

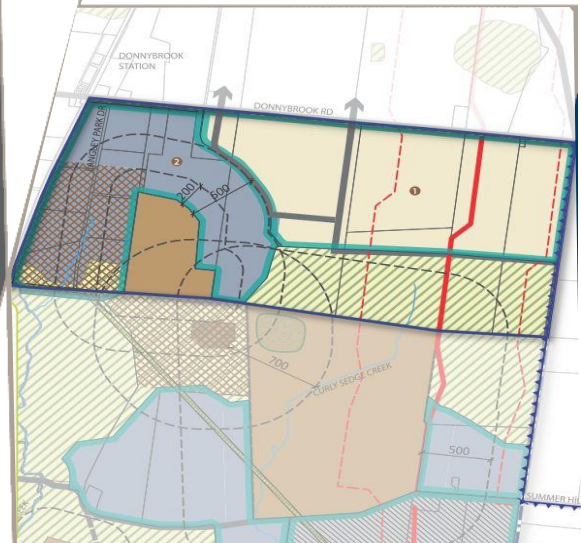
Utility Services Infrastructure Assessment

Shenstone Park Precinct Structure Plan

V162183

Prepared for
City of Whittlesea & Victorian Planning
Authority

17 July 2017



Document Information

Prepared for City of Whittlesea & Victorian Planning Authority
Project Name Shenstone Park Precinct Structure Plan
File Reference V162183REP001F01.docx
Job Reference V162183
Date 17 July 2017

Contact Information

Cardno Victoria Pty Ltd
Trading as Cardno
ABN 47 106 610 913

Level 4
501 Swanston Street
Melbourne
Victoria 3000 Australia

Telephone: (03) 8415 7777
Facsimile: (03) 8415 7788
International: +61 3 8415 7777

victoria@cardno.com.au
www.cardno.com

Document Control

Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
D01	15/06/17	Nick Glasson	NG		
F01	17/07/17	Nick Glasson	NG	Ralph Lowe	RL

© Cardno. Copyright in the whole and every part of this document belongs to Cardno and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person other than by agreement with Cardno.

This document is produced by Cardno solely for the benefit and use by the client in accordance with the terms of the engagement. Cardno does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by any third party on the content of this document.

Table of Contents

1	Executive Summary	5
2	Introduction	6
2.1	Methodology	6
3	Site Overview	7
4	Precinct Development Proposal	9
5	Utility Services Infrastructure	10
5.1	Sewerage Reticulation	10
5.1.1	Existing Infrastructure	10
5.1.2	Development Infrastructure	10
5.1.3	Constraints & Opportunities	13
5.2	Water Supply	14
5.2.1	Existing Infrastructure	14
5.2.2	Development Infrastructure	14
5.2.3	Constraints & Opportunities	16
5.3	Electricity Supply	17
5.3.1	Existing Infrastructure	17
5.3.2	Development Infrastructure	19
5.3.3	Constraints & Opportunities	19
5.4	Gas Supply	20
5.4.1	Existing Infrastructure	20
5.4.2	Development Infrastructure	21
5.4.3	Constraints & Opportunities	21
5.5	Telecommunications	23
5.5.1	Existing Infrastructure	23
5.5.2	Development Infrastructure	23
5.6	Donnybrook Road Services Corridor	23
6	Conclusion & Recommendations	25

Appendices

Appendix A	Precinct Services Plans
Appendix B	Transmission Line Easement Guidelines
Appendix C	Donnybrook PSP Gas Easement

Figures

Figure 3-1	Site Overview	7
Figure 3-2	Existing Catchments	8
Figure 4-1	Preliminary Structure Plan	9
Figure 5-1	Wollert RWTP Site	11
Figure 5-2	Sewer Infrastructure	12
Figure 5-3	Sewer Infrastructure for Reduced Conservation Area	13
Figure 5-4	Donnybrook PSP Rail – Pipe Track Interface	13

