proposed mix of community services and residential areas. This building is expected to require supply connection to be made available in 2024.

A total load of approximately 5000kVA will be required to be supplied at completion of the whole development under Endeavour Energy's current standards

3.3.2 Endeavour Energy distribution assets - 11kV Feeder

Endeavour Energy have indicated that a new 11kV high voltage feeder will need to be reticulated approximately 1.5km from Penrith Zone Substation to provide supply to the development. This would need to be installed prior to the commissioning of the first stage. The proposed route is shown below in Figure 13.



New feeder line

Figure 11 - 11kV feeder proposed route

An alternative connection will be required and an adjacent 11KV feeder will need to be extended to the development for backup and redundancy. This is envisaged to be achieved by extending the existing 11kV high voltage feeder PH1290 'GLEBE PL' to the development from Lord Sheffield Circuit. The proposed route is shown below in Figure 12.

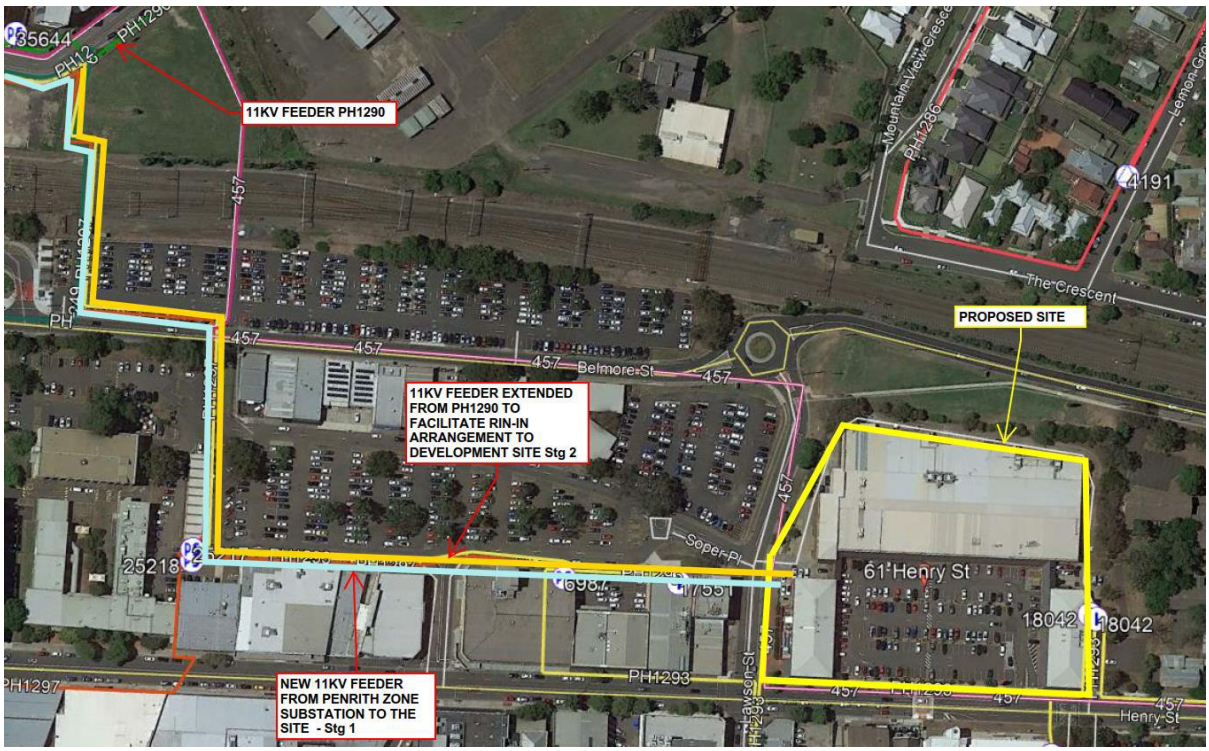


Figure 12 - 11kV feeder backup proposed route

3.3.3 Endeavour Energy transmission assets

The overhead 33kV transmission feeder 457 'PENRITH TRANSMISSION SUBSTATION & KINGSWOOD ZONE SUBSTATION TO CLAREMONT MEADOWS ZONE SUBSTATION passes by the lot on its western and southern boundaries of the development. This transmission feeder provides a 33kV high Voltage connection between Penrith, Kingswood and Claremont Meadows Zone Substations. The 33kV transmission feeder may require relocation or undergrounding past the development.

If the 33kV overhead transmission feeder is not reticulated underground, the proximity of the conductors to the building must be taken into consideration during the buildings design.

3.3.4 400V Low Voltage Network

Endeavour Energy will require a nominal 400V 3 phase Low Voltage network to be established in order to provide points of supply for each of the buildings of the proposed development. Pad mount substations will be installed to supply Low Voltage to the development, where required or economically feasible indoor substations will be installed.

3.3.5 Transgrid

Transgrid information was obtained by JWP in consultation with Transgrid.

Transgrid high voltage network communication cables are within the vicinity of the Henry Lawson Centre development. With locations and setup of high voltage services from Endeavour Energy as part of the development, safe and compliant earthing design for these high voltage assets will need to be implemented to avoid influence on Transgrid communications. The locations of the Transgrid cables in relation to the development site is indicatively shown in Figures 13 and 14.

Figure 13 - Transgrid cables West of site

Figure 14 - Transgrid cables East of site

Site boundary

Existing Transgrid cables

3.4. Gas

The current gas supply in the neighbouring area southwest of the site is sufficient. At present a 110mm dia distribution main at 210 kPa pressure exists along Lawson St which appears ready for extension or connection to a development. Jemena could also consider replacing the existing 63mm dia 210 kPa main along Henry Street with an equivalent 110mm line. Existing mains are shown in Figure 15.

With combined capacity in Lawson St and Henry St there would be sufficient gas supply for the development subject to commercial assessment by Jemena. No impediment is seen for supply and connection would be easy.

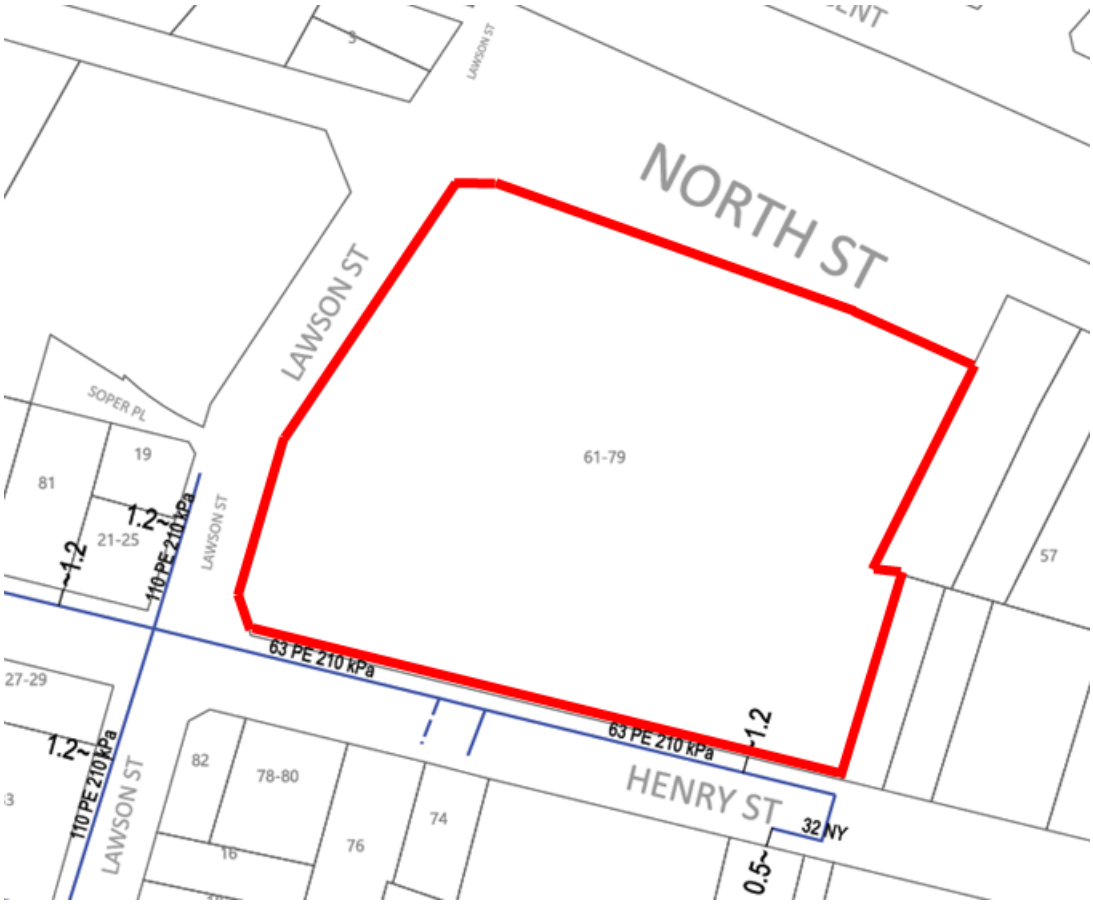


Figure 15 - Existing gas supply lines

3.5. Telecommunications

Telecommunication services by NBN, Telstra and Optus are available for connection to the proposed Henry Lawson Centre development. The site area contains many possible lead-in connection points which is an excellent opportunity for this development.

3.5.1 National Broadband Network

The NBN coverage from NBN Co is shown in Figure 16 and clearly indicates NBN services are available for the site. There does not seem to be any impediments on service connection to the Henry Lawson Centre development. Connection via optic fibre i.e. fibre to the premises is recommended.

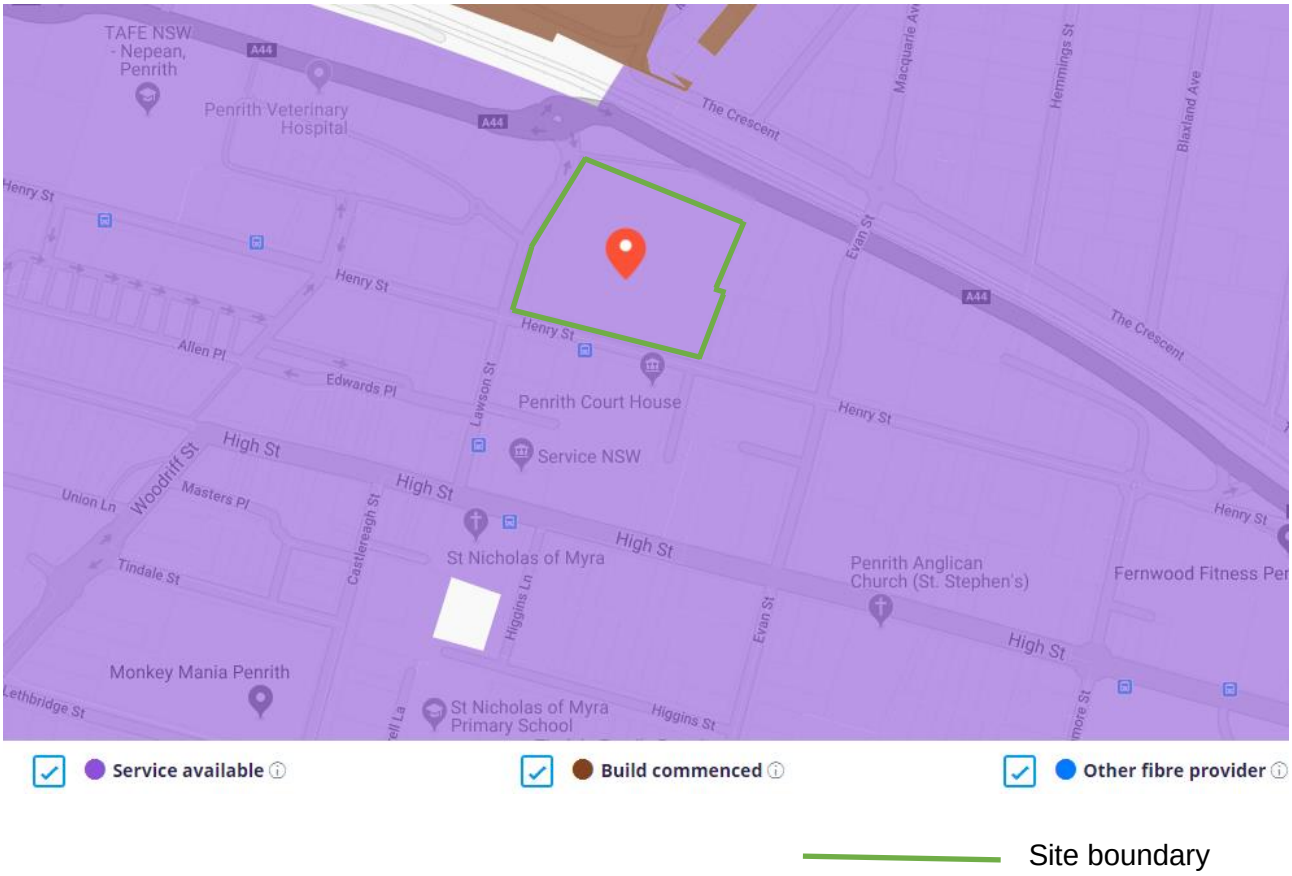


Figure 16 - Existing NBN services relative to the site (NBN, 2019)

Whilst NBN Co coverage indicates availability it is also worth identifying the location of cables to verify availability at a finer scale and likely lead in cables in roads from which service connections would occur. For this purpose Figure 17 below shows an aerial image from Nearmap at 4 September 2019 with site boundaries and NBN cable network alignments highlighted. Following this in Figure 18 is the schematic NBN network from Dial Before You Dig information patched together to form one image with the site and surrounding area.

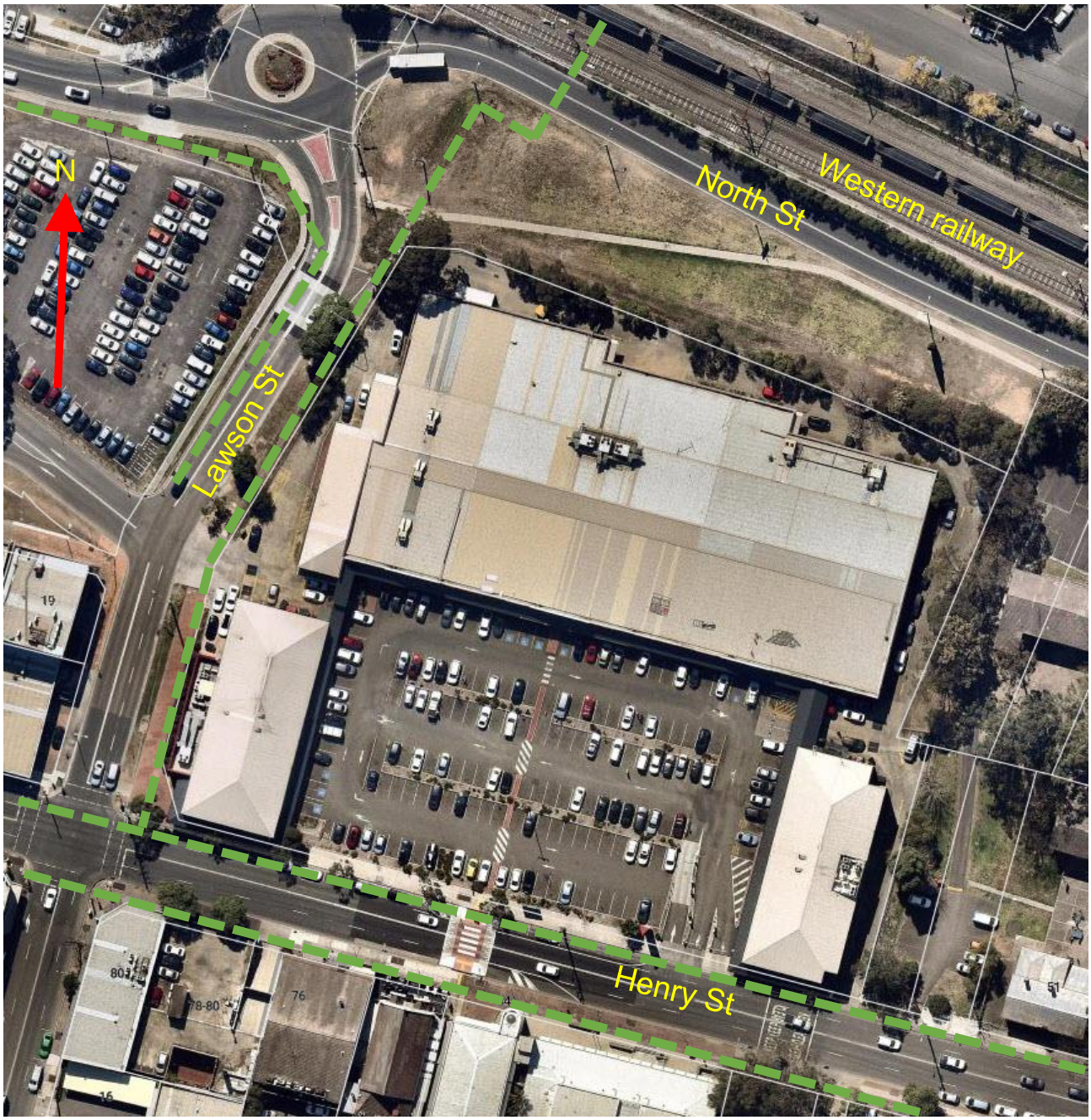


Figure 17 - Existing NBN cables relative to the site (Nearmap, 2019)

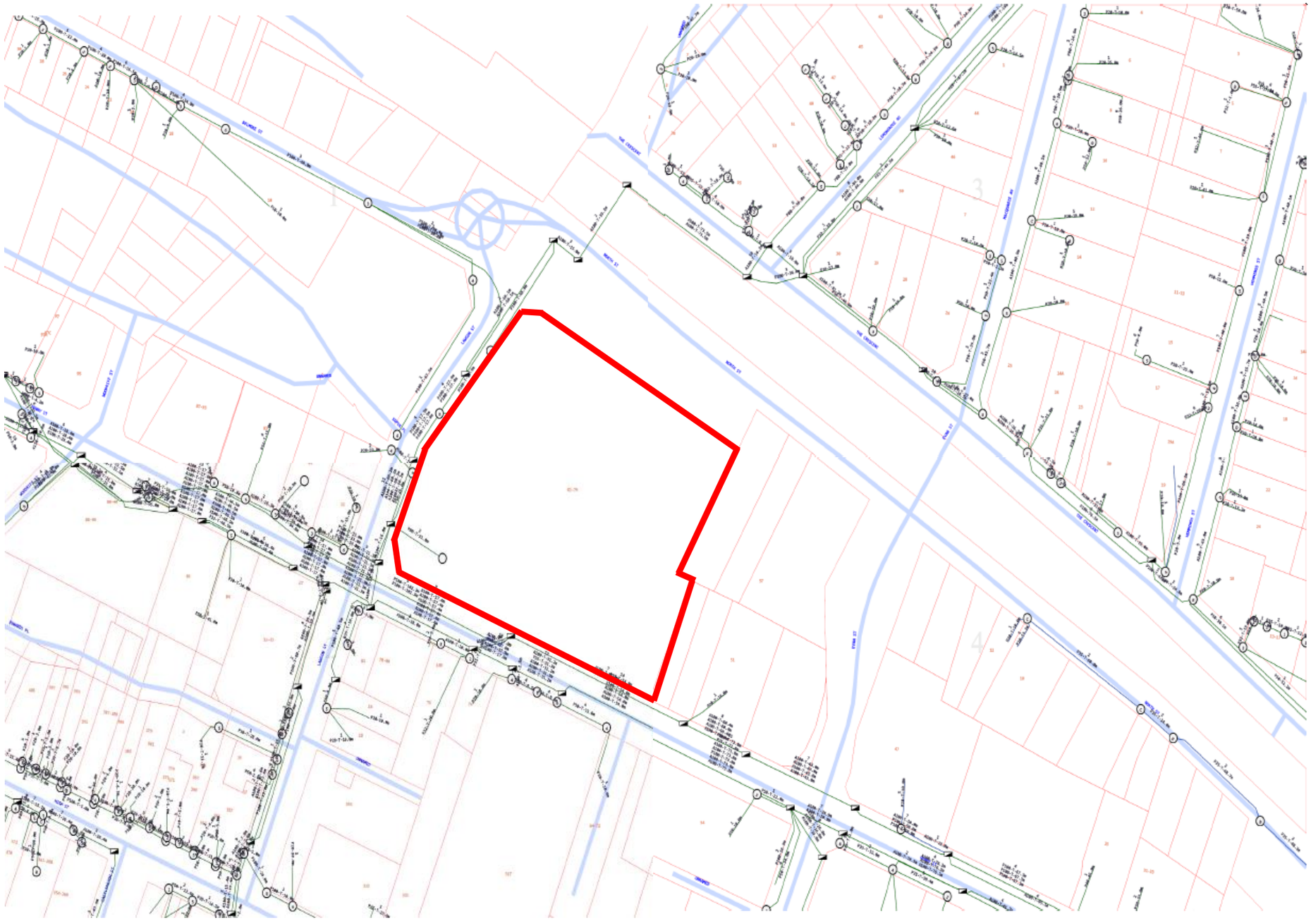


Figure 18 - Existing NBN cables relative to the site and surrounding area

3.5.2 Telstra

Telstra landlines are present within the development site and also along Henry St and Lawson St. These are shown in Figure 19 using Telstra's Dial Before You Dig information. Even though all the Telstra cables in this area are copper wire, the copper wire connections may be of some use. It should also be noted that Telstra optic fibre connection could be relatively easily provided from access points slightly further away from the site and there is a large Telstra exchange facility in Henry St at the corner of Woodriff St.

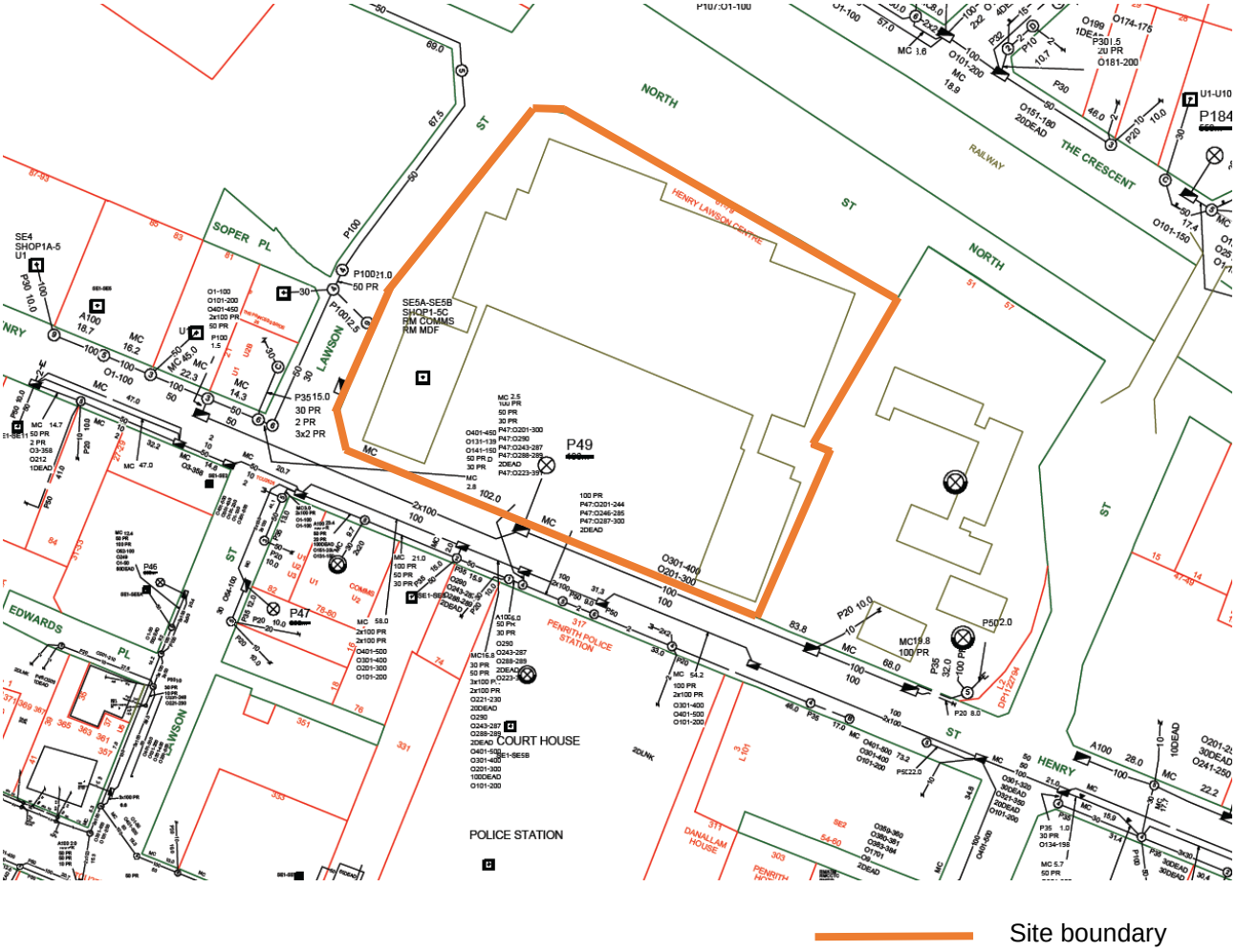


Figure 19 - Telstra services map

As Telstra network maps can be relatively difficult to interpret Figure 20 below shows an aerial image taken on 4 September 2019 with site boundaries and the Telstra network along roads highlighted.