Figure 5-5	Drinking Water Infrastructure	15
Figure 5-6	Recycled Water Infrastructure	16
Figure 5-7	Existing Overhead Electricity	17
Figure 5-8	Existing Power Transmission Lines	18
Figure 5-9	Power Transmission Easement	18
Figure 5-10	Existing Gas Transmission Pipeline	20
Figure 5-11	Existing Citygate	21
Figure 5-12	Donnybrook PSP Gas Easement	22
Figure 5-13	Donnybrook Road Northern Services Corridor	23

1 Executive Summary

Cardno has undertaken a high level assessment of the provision of utility services infrastructure to cater for the urban development of the Shenstone Park precinct to support of the preparation of the Precinct Structure Plan for this area by Whittlesea City Council and the Victorian Planning Authority.

Review of existing and planned authority services infrastructure and consultation with the relevant utility services authorities has determined that the provision of utility services to the Shenstone Park precinct is well advanced as a result of planning undertaken for the provision of utility services to the Donnybrook and Woodstock precincts to the north. A services corridor has been established along Donnybrook Road which will accommodate trunk utility services that service the precincts to both the north and south of Donnybrook Road.

Specifically, trunk drinking water and gas mains and an overhead high voltage electricity feeder line have recently constructed on the northern side of Donnybrook Road, which are designed to cater for development of Shenstone Park as well as the Donnybrook and Woodstock precincts.

The Donnybrook Road East Branch Sewer is expected to be constructed along Donnybrook Road within the next 12 months which will similarly service all three precincts. A trunk non-drinking water main will progressively extend along Donnybrook Road to provide this service to the precincts, whilst fibre optic telecommunications facilities will be provided by NBN Co.

There are a number of existing and proposed trunk services facilities and pipelines within or adjacent to the precinct that have the potential to impact on adjacent development and these impacts need to be considered in the further planning of the precinct. These include the following:

- > YVW's proposed Recycled Water Treatment Plant
- > YVW's proposed pipe track along the western boundary of the precinct
- > YVW's proposed Sewer Pump Station in the south east of the precinct
- > Existing power transmission lines in the south west of the precinct
- > APA's existing gas transmission pipelines and associated easement
- > AGN's existing City Gate station

Details of these facilities and their impacts are detailed in the following report.

2 Introduction

The City of Whittlesea (Council) together with the Victorian Planning Authority (VPA) are preparing a Precinct Structure Plan for the Shenstone Park Precinct. To assist in this process, Cardno has been engaged to undertake a high level assessment of the provision of utility services infrastructure to cater for new urban development in the Shenstone Park Precinct.

The utility services assessed are sewerage, potable and recycled water, electricity, gas and telecommunications. The goals of the assessment are to identify existing services infrastructure and capacity, and to determine future servicing strategies to cater for development as it progresses in consultation with the relevant services authorities. Services capacity and routes, land take, timing / staging and costs associated with these services strategies are all to be considered and opportunities and constraints identified for further investigation where necessary.

2.1 Methodology

The assessment commenced with a briefing by Council and the VPA on the context and objectives of the PSP, including provision of the envisaged urban structure and land uses for the precinct. Utilities services reports for the adjacent Donnybrook/Woodstock and English Street PSPs were reviewed along with other background information such as aerial survey and cadastral property boundaries.

Records of existing utility services assets were obtained via the Dial Before You Dig service and reviewed. Subsequently a site inspection was undertaken to visually assess the precinct area from the existing public roads in the precinct and to verify existing above ground assets.

The authorities with responsibility for providing the utility services infrastructure for the precinct were approached for advice on their existing services and planning of servicing the future development. A number of key landowners in the precinct were approached to confirm existing servicing arrangements and to discuss future servicing arrangements.

3 Site Overview

The Shenstone Park PSP is located south of Donnybrook Road and east of the Melbourne – Sydney railway line as shown in the figure below, and is approximately 614 ha in area.