Figure 20 - Telstra services relative to site aerial view (Nearmap, 2019)

3.5.3 Optus

Optus fibre cable is currently accessible outside the front of the site. As displayed in Figure 21 a connection from the existing cables on Henry Street is quite feasible to service this development. This connection will provide sufficient access to the Optus network.

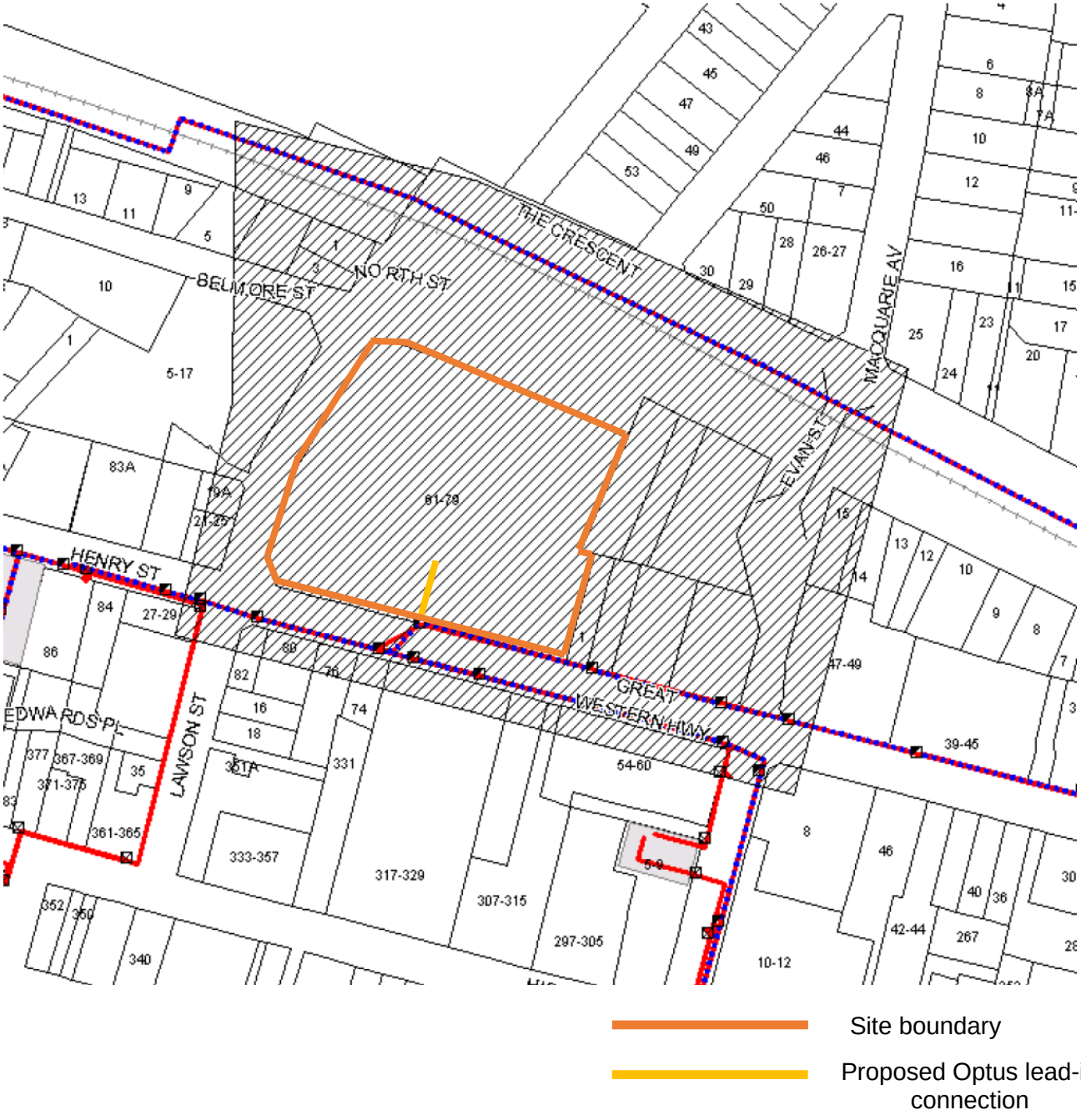


Figure 21 - Optus cable map

3.5.4 TPG

TPG is not actually provided in the vicinity of the site even though Dial Before You Dig shows one location where an asset is present which has been confirmed by phone discussion with TPG. This location is portrayed in Figure 22**.** This service presently cannot be utilised for this development, hence supplementary telecommunication networks such as NBN, Telstra and Optus will need to be utilised. It could be possible that TPG plan some future expansion of their network.

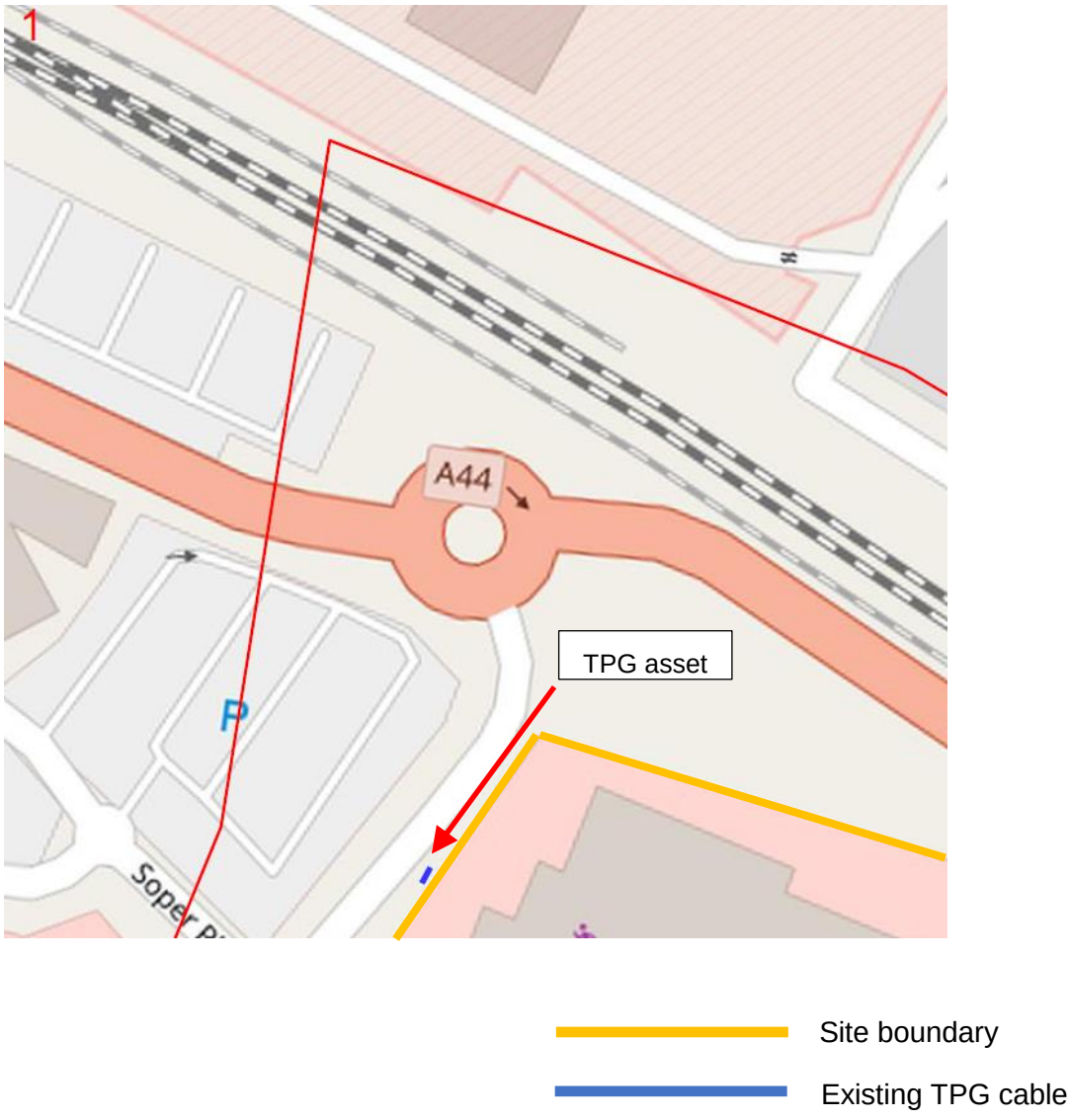


Figure 22 - TPG cable map

To help with understanding of the asset location the position is shown in Figure 23 using aerial imagery from Nearmap.

Figure 23 - TPG asset position map (Nearmap, 2019)

4. CONCLUSIONS

Overall, the Henry Lawson Centre development can be serviced effectively but some extra capacity implementation is required for water, sewer and electricity. Upgrade of sewer and water is needed and this requires some network changes which are yet to be confirmed with Sydney Water in February 2020 Sydney Water in February 2020 following completion of their Local Area Scheme Plan for the Penrith central business district. Indicative sizing and alignments expected have been provided within this utilities report through assistance from Water Servicing Coordinator, Qalchek.

Electrical servicing is feasible though a new 11 kV feeder which is required for a distance of 1.5km from Penrith Zone substation to the site as well as a backup 11 kV connection from a nearby location in Thornton. Powerline Design has provided the electrical servicing assessment and their electrical report is included in Appendix B to this overall utilities servicing report. The key items from electrical servicing are copied in this utilities report. There are other considerations with electrical servicing and hence the report from Powerline Design needs to be considered in entirety for project development.

No concerns are seen for telecommunications or gas as services are available with minimal undertaking.

Allowances for utilities with the planned stages of development can be determined once planning approval has been obtained though it should be expected that most of the utility upgrades would be in the first or second stages.

This report outlines the likely utility servicing availability and approaches for the Henry Lawson Centre development. Servicing approaches may be adjusted at any time, and will need confirmation by the respective utility authority before undertaking any utility design.

APPENDIX A – SYDNEY WATER RESPONSE

Case Number: 181727

27 November 2019

AUSTRALIAN FOUNDATION FOR DISABILITY
c/- QALCHEK PTY LTD

FEASIBILITY LETTER

Developer:	**AUSTRALIAN FOUNDATION FOR DISABILITY**
Your reference:	**PM 25009**
Development:	**Lot 1 DP771927 61-79 HENRY ST, Penrith**
Development Description:	**Proposed mixed use development consisting of Commercial/ Retail, Hotel and Residential towers.**
Your application date:	**30 October 2019**

Note: **Level 1 water restrictions are now in place**, which limits how and when water can be used outdoors. This can impact you and your contractors in the activities they need to undertake for this proposal.

Using water to suppress dust is not restricted, but this does mean that you/your contractors will need to apply for an exemption permit to use water for most outdoor uses including:

- Cleaning equipment and the exterior of new buildings
- Drilling and boring, and
- Batching concrete on-site

Fines for deliberate breaches of restriction rules apply from 1 September 2019.
For more information on the restrictions and for applying for an exemption, visit our web site at http://www.sydneywater.com.au/SW/water-the-environment/what-we-re-doing/water-restrictions/index.htm
The more water everyone saves, the longer we can stave off the progression to stricter restrictions or emergency measures.
Please provide this information to your contractors and delivery partners to inform them of their obligations.

Dear Applicant

This Feasibility Letter (Letter) is a guide only. It provides general information about what Sydney Water's requirements could be if you applied to us for a Section 73 Certificate (Certificate) for your proposed development. **The information is accurate at today's date only.**

If you obtain development consent for that development from your consent authority (this is usually your local Council) they will require you to apply to us for a Section 73 Certificate. You will need to submit a new application (and pay another application fee) to us for that Certificate by using your current or another Water Servicing Coordinator (Coordinator).

Sydney Water will then send you either a:

- Notice of Requirements (Notice) and Developer Works Deed (Deed) or
- Certificate.

These documents will be the definitive statement of Sydney Water's requirements.

There may be changes in Sydney Water's requirements between the issue dates of this Letter and the Notice or Certificate. The changes may be:

- if you change your proposed development eg the development description or the plan/ site layout, after today, the requirements in this Letter could change when you submit your new application; and

- if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from Sydney Water and to the extent that it is able, Sydney Water limits its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

What You Must Do To Get A Section 73 Certificate In The Future.

To get a Section 73 Certificate you must do the following things. You can also find out about this process by visiting www.sydneywater.com.au > Plumbing, building & developing > Developing > Land development.

1. **Obtain Development Consent from the consent authority for your development proposal.**

2. **Engage a Water Servicing Coordinator (Coordinator).**

   You must engage your current or another authorised Coordinator to manage the design and construction of works that you must provide, at your cost, to service your development. If you wish to engage another Coordinator (at any point in this process) you must write and tell Sydney Water.

   For a list of authorised Coordinators, either visit www.sydneywater.com.au > Plumbing, building & developing > Developing > Providers > Lists or call **13 20 92.**

   The Coordinator will be your point of contact with Sydney Water. They can answer most questions that you might have about the process and developer charges and can give you a quote or information about costs for services/works (including Sydney Water costs).

3. **Developer Works Deed**

   After the Coordinator has submitted your new application, they will receive the Sydney Water Notice and Developer Works Deed. You and your accredited Developer Infrastructure Providers (Providers) will need to sign and lodge both copies of the Deed with your nominated Coordinator. After Sydney Water has signed the documents, one copy will be returned to the Coordinator.

   The Deed sets out for this project:

   - your responsibilities;
   - Sydney Water's responsibilities; and
   - the Provider's responsibilities.

   You must do all the things that we ask you to do in that Deed. This is because your development does not have water and sewer services and you must construct and pay for the following works extensions under this Deed to provide these services.

   Note: The Coordinator must be fully authorised by us for the whole time of the agreement.

4. Water and Sewer Works

4.1 Water

Your development must have a frontage to a water main that is the right size and can be used for connection.

Sydney Water has assessed your application and found that:

Please be advised that Sydney Water are undertaking a Penrith CBD assessment and will produce a Local Area Scheme Plan approximately in Feb 2020 for both water and wastewater. Sydney Water will aim to provide an assessment on the Potable water sizing requirements by then.

4.2 Sewer

Your development must have a sewer main that is the right size and can be used for connection. That sewer must also have a connection point within your development's boundaries.

Sydney Water has assessed your application and found that:

Please be advised that Sydney Water are undertaking a Penrith CBD assessment and will produce a Local Area Scheme Plan approximately in Feb 2020 for both water and wastewater. Sydney Water will aim to provide an assessment on the Sewer sizing requirements by then.

5. Ancillary Matters

5.1 Asset adjustments

After Sydney Water issues this Notice (and more detailed designs are available), Sydney Water may require that the water main/sewer main/stormwater located in the footway/your property needs to be adjusted/deviated. If this happens, you will need to do this work as well as the extension we have detailed above at your cost. The work must meet the conditions of this Notice and you will need to complete it **before we can issue the Certificate**. Sydney Water will need to see the completed designs for the work and we will require you to lodge a security. The security will be refunded once the work is completed.

5.2 Entry onto neighbouring property

If you need to enter a neighbouring property, you must have the written permission of the relevant property owners and tenants. You must use Sydney Water's **Permission to Enter** form(s) for this. You can get copies of these forms from your Coordinator or the Sydney Water website. Your Coordinator can also negotiate on your behalf. Please make sure that

you address all the items on the form(s) including payment of compensation and whether there are other ways of designing and constructing that could avoid or reduce their impacts. You will be responsible for all costs of mediation involved in resolving any disputes. Please allow enough time for entry issues to be resolved.

5.3 Costs

Construction of these **future** works will require you to pay project management, survey, design and construction costs **directly to your suppliers**. Additional costs payable to Sydney Water may include:

- water main shutdown and disinfection;
- connection of new water mains to Sydney Water system(s);
- design and construction audit fees;
- contract administration, Operations Area Charge & Customer Redress prior to project finalisation;
- creation or alteration of easements etc; and
- water usage charges where water has been supplied for building activity purposes prior to disinfection of a newly constructed water main.

Note: Payment for any Goods and Services (including Customer Redress) provided by Sydney Water will be required prior to the issue of the Section 73 Certificate or release of the Bank Guarantee or Cash Bond.

Your Coordinator can tell you about these costs.

6. Approval of your Building Plans

You must have your building plans approved **before the Certificate can be issued. Building construction work MUST NOT commence until Sydney Water has granted approval.** Approval is needed because construction/building works may affect Sydney Water's assets (e.g. water and sewer mains).

Your Coordinator can tell you about the approval process including:

- Your provision, if required, of a "Services Protection Report" (also known as a "pegout"). This is needed to check whether the building and engineering plans show accurately where Sydney Water's assets are located in relation to your proposed building work. Your Coordinator will then either approve the plans or make requirements to protect those assets before approving the plans;
- Possible requirements;
- Costs; and
- Timeframes.

You can also find information about this process (including technical specifications) if you either:

- visit www.sydneywater.com.au > Plumbing, building & developing > Building > Building

over or next to assets. Here you can find Sydney Water's *Technical guidelines - Building over and adjacent to pipe assets*; or

- call 13 20 92.

Notes:

- **The Certificate will not be issued until the plans have been approved and, if required, Sydney Water's assets are altered or deviated;**
- **You can only remove, deviate or replace any of Sydney Water's pipes using temporary pipework if you have written approval from Sydney Water's Urban Growth Business. You must engage your Coordinator to arrange this approval; and**
- **You must obtain our written approval before you do any work on Sydney Water's systems. Sydney Water will take action to have work stopped on the site if you do not have that approval. We will apply Section 44 of the *Sydney Water Act 1994*.**

7. **Special Requirements**

Multi-level individual metering requirements

Your development must either allow for or provide individual metering. This means that you must:

1. comply at all times and in all respects with the requirements of Sydney Water's "*Multi-level Individual Metering Guide*" (version 6 dated 1 July 2015);

2. provide and install plumbing and space for individual metering in accordance with Sydney Water's "*Multi-level Individual Metering Guide*";

3. if and when you implement a strata/ stratum plan (or strata/ stratum subdivide) you must:
    a. engage an Accredited Metering Supplier ("**AMS**") to provide individual metering in accordance with the "*Multi-level Individual Metering Guide"* and meet the cost of the meters and metering system;
    b. transfer the meters and metering system to Sydney Water once the Testing Certificate has been issued by Sydney Water to the AMS and the AMS has confirmed that payment for the meters and metering system has been paid in full.

Before the Section 73 Certificate can be issued, you will be required to sign an undertaking to show that you understand and accept these metering requirements and associated costs.

Visit www.sydneywater.com.au > Plumbing, Building & Developing > Plumbing > Meters & metered standpipes to see the *Multi-level individual metering guide* and find out more.

OTHER THINGS YOU MAY NEED TO DO

Shown below are other things you need to do that are NOT a requirement for the Certificate. They may well be a requirement of Sydney Water in the future because of the impact of your development on our assets. You must read them before you go any further.

Disused Sewerage Service Sealing

Please do not forget that you must pay to disconnect all disused private sewerage services and seal them at the point of connection to a Sydney Water sewer main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed drainer. The licensed drainer must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Soffit Requirements

Please be aware that floor levels must be able to meet Sydney Water's soffit requirements for property connection and drainage.

Requirements for Business Customers for Commercial and Industrial Property Developments

If this property is to be developed for Industrial or Commercial operations, it may need to meet the following requirements:

Trade Wastewater Requirements

If this development is going to generate trade wastewater, the property owner must submit an application requesting permission to discharge trade wastewater to Sydney Water's sewerage system. You must wait for approval of this permit before any business activities can commence.

The permit application should be emailed to Sydney Water's Business Customer Services at businesscustomers@sydneywater.com.au

It is illegal to discharge Trade Wastewater into the Sydney Water sewerage system without permission.

A **Boundary Trap** is required for all developments that discharge trade wastewater where arrestors and special units are installed for trade wastewater pre-treatment.

If the property development is for Industrial operations, the wastewater may discharge into a sewerage area that is subject to wastewater reuse. Find out from Business Customer Services if this is applicable to your development.

Backflow Prevention Requirements

Backflow is when there is unintentional flow of water in the wrong direction from a potentially

polluted source into the drinking water supply.

All properties connected to Sydney Water's supply must install a testable **Backflow Prevention Containment Device** appropriate to the property's hazard rating. Property with a high or medium hazard rating must have the backflow prevention containment device tested annually. Properties identified as having a low hazard rating must install a non-testable device, as a minimum.

Separate hydrant and sprinkler fire services on non-residential properties, require the installation of a testable double check detector assembly. The device is to be located at the boundary of the property.

Before you install a backflow prevention device:

1. Get your hydraulic consultant or plumber to check the available water pressure versus the property's required pressure and flow requirements.
2. Conduct a site assessment to confirm the hazard rating of the property and its services. Contact PIAS at NSW Fair Trading on **1300 889 099**.

For installation you will need to engage a licensed plumber with backflow accreditation who can be found on the Sydney Water website:
http://www.sydneywater.com.au/Plumbing/BackflowPrevention/

Water Efficiency Recommendations

Water is our most precious resource and every customer can play a role in its conservation. By working together with Sydney Water, business customers are able to reduce their water consumption. This will help your business save money, improve productivity and protect the environment.

Some water efficiency measures that can be easily implemented in your business are:

- Install water efficiency fixtures to help increase your water efficiency, refer to WELS (Water Efficiency Labelling and Standards (WELS) Scheme, http:// www.waterrating.gov.au/
- Consider installing rainwater tanks to capture rainwater runoff, and reusing it, where cost effective. Refer to http://www.sydneywater.com.au/Water4Life/InYourBusiness/ RWTCalculator.cfm
- Install water-monitoring devices on your meter to identify water usage patterns and leaks.
- Develop a water efficiency plan for your business.

It is cheaper to install water efficiency appliances while you are developing than retrofitting them later.

Contingency Plan Recommendations

Under Sydney Water's customer contract Sydney Water aims to provide Business Customers with a continuous supply of clean water at a minimum pressure of 15meters head at the main tap. This is equivalent to 146.8kpa or 21.29psi to meet reasonable business usage needs.

Sometimes Sydney Water may need to interrupt, postpone or limit the supply of water services to your property for maintenance or other reasons. These interruptions can be planned or unplanned.

Water supply is critical to some businesses and Sydney Water will treat vulnerable customers, such as hospitals, as a high priority.

Have you thought about a **contingency plan** for your business? Your Business Customer Representative will help you to develop a plan that is tailored to your business and minimises productivity losses in the event of a water service disruption.

For further information please visit the Sydney Water website at: http:// www.sydneywater.com.au/OurSystemsandOperations/TradeWaste/ or contact Business Customer Services on **1300 985 227** or businesscustomers@sydneywater.com.au

Fire Fighting

Definition of fire fighting systems is the responsibility of the developer and is not part of the Section 73 process. It is recommended that a consultant should advise the developer regarding the fire fighting flow of the development and the ability of Sydney Water's system to provide that flow in an emergency. Sydney Water's Operating Licence directs that Sydney Water's mains are only required to provide domestic supply at a minimum pressure of 15 m head.

A report supplying modelled pressures called the Statement of Available pressure can be purchased through Sydney Water Tap in™ and may be of some assistance when defining the fire fighting system. The Statement of Available pressure, may advise flow limits that relate to system capacity or diameter of the main and pressure limits according to pressure management initiatives. If mains are required for fire fighting purposes, the mains shall be arranged through the water main extension process and not the Section 73 process.

Large Water Service Connection

A water main will be available, once you have completed your drinking water main construction to provide your development with a domestic supply. The size of your development means that you will need a connection larger than the standard domestic 20 mm size.

To get approval for your connection, you will need to lodge an application with Sydney Water Tap in™. You, or your hydraulic consultant, may need to supply the following:

- A plan of the hydraulic layout;
- A list of all the fixtures/fittings within the property;
- A copy of the fireflow pressure inquiry issued by Sydney Water;
- A pump application form (if a pump is required);
- All pump details (if a pump is required).

You will have to pay an application fee.

Sydney Water does not consider whether a water main is adequate for fire fighting purposes for your development. We cannot guarantee that this water supply will meet your Council's fire fighting requirements. The Council and your hydraulic consultant can help.

Disused Water Service Sealing

You must pay to disconnect all disused private water services and seal them at the point of connection to a Sydney Water water main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed plumber. The licensed plumber must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Other fees and requirements

The requirements in this Notice relate to your Certificate application only. Sydney Water may be involved with other aspects of your development and there may be other fees or requirements. These include:

- plumbing and drainage inspection costs;
- the installation of backflow prevention devices;
- trade waste requirements;
- large water connections and
- council fire fighting requirements. (It will help you to know what the fire fighting requirements are for your development as soon as possible. Your hydraulic consultant can help you here.)

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from Sydney Water and to the extent that it is able, Sydney Water limits its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

END

APPENDIX B - ELECTRICAL SERVICING REPORT

powerlinedesign

Accredited Level 3 Service Provider NSW – 2486

61-79 HENRY ST, PENRITH INFRASTRUCTURE REPORT

Report Prepared For:	Proponent: J. Wyndham Prince Contact: Kevin Songberg Ph: 02 4720 3315
Location:	Henry Lawson Centre 61-79 Henry St, Penrith NSW Lot 1 DP771927
Supply Authority:	Endeavour Energy
Technical Review Reference:	ENL3570
Report Prepared By:	Nicholas Anderson
Date:	10 December 2019
Reviewed By:	Michael Baranowski
Reference No:	PLD3436
Version:	1.0

Table of Contents

1 Introduction

This report has been commissioned by J. Wyndham Prince to investigate the requirements to provide electricity supply to the proposed mixed-use development of the Henry Lawson Centre at 61-79 Henry Street, Penrith - Lot 1 DP771927.