Figure 3-1 Site Overview

The Donnybrook / Woodstock PSP areas are located immediately to the north of the PSP, and the English Street PSP immediately to the west. The Urban Growth Boundary forms the eastern boundary of the PSP. The land to the south is being assessed for future development as part of the Northern Quarries Investigation Area.

Merri Creek clips the south west corner of the site. The majority of the precinct is rural land that has been largely cleared for agricultural activities, with scattered remnant trees predominantly in the south of the precinct and a number of windrows.

The Woody Hill Quarry is located at 870 Donnybrook Road in the west of the precinct. The quarry is an ongoing operation that is progressively mining a local hill within the property.

Langley Park Drive is a sealed rural road that extends south from Donnybrook Road to provide access to rural living properties between the quarry and the railway line.

The precinct consists of three catchments as illustrated on the following figure which shows the existing surface contours with the ridge lines through the site and arrows indicating the general fall of the land.

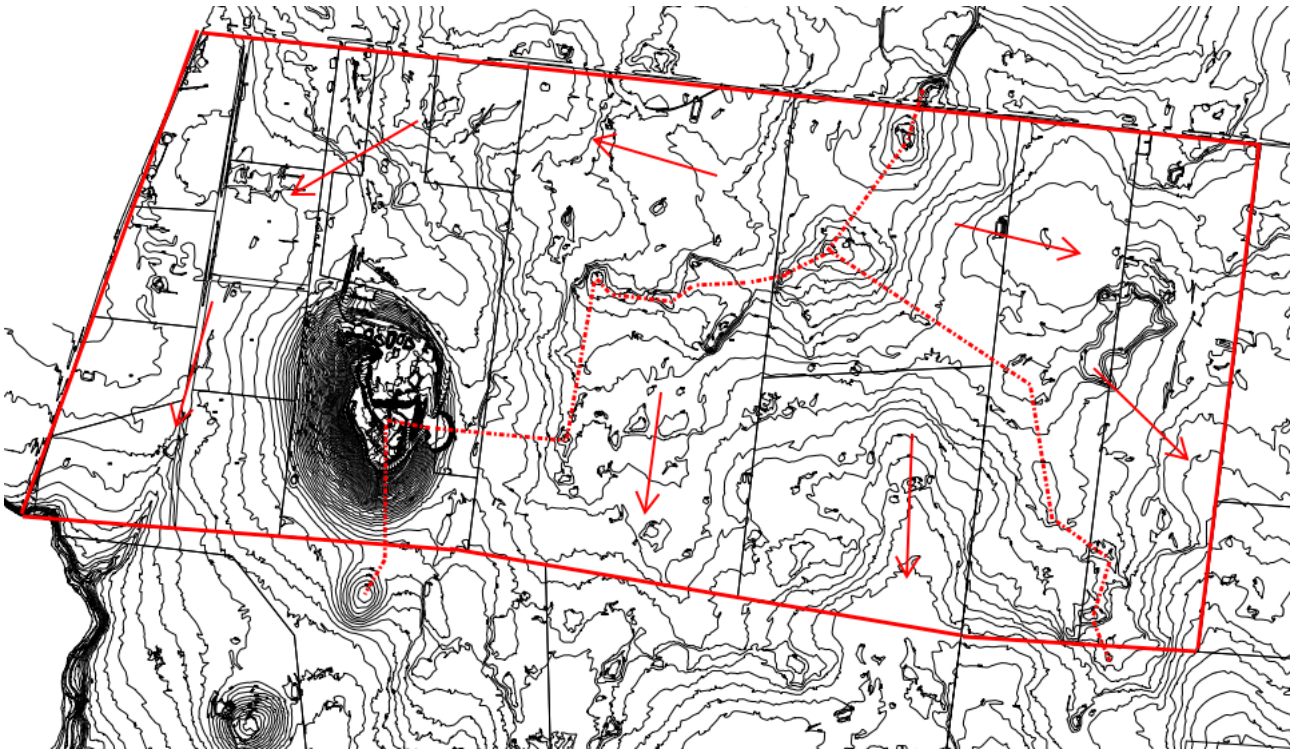


Figure 3-2 Existing Catchments

The northwest portion of the site falls to the west then south towards Merri Creek. The central part of the site falls to the south, towards Curly Sedge Creek, whilst the northeast portion of the site falls to the east then south.