This shall involve a detailed assessment of Endeavour Energy's network assets in the area as well as a technical review performed by Endeavour Energy to assess the distribution network's available capacity.

This report will also discuss Endeavour Energy's requirements for new infrastructure to provide supply from nearby zone substations and transmission assets. Also, a brief discussion of the potential environmental issues that will need to be addressed during the design phase of the electrical works.

2 Location

The proposed mixed-use development of 61-79 Henry Street, Penrith - Lot 1 DP771927 is located approximately 50kms west of the Sydney CBD, approximately 0.6kms east of the Penrith Railway Station bordering the southern side of the Main Western Railway.

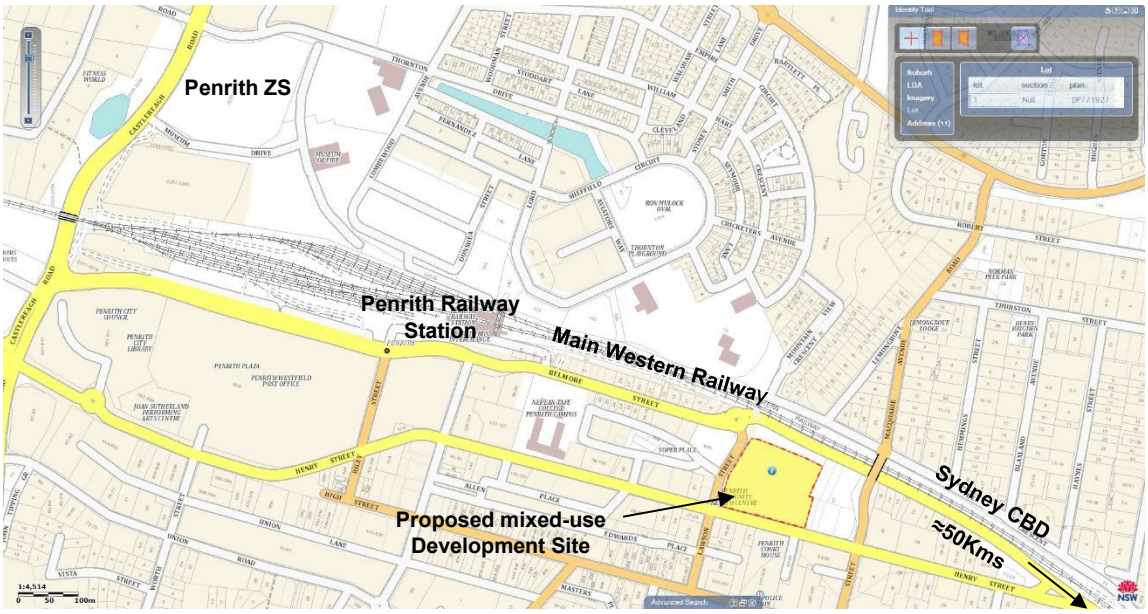


FIGURE 1 - LOCALITY OF PROPOSED MIXED-USE DEVELOPMENT SITE [1]

The proposed development is within the land parcel: Lot 1 DP 771927, located within the Penrith City Council LGA and is zoned B3 – Commercial Core due to its proximity to the Penrith CBD. The surrounding lots to the south, east and west are also zoned B3 – Commercial Core. The lot to the north is zoned SP2 – Special Purpose zone which is part of the Main Western Railway. R2 – Low Density Residential, is located to the north of the site on the opposite side of the Main Western Railway. [2]

3 Electricity supply requirements for the mixed-use development of 61-79 Henry St, Penrith.

The current planning proposal for the mixed-use development of 61-79 Henry St, Penrith is planned to be developed in 4 separate stages [3].

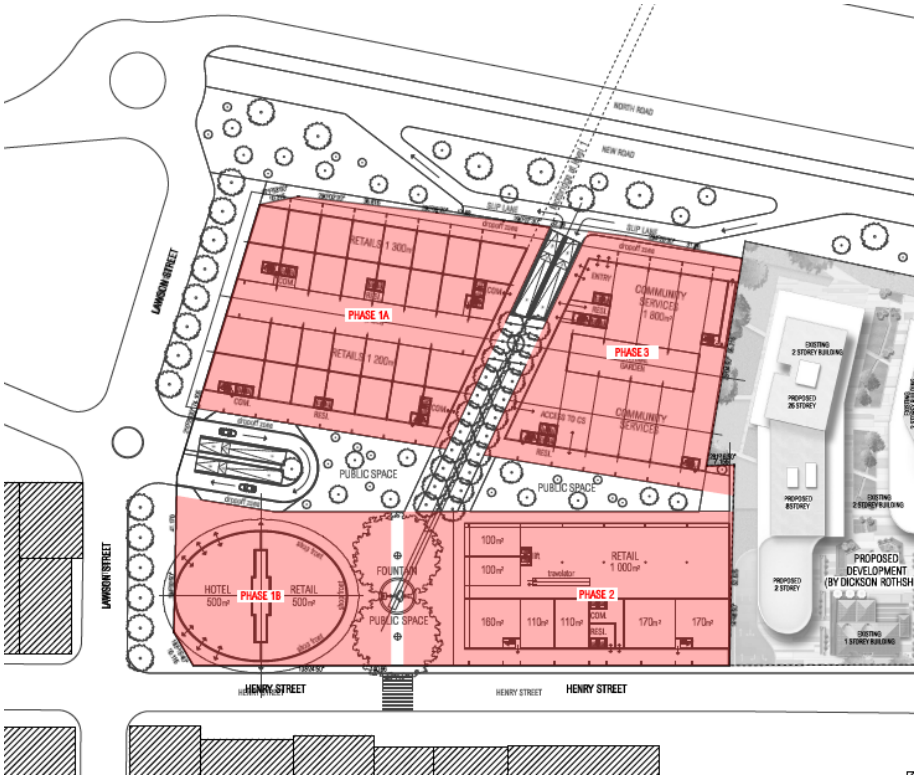


FIGURE 2 - STAGING - URBAN DESIGN MIXED USED PROJECT [3]

The first stage that is expected to be constructed is the mixed-use retail and residential building designated PHASE 1A. This is located on the north west corner of the development and is estimated to have a maximum demand of approximately 1100 kVA from the proposed mix of retail, commercial and residential areas. The estimated maximum demand of this building would require a 1500kVA pad mount substation be installed adjacent to the building. A low voltage circuit breaker located within the pad mount substation will be the point of supply. This building is expected to require supply connection to be made available in 2022 [4].

The second stage is designated PHASE 1B and is planned to be a hotel and retail building on the corner of the Lawson & Henry Street intersection [3]. This building is estimated to have a maximum demand of approximately 1800 kVA from the proposed mix of retail, commercial and residential areas. This estimated maximum

demand would require multiple transformers to be installed to supply this building, an indoor substation could be constructed within the building (subject to Endeavour Energy's approval). Alternatively, two (2) 1000kVA pad mount substations installed beside the building could provide supply. A low voltage circuit breaker located within the pad mount substation will be the point of supply. This building is expected to require supply connection to be made available in 2022 [4].

The third stage is designated PHASE 2 and is planned to be a retail, commercial and residential building on the south east corner of the lot [3]. This building is estimated to have a maximum demand of approximately 1600kVA from the proposed mix of retail, commercial and residential areas. This estimated maximum demand would require multiple transformers to be installed to supply this building, an indoor substation could be constructed within the building (subject to Endeavour Energy's approval). Alternatively, two (2) 1000kVA pad mount substations installed adjacent to the building. A low voltage circuit breaker located within the pad mount substation will be the point of supply. This building is expected to require supply connection to be made available in 2023 [4].

The fourth stage is designated PHASE 3 and is planned to be a mixed-use building located on the north east corner of the development. This building is expected to contain areas for community services and residential units [3]. The building is estimated to have a maximum demand of approximately 540kVA from the proposed mix of community services and residential areas. This building is expected to require supply connection to be made available in 2024 [4].

The supply to the development has been reviewed based on the Planning Proposal provided by J. Wyndham Prince [3]. Maximum demand calculations have been calculated in accordance with AS3000 and Endeavour Energy standards. These loads do not include supply to outdoor lighting and auxiliary services for the arcades and public spaces as no information has been provided to allow for calculation of these loads. A total load of approximately 5000kVA will be required to be supplied at completion of the whole development under Endeavour Energy's current standards.

4 Network Assessment

4.1 Current Endeavour Energy Network Assets

4.1.1 Distribution Assets

The existing Henry Lawson Centre is currently supplied from indoor substation 18042 'HENRY ST'. This substation contains two (2) 750 kVA transformers located within the building in the south east corner of Lot 1 DP771927. Indoor substation 18042 is supplied from 11kV high voltage feeder PH1293 'SOPER PL & CAP BANK 5A' from Penrith Zone Substation.

PHOTO 1 - INDOOR SUBSTATION 18042

The indoor substation currently supplies the commercial premises located within the lot, and in addition two (2) low voltage feeders also service Henry Street. This indoor substation will require removal as part of a project to supply a stage of the development or an asset relocation to remove these assets to allow demolition of the building.

Endeavour Energy have indicated that a new 11kV high voltage feeder will need to be reticulated approximately 1.5km from Penrith Zone Substation to provide supply to the development. This would need to be installed prior to the commissioning of the first stage [5].

An alternative connection will be required and an adjacent 11KV feeder will need to be extended to the development for backup and redundancy. This is envisaged to

be achieved by extending the existing 11kV high voltage feeder PH1290 'GLEBE PL' to the development from Lord Sheffield Circuit.

4.1.2 Transmission Assets

The overhead 33kV transmission feeder 457 'PENRITH TRANSMISSION SUBSTATION & KINGSWOOD ZONE SUBSTATION TO CLAREMONT MEADOWS ZONE SUBSTATION TEE' passes by the lot on its western and southern boundaries of the development. This transmission feeder provides a 33kV high Voltage connection between Penrith,

PHOTO 2 – TRANSMISSION FEEDER ALONG FRONTAGE OF DEVELOPMENT VIEWED FROM HENRY & LAWSON ST INTERSECTION

Kingswood and Claremont Meadows Zone Substations [6].

The 33kV transmission feeder may require relocation or undergrounding past the development. The transmission line will require an assessment and calculations to be performed under various weather conditions to determine if the overhead transmission line complies with AS7000, Endeavour Energy's Standards and the Electrical Safety Rules. This will be required to be confirmed when the final design of the building is completed or alternatively have this performed in conjunction with the design of the buildings.

FIGURE 3 – OVERHEAD 33KV TRANSMISSION FEEDER ROUTE

If the feeder was found to require relocating underground, it is expected that Endeavour Energy would require the whole overhead section of the feeder to be undergrounded. This would be an approximate distance of 930m from Belmore St at the Penrith Railway Station Carpark to the Henry & Doonmore Street intersection. This would be determined by Endeavour Energy at time of application.

4.2 Connection to Endeavour Energy's 11kV Network

4.2.1 New 11kV High Voltage Feeder

As outlined in section 4.1 connection to Endeavour Energy's 11kV network will be required to be achieved by reticulating a new 11kV feeder from Penrith Zone Substation to the development site.