4 Precinct Development Proposal

The preliminary structure plan for the development of the Shenstone Park Precinct is illustrated in the figure below extracted from the 'Northern Quarries Investigation Area Draft Addendum to the Growth Corridor Plans':

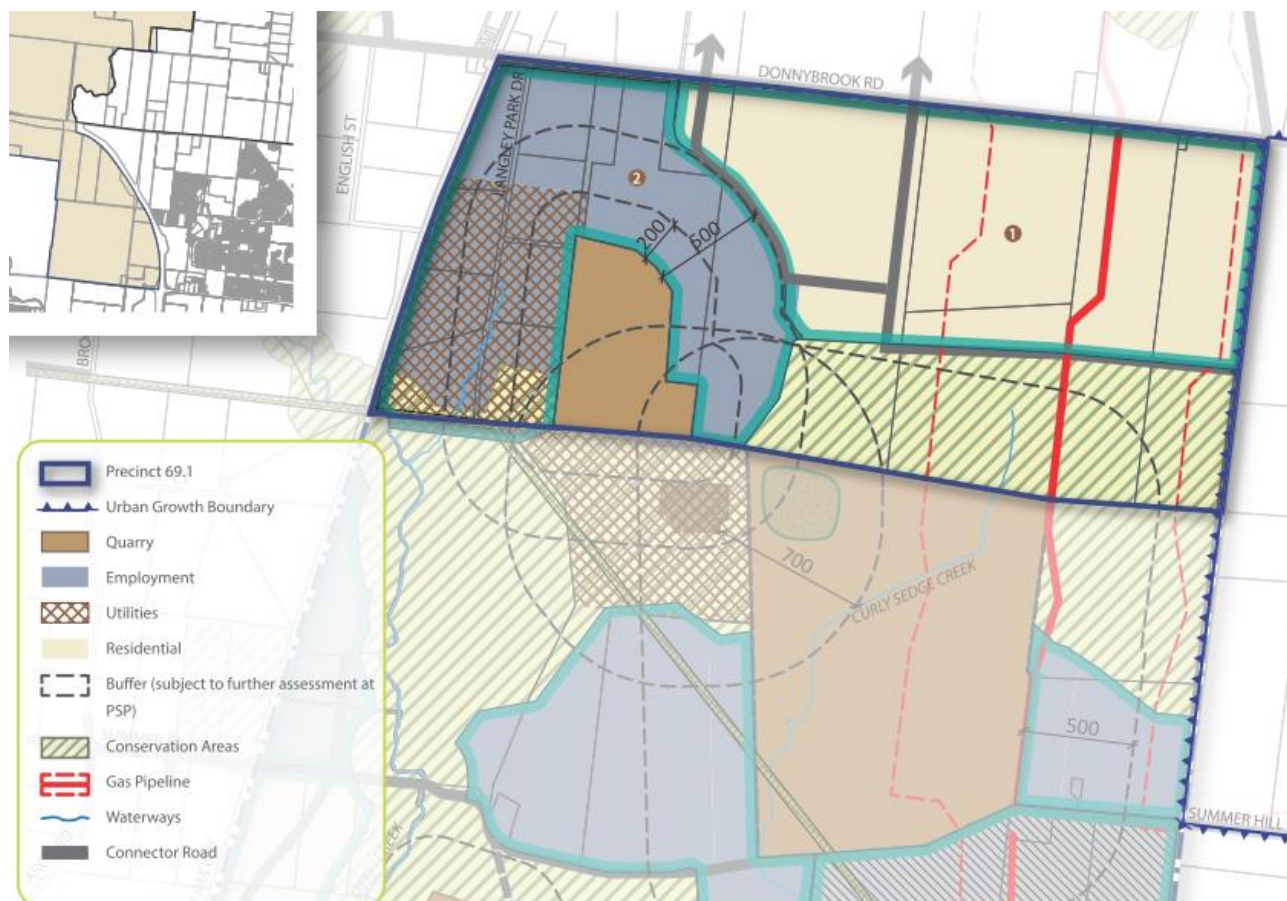


Figure 4-1 Preliminary Structure Plan

The southern part of the precinct is envisaged to be retained as a Conservation Area based on its biodiversity values. This area also encompasses the buffer of a potential new quarry to the south. It should be noted that the Department of Environment, Land, Water and Planning has proposed a reduction in the Conservation Area to exclude areas of low biodiversity values. This would shift the northern boundary of the Conservation Area south and is subject to Commonwealth approval.

The options for development of the western portion of the precinct are constrained by the buffers required for the quarries continuing operations, and accordingly this area is proposed for employment uses.

Existing gas transmission pipelines run north south through the precinct shown conceptually in red in the figure above. There are buffers associated with these pipelines within which certain land uses are restricted. This is discussed in detail in section 5.4 of the report.

Yarra Valley Water are proposing to construct a sewerage treatment plant to the south of the existing quarry which will have buffers associated with its operation.

The remainder of the precinct is proposed for residential development. The initial planning of the precinct has indicated that a yield 3750 dwellings with a resident population of 10,500, along with 3000 on site jobs in the employment area could be supported.

5 Utility Services Infrastructure

The following sections describe any existing services infrastructure within the precinct, and the high level strategy for providing each service capable of catering for the development proposal as outlined above. This advice focuses on trunk infrastructure requirements, with the local reticulation of services to occur as part of subdivisional development in accordance with standard industry practice.