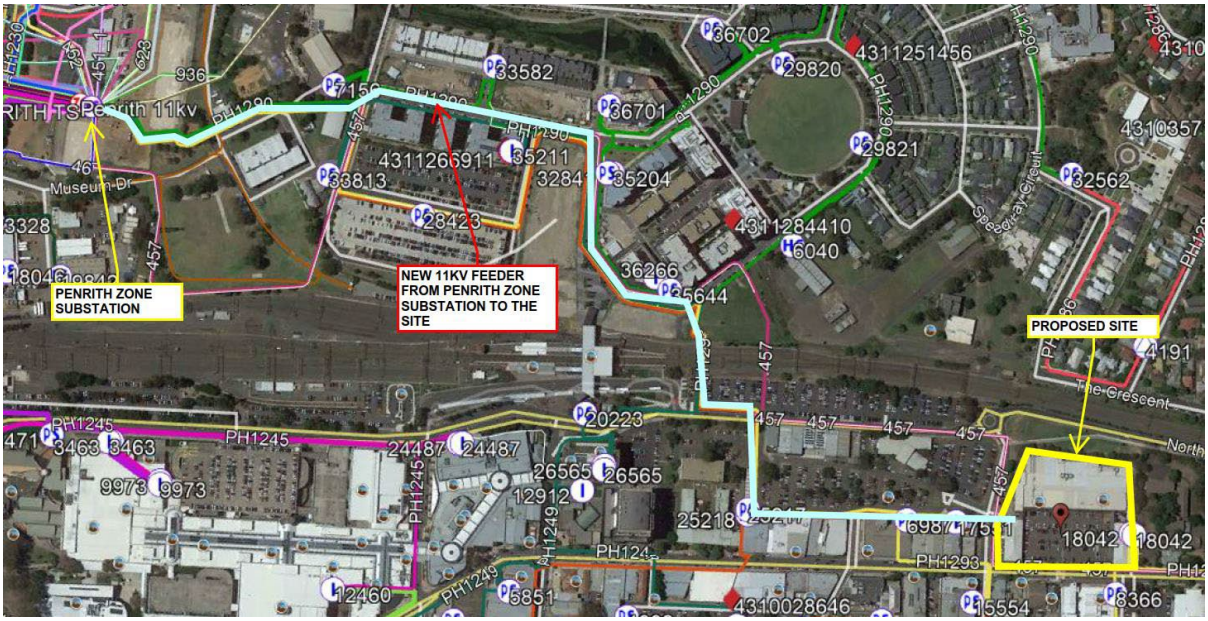


PHOTO 3 – NEW 11KV HIGH VOLTAGE FEEDER ROUTE

The new feeder is suggested to take the route shown above, this route utilises existing ducts to pull through high voltage cable for most of the route. Appropriate precautions will need to be taken during design and construction along this route, as sections of the ducts are marked as containing asbestos on Endeavour Energy's GIS. The estimated route length for the reticulation of the new feeder is one thousand five hundred (1500) metres to the edge of the development [6].

4.2.2 Feeder Extension to Provide Redundancy

As outlined in section 4.1 an existing 11kV high voltage feeder will be required to be extended to the development site to provide redundancy. This is envisaged to be achieved by replacing the high voltage switchgear in pad mount substation 35644 to a three (3) feeder arrangement. High voltage cable then can be reticulated to the development site to extend the 11kV feeder PH1290 to provide redundancy.

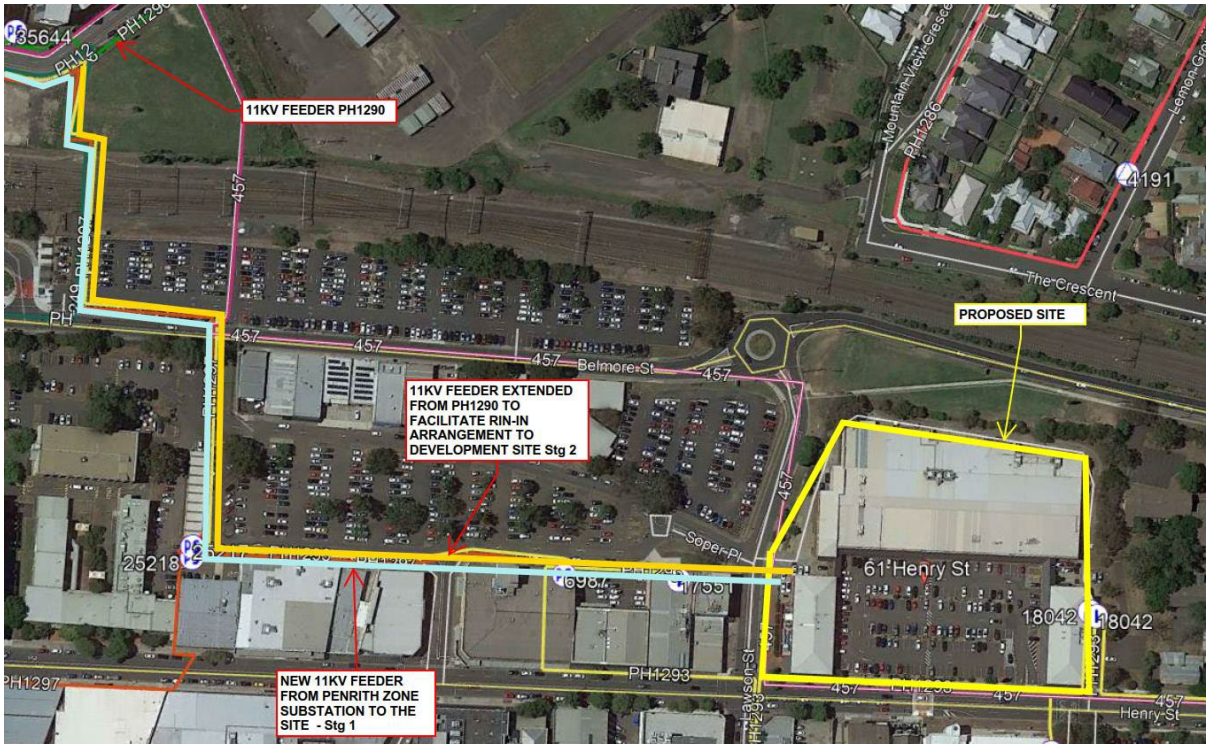


PHOTO 4 – PROPOSED 11KV HIGH VOLTAGE FEEDER PH1290 EXTENSION ROUTE

Final feeder routes will be determined by Endeavour Energy at the time of application and will be dependent on their network requirements.

4.3 400V Low Voltage Network

Endeavour Energy will require a nominal 400V 3 phase Low Voltage network to be established in order to provide points of supply for each of the buildings of the proposed development. (11,000:433) V pad mount substations will be installed to supply Low Voltage to the development, where required or economically feasible indoor substations will be installed.

The pad mount substations installed to provide supply to the proposed development are expected to require the following configuration;

- 11kV Siemens RTR or RTRR Switchgear,
- 11000:433 V pad mount substation transformers, 500kVA transformer. Where the Maximum Demand requires, higher capacity transformers will be utilised (larger transformer sizes available are 1000 kVA & 1500 kVA).
- Webber Category 2 Low Voltage switchgear with Endeavour Energy approved circuit breakers are expected be required to be installed to supply the load of all buildings,
- Concrete Plinth,
- Concrete culvert footing,
- Type 14 fibreglass cubicles as standard and for substations which require larger than the standard 500kVA transformers, Type 16 fibreglass cubicle will be utilised.

The Pad mount substations are required to be located within the lots of the development. Each of the pad mount substations will require a minimum of 2.75m x 5.5m easement and a restriction zone in relation to fire ratings of buildings that extends 3.0m from the pad mount substation plinth. The easement will need to be located above the 1:100-year flood level, be level over the entire easement and be free of any other service encroachment.

Indoor substation buildings must comply with the National Construction Code and be designed by a practicing structural engineer. The building area of the indoor substation chamber is for Endeavour Energy's exclusive use and cannot be shared with any other services or give access to other services or areas. See appendix 2 for further details of Endeavour Energy's indoor substation requirements.

Several mains pillars and streetlights supplied from the existing indoor substation along the Henry St frontage of the development will be required to be maintained.

They will be required to continue to provide backup supply to existing feeders and streetlighting. The assets will require to be connected to one of the substations installed during construction of the development. Low Voltage 240mm^2 Al 4-Core underground cable will be used for interconnections between pad mount substations and Mains Pillars.

All cabling and ducting will require to be reticulated within Endeavour Energy's standard cable alignment located 0-1200mm out from the front property boundary where possible.

Where the cable allocation is unavailable due to obstacles, or cables are required to be reticulated through the lot. A minimum 3.0m wide easement may be created to allow cables to be installed where approved by Endeavour Energy.

4.4 Streetlighting

Penrith City Council will require public lighting to be installed as part of the development. Council as the public lighting customer will nominate the lighting requirement for the project by completing a Public Lighting Design Brief (PLDB). The PLDB will be initiated by the Level 3 Accredited Service Provider during the design process for each stage of the development.

The developer is responsible for the funding, procurement and installation of all new/modified lighting assets, Penrith City Council will be responsible for all future maintenance and electricity usage charges once Endeavour Energy accept ownership of the assets.

The design of the streetlighting will be prepared in accordance with the details contained within the PLDB, Endeavour Energy's T&C/lighting standards and AS1158.

5 Funding & Reimbursements

Endeavour Energy's current reimbursement policy is for the developer to be responsible for funding of all contestable works. Endeavour Energy will provide a capital contribution towards the cost of the transformer component within each substation [7]. Endeavour Energy may also require additional ducts to be installed in addition to the mandatory spare ducts required. These additional ducts will be reimbursed at the rate determined by Endeavour Energy at the time of design certification [8]. Funding of the works required to extend the 11kV feeders, modification to protection and construction of the 400V low voltage network is the responsibility of the developer.

6 Potential Environmental Issues

Preliminary environmental searches have been carried out to identify environmental issues that may need to be addressed during the design and construction of the proposed development's connection to Endeavour Energy's network.

6.1 Heritage

A search of the NSW Office of Environment & Heritage's Search for NSW heritage tool found the following heritage sites on the NSW Heritage Register in the vicinity of the development site [9].

- Methodist Church (Former) is located on the opposite side of Henry St to the development site
- Penrith Infants Department (1884 Building) is located on the eastern boundary of the development site.

This heritage search will require to be repeated and heritage sites assessed in the summary environmental report once the scope of works for the project is determined. This will be undertaken during the design phase of the electrical works to determine any possible impacts and necessary mitigation measures before electrical works can commence.

6.2 Protected Matters

A search of the Department of the Environment and Energy's Protected Matters Search Tool was performed to determine if matters of national environmental significance possibly occur in the vicinity of the development site. Numerous species of protected flora and fauna were found to occur in the vicinity of the site [10]. During the design phase of the electrical works impacts to these matters will need to be considered, if significant adverse impacts cannot be mitigated a thorough environmental assessment will be required to be carried out to determine appropriate mitigation measures.

6.3 BioNet Atlas of NSW Wildlife

A search of the NSW - Office of Environment & Heritage's BioNet Atlas of NSW Wildlife was performed to determine if any threatened or protected species have been identified in the vicinity of the development site. Numerous threatened and protected species have been identified in the vicinity of the site [11]. During the design phase of the electrical works, impacts to these species will need to be considered, if significant adverse impacts cannot be mitigated a thorough environmental assessment will be required to be carried out to determine appropriate mitigation measures.

7 Conclusion

After investigating Endeavour Energy's existing network assets, as well as reviewing Endeavour Energy's technical review. It is concluded that there is insufficient capacity available to supply the development from the existing 11kV high voltage feeders extending past the development site.

A new 11kV high voltage feeder will be required to be extended from Penrith Zone Substation to supply the estimated 5000kVA load of the completed development during the first stage of the development. The new 11kV feeder route is expected to be extended predominantly through existing ducts along the proposed route.

It is also expected that Endeavour Energy will require the existing 11kV high voltage feeder PH1290 be extended to the development site to provide redundancy during one of the following stages.

If the 33kV overhead transmission feeder is not reticulated underground, the proximity of the conductors to the building must be taken into consideration during the buildings design to achieve safe approach distances for ordinary persons during construction and maintenance works.

7.1 Validity

This report is subject to the conditions at the time of the report, as a result this report is only valid for a period of up to 31 days after which the report findings should be reviewed.

7.2 Disclaimer

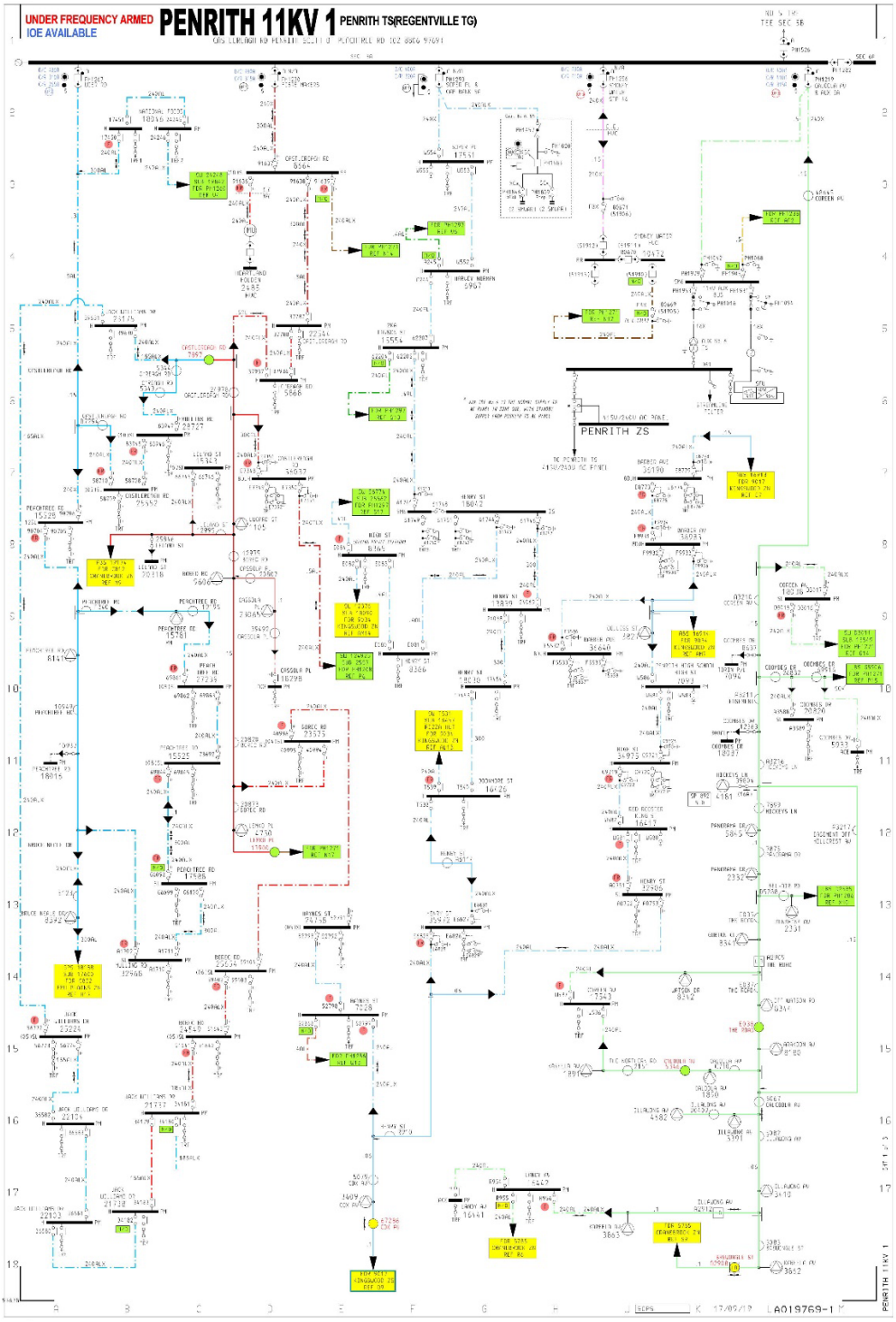
Please note that this report is based on experience and current Endeavour Energy standards. There may be alterations based on Endeavour Energy's network requirements at the time of application for connection. There may be alterations depending on any adjacent developments superseding the proposed development, developer planning and design alterations, or changes to relevant standards once the electrical reticulation design is submitted for certification or during the construction phase.

This report has been prepared with every effort made to ensure its accuracy, neither Power Line Design Pty Ltd nor any of its employees shall be liable on any ground whatsoever to any party in respect of decisions or actions taken as a result of this report.

8 Appendices

8.1 Appendix 1A

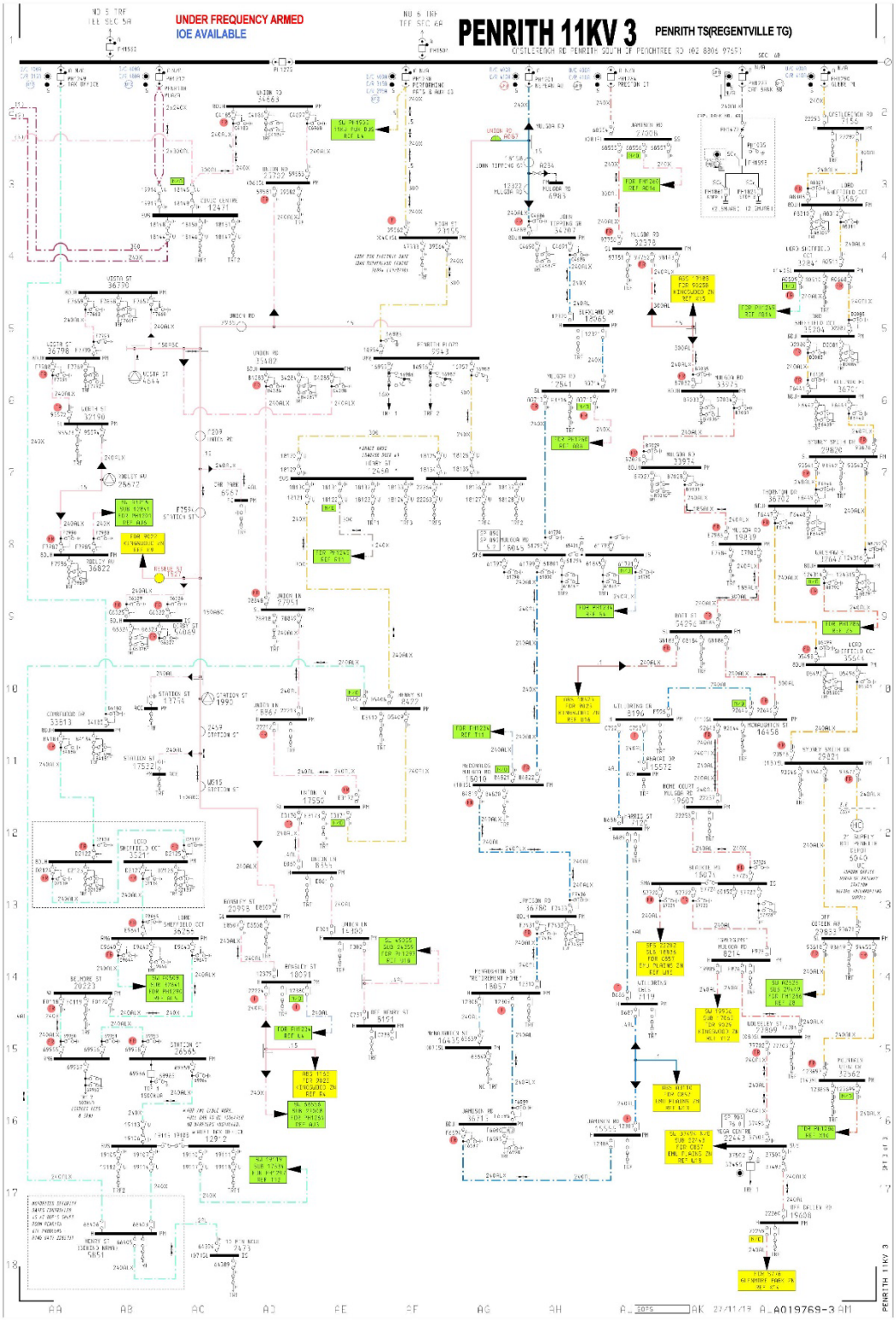
Endeavour Energy HV SOPS - Penrith 11kV 1



[12]

8.2 Appendix 1B

Endeavour Energy HV SOPS - Penrith 11kV 3



[12]

8.3 Appendix 2

MDI 0028 - Underground Network Design

6.4 INDOOR SUBSTATIONS

Indoor substation building must comply with the requirements of the National Construction Code. Full details of the substation construction requirements (and some basic building design details) are contained in Section 7 – Substations and switching station of MCI 0006 and must be referred to when producing any design. Basic building requirements covered in MCI 0006 include but are not limited to:

- Building design must be by a practising structural engineer and certified accordingly.
- Building to be fire rated (two [2] hours in all areas, including common doors in multiple room substations).
- Ventilation (natural and forced ventilation).
- Blast wall rated buildings where oil filled transformers are installed.
- Drainage.
- Alarms.
- Access requirements.
- Conduits and cable trays.
- Lifting and pulling fixtures.
- Light and power.
- Painting.

6.4.1 Building area for Endeavour Energy's sole use

The indoor substation chamber, chamber access, ventilating shafts and cable ducts are for Endeavour Energy's exclusive use and cannot be used to contain other services or give access to other services or areas.

Consideration will be given to sharing of passageways, where the substation chamber can be made secure against entry by other than authorised personnel and a right of way is obtained in Endeavour Energy's favour.

6.4.2 Substation location within a building

Where a substation is required within a customer's premises, it must be located entirely at street or ground level with personnel and plant access off same level. Any deviation from this will require the Substation Assets Manager approval in writing.

Indoor substations require the use of either dry-type transformers or less combustible insulating liquids (K-class) with a flash point exceeding 300°C. Endeavour Energy uses natural ester oils for K-class insulating liquids for sealed transformers. Where tenants may be below the substation and potentially affected by fire i.e. High rise buildings, the selection of a dry or high flammability transformer must be at the Substation Assets Manager's approval based upon risk assessment.

All indoor substations having liquid insulation must have bunds and all cable entries must be sealed with a fire sealant system as detailed in Section 7 – Substations and Switching stations of MCI 0006.

All rooms containing transformers and/or switchgears will have a minimum of two (2) access/exit doors spaced diagonally opposite and as far apart as possible.

The building design will be such that each of the major equipment could be removed without dismantling/disturbing any other equipment.

Refer to Section 7 – Substations and switching stations in MCI0006 for more details on access requirements.

Notes:

1) It is important to note that a substation with a separate transformer and switchgear room will require more floor space, special ventilation, and additional personnel and equipment access.

2) Where dry or transformers filled with natural ester oil (oil having high flash point) are used, the customer will pay for the extra cost of the transformer. Dry transformers can take up to six (6) months to obtain.

3) Transformers produce a low frequency hum (refer to ETS 0070, ETS 0073 and ETS 0079) and also produce electrical and magnetic fields that can have an impact on people and equipment, such as computer monitors. This should be taken into account when locating substations.

All substation building designs must be in accordance with standard Endeavour Energy drawings in Section 7 – Substation and switching stations of MCI 0006. Where modifications are required to the standard substation layout to enable it to be incorporated into the building, approval for the modification is required from the Substation Assets Manager

6.4.3 Security of supply

Where individual substations are located on the same site, but housed in separate buildings, segregation between these substations can be achieved with HV switches, depending on Endeavour Energy's requirements

If it is considered that more security of supply is required for the customer's processes than is offered by the standard configurations, other arrangements can be used, for example:

- Individual rooms for each transformer and associated switchgear.
- Separate rooms for switchgear and transformers.
- Dry transformers.
- Additional HV feeder supplies.
- Double bus-section isolators (in existing older substation).

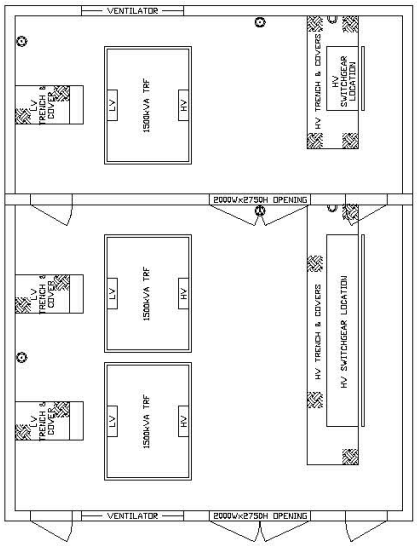


Figure 5 - Three (3) transformer substation

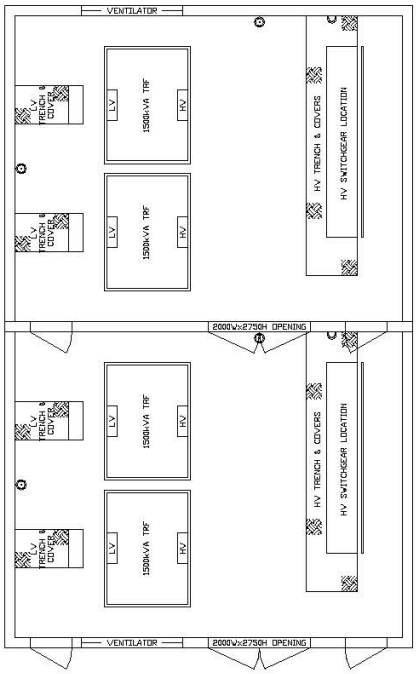


Figure 6 - Four (4) transformer substation

Notes:

1) Additional access doors, ventilation and the like may need to be installed, in addition to those shown on the standard drawings, to suit Endeavour Energy's requirements.
2) Cables supplying multiple rooms will be segregated from each other (to prevent damage from fire or explosions in one room taking out the supply to the other room) either by laying them in separate trenches or by concrete encasing. Exposed cables from different supply points will not be laid through one room's trench into the other room.

6.4.4 Building construction drawings

The requirements for an indoor substation are set out in Endeavour Energy's standard layout drawings located in Section 7- Substations and switching stations in MCI 0006. These layout drawings are to be read in conjunction with this instruction.

The layout drawings can be used for construction provided that the room is identical in size to the layout drawing, and the location of incoming conduits and the room orientation are clearly marked on the site layout drawing.

The dimensions shown on the layout drawings indicate finished sizes required in the building, and allowance must be made for wall and floor finishes. Standard substation layout drawings are also issued to customers to enable preparation of architect's drawings.

Endeavour Energy's requirements will be incorporated into the customer's construction drawings and specification. These drawings will be drawn to a 1:50 scale, contain all dimensions, and will be sufficiently detailed to define the construction of the room.

The standard reference drawings (that is, other than the layout drawings) can also be used for building purposes provided that accurate cross-reference is made between the architect's and consultant's drawings and Endeavour Energy's drawings, so that any possibility of misinterpretation is avoided.

Drawings are required indicating the location of the substation in relation to adjoining construction, property boundaries, and the like.

If not on the street alignment, the drawings will also indicate the access route, type of road surface, relative levels of the roadway, any overhead construction and details of levels external to the substation. Drawings will also indicate all cable access information, for example, a conduit route, pits and alcoves.

For all Contestable Works projects, drawings and any relevant specifications must be submitted to the Manager Network Connections or the nominated representative for certification in accordance with Endeavour Energy's certification process. For new construction or modification to existing buildings by Endeavour Energy staff all designs and drawings must be submitted to the Substation Assets Manager.

Such approval, when granted, does not absolve the customer, the architect and/or consultants from the responsibility of confirming the substation complies with the Building Code of Australia and any specific requirements of other statutory authorities.

Note: Construction of the substation must not commence before written approval of the construction drawings is received.

If construction commences without approval, Endeavour Energy will hold itself free to refuse to accept the substation building if the work carried out is not to Endeavour Energy's standards.

6.4.5 Substation minimum room dimensions

Because of considerable variation in the space requirements for substations due to various types of equipment and different access arrangements, early consultation is essential so that Endeavour Energy's requirements can be determined before detailed design begins.

As a guide, the minimum internal room dimensions (excluding any lifting equipment) are set out in the following tables:

- Width = looking at HV end of transformer – left to right.
- Depth = looking at HV end of transformer – front to back.

Table 2 - Typical room size for transformer and switchgear in the one (1) room

No. of transformers	Minimum internal room size, mm (approx.)		
	Width	Depth	Height
1	5700	4600	2700
2	6000	7600	2700
3 (dry only – all 3)	8500	7600	2700
4 (dry only – all 4)	11000	7600	2700

Table 3 - Typical room size for transformers and HV switchgear in separate rooms

No. of transformers	Minimum internal room size, mm (approx.)					
	Switchgear room			Transformer room		
	Width	Depth	Height	Width	Depth	Height
1	3100	4350	2500	3750	4600	2700
2	3100	5100	2500	6000	6100	2700
3	3100	5850	2500	Use multiples of standard room sizes or dry transformers		
4	3100	6600	2500			

Notes:

1) Actual room sizes should always be checked against Endeavour Energy's latest standard drawings, located in Section 7 – Substations and switching stations in MCI 0006. Where dry type transformers are required, the door and room sizes may need to be increased. The transformer mass may also increase to 5500kg and is required to be confirmed by the Substation Assets Manager before the design is completed and certified.

2) Substations requiring more than two (2) transformers must have multiple transformer rooms with a maximum of two (2) transformers in each room. Rooms with more than 2 transformers will only be allowed at the Substation Assets Manager's discretion (Refer to Figure 5 and Figure 6). If approval is given for more than 2 transformers then they must all be dry type transformers.

3) The room dimensions set out above are clear inside dimensions and exclude columns, beams and any other intrusions.

4) The height is the clear ceiling height excluding beams, lifting hooks/cranes, air ducts and the like.

5) The standard access door locations may need to be varied (after Endeavour Energy's approval) to better suit site conditions.

6) The design must be such that each of the major equipment could be removed without dismantling/disturbing any other equipment.

7) In CBD, and at the Substation Assets Manager's discretion, a small alcove style switching room or an oil filled padmount style indoor substation, refer to Figure 7 and Figure 8, may be permitted (refer to Section 7 of MCI 0006 drawings for details of room dimensions) provided that:

(a) There is no distribution network requirement to have additional switchgears/feeders currently or in future (to be confirmed by the Asset Strategy and Planning branch), other than that to feed one transformer.

(b) Acceptable access to the transformer location is available.

(c) HV cables feeding the transformer and switchgears are laid in ducts having a minimum internal diameter of 125mm. It is mandatory that all ducts will maintain the orientation/configuration for the entire length.

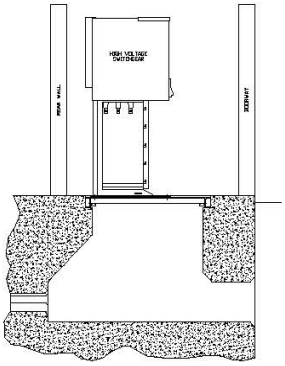


Figure 7 - Alcove style switching room

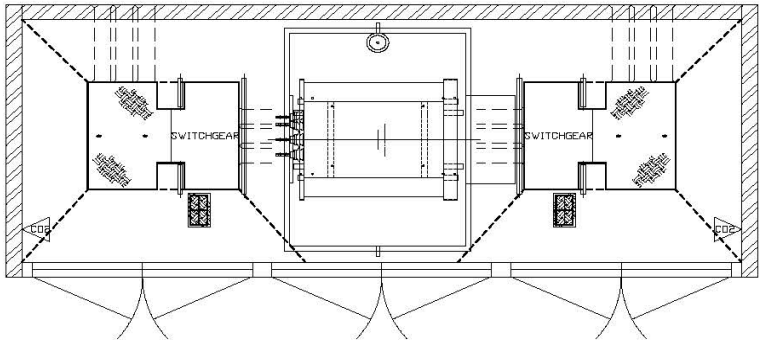


Figure 8 - Padmount style indoor substation

6.4.6 Cable basements

Cable basement substations (where access to the cables would be considered a confined space, an example would be hatch access via ladders) are not permitted. All cabling will be run through ducts or in cable trenches with removable covers.

6.4.7 Ventilation/pressure relief systems

For all new indoor constructions or where there is a change to an existing building or transformer size/quantity greater than the original design a ventilation design and report needs to be carried out. For full details of the ventilation/pressure relief systems and design requirements, refer to Section 7 – Substations and switching stations in MCI 0006.

The full load equipment losses to be provided for are 16 kW for each oil filled transformer, or 20kW for each dry transformer. The ventilation system must be designed to cater for the maximum number of transformers the room can accommodate.

Two-stage louvres must be installed on all available doors and walls to achieve the maximum natural ventilation and pressure relief area irrespective of if forced ventilation is added. Generally, in order to achieve the temperature as specified below, forced ventilation into the room by means of a fan(s) will also be required. Forced ventilation systems must be designed, supplied, installed and maintained by the customer without the need to enter the substation. The ventilation must be forced into the room and not extracted out and be sufficient to maintain a maximum temperature of 5° C inside the substation building, above the air intake temperature, the fans will start when the temperature inside the room reaches 35 °C.

Intake air (from outside) must be relatively dust free and as such filters are required; they will be fitted to the outside of the substation and regularly maintained by the customer. Filters are necessary when dust or other substances present in the area could impair the operation of equipment.

All walls will be suitable to withstand an internal pressure of at least 2.0 kPa. To achieve this rating walls will be made from either solid concrete, double brick or core filled concrete blocks.

An area of 4m² of louvre will generally provide adequate pressure relief for equipment failures.

Roof ventilators can be used where a substation is a freestanding structure.

6.4.8 Substation bund walls

Where oil filled transformers are installed, individual bund walls will need to be installed around each transformer suitable for retaining the full amount of oil. All associated cables and ducts will need to be sealed to prevent oil and fire spreading (refer to Section 7 – Substations and switching stations in MCI 0006).

Bund walls are not to reduce the effectiveness of cooling of the transformers.

6.5 CABLING TO THE SUBSTATION

Connections from the HV network to the substation switchgear will be in three (3) core cables or full fault rated single core cables up to 300mm^2. Single core cables can only be used if approved by the Substation Assets Manager.

The full cable route must be designed to allow for large radius bends (minimum two meters up to three metres radius) on all cables, cables will be supported for their full length, and there must be no sharp edges in contact with the cables.

Where necessary, there must be suitable areas set aside to install and operate cable push/pulling equipment. This will generally be in the form of concrete pits.

Cables connected to the network that pass through one substation room to another substation room must be segregated completely (by concrete encased conduits). This will prevent a fault in one trench from damaging the cables to the second substation room.

6.6 CABLE PITS AT PADMOUNT SUBSTATIONS

Where pits are required for cables to enter into a substation only approved pits will be used. Where a new design or on site constructed pit is used then the process will be as follows.

There is no Australian standard relating to electrical or communication pit performance. Pits are selected by size, volume and location. Cover loadings are transmitted to pit structures. For further information AS 4198-1994 can give assistance in designing a suitable pit.

Concrete pits must be submitted for approval to the Substation Assets Manager; they must be designed and certified by a practicing structural engineer to accommodate access covers to AS 3996:2006. Construction must not commence without an approved drawing.

Where a padmount or switching station is erected in a concrete, tile, or similar hard surfaced area or in an area where future access for excavation can be restricted, a cable pit with an access opening of at least 1000mm square x 1100mm deep must be provided at the HV and LV end of the padmount substation.

It is essential to refer to MCI0006 section 7 for details on pits and lids.

Pits must have pulling eyes for all cables, rated at 25.0 kN minimum and must have full opening hatch rated as a minimum Class B (80 kN) in accordance with AS3996:2006. Where the traffic is expected to exceed the Class B rating then the pit and lid must be rated to suit the location as detailed in AS 3996:2006.

The pit lids must be of concrete construction at least 50mm thick with suitable lifting points/eyes as detailed in this standard and AS 3996:2006. The lid weight and class rating must be marked on the lid.

The access pits needs to be open on the padmount side to allow the cables to be laid in and out during installation and maintenance to prevent excessive bending and damage.

The pit must be suitable to allow cable or conduit access (through knock outs or similar) for at least six (6) x 125mm conduits on all sides or more when required for the specific project.

8.4 Appendix 3 - Additional Photos

PHOTO 5 – HENRY STREET FRONTAGE OF PROPOSED DEVELOPMENT

PHOTO 6 – VIEW SOUTH DOWN LAWSON STREET

PHOTO 7 – EXISTING OVERHEAD 33KV TRANSMISSION FEEDER BELMORE STREET

PHOTO 8 – NORTHERN FRONTAGE OF THE SITE

VIEWED FROM BELMORE & LAWSON STREET INTERSECTION

PHOTO 9 – LAWSON ST & SOPER PL – SUGGESTED LOCATION FOR HV FEEDER TO ENTER DEVELOPMENT SITE

PHOTO 10 – RIGHT OF WAY PROVIDING ACCESS TO INDOOR SUBSTATION 18042 FROM HENRY ST

9 References

[1] SIXMaps, *Map of mixed-use development site location,* Sydney: NSW DFSI Spatial Services, 2019.

[2] NSW Department of Planning, Industry and Environment, "NSW Planning Portal," New South Wales Government, 2 December 2019. [Online]. Available: https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/lot. [Accessed 2 December 2019].

[3] Environa Studio, "61-79 Henry St, URBAN DESIGN MIXED USED PROJECT," Environa Studio, Surry Hills, 29/11/2019.

[4] K. Songberg, "[110606-02] Development timing guidance with 61 - 79 Henry St Penrith for utility feasibility assessments," J. WYNDHAM PRINCE, Penrith, 2019.

[5] A. Shahalam, "ENL3570 - Enquiry for available capacity at 61-79- Henry Street, PENRITH NSW 2750," Endeavour Energy - Network Connections, Huntingwood, 2019.

[6] Endeavour Energy, "Endeavour Energy GIS," Geomedia WebMap, Huntingwood, 2019.

[7] R. Howard, *Important Notice IN 043/18 Review of Endeavour Energy Funding of Substation Equipment and HV cabling,* Huntingwood: Endeavour Energy, 2018.

[8] T. Kavaliauskas, *Important Notice IN 033/17 Revised Fact Sheet 11,* Huntungwood: Endeavour Energy, 2017.

[9] State of New South Wales and Office of Environment and Heritage, "Search for NSW Heritage," State of New South Wales and Office of Environment and Heritage, 15 November 2019. [Online]. Available: https://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx. [Accessed 15 November 2019].

[10] Department of the Environment and Energy, "Protected Matters Search Tool Report," 28 May 2015. [Online]. Available: http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf. [Accessed 6 December 2019].

[11] NSW Environment, Energy and Science, "NSW BioNET Web Services," Office of Environment & Heritage, Sydney, 2019.

[12] Endeavour Energy, "Endeavour Energy SOPS Viewer," Endeavour Energy, Huntingwood, 2019.

[13] Nearmap Australia Pty Ltd, "PhotoMaps by Nearmaps," Nearmap, Barangaroo, 2019.

[14] Endeavour Energy - Asset Standards and Design, "Technical Bulletin - TB 0188A - Changes to MDI0030 ADMD Schedule," 12 September 2016. [Online]. Available: https://www.endeavourenergy.com.au/asp. [Accessed 21 November 2019].