The conceptual alignments of existing and proposed services are shown on the Precinct Services Plans in Appendix A.

5.1 Sewerage Reticulation

Yarra Valley Water (YVW) is the authority responsible for the provision of sewerage reticulation facilities for the precinct.

5.1.1 Existing Infrastructure

There is no existing sewerage infrastructure within the Shenstone Park precinct or surrounding environs.

5.1.2 Development Infrastructure

The sewerage outfall for the broader East Donnybrook region which includes the Shenstone Park, Donnybrook, Woodstock and Lockerbie precincts is the Amaroo Branch Sewer. This 1500 mm diameter sewer will extend north from Craigieburn running parallel to the Melbourne – Sydney railway line, and will connect the region to the Melbourne sewerage system. Construction of the Amaroo Branch Sewer is well progressed and is forecast to be completed by late 2017.

Within the Shenstone Park precinct, the Amaroo Branch Sewer will be located typically 15 m east of the railway reserve. A YVW pipe track of 20 to 25 m width off the railway reserve will be created via a Public Acquisition Overlay, to protect this key asset and proposed YVW water assets.

The other key YVW sewer asset proposed to service development in this region is the Wollert Recycled Water Treatment Plant (RWTP). This facility will be located in the south west corner of the Shenstone Park precinct.

The purpose of the RWTP is to remove volume from sewer discharges which will be treated to Class A recycled water standard for distribution to development in the region via a third pipe system. The balance of flows including solids will be discharged to the Amaroo Branch Sewer.

The core RWTP facility is proposed to be located in land directly to the south of the quarry (outside of the Shenstone Park precinct), with storage lagoons proposed to be located in properties abutting Langley Park Drive (nominated for 'Utilities' on the Preliminary Structure Plan).

The proposed location of the core RWTP facility is indicated by the purple triangle in the figure below with the associated sewer pumping stations represented by the circles. The indicative extents of the RWTP land take are shown in yellow.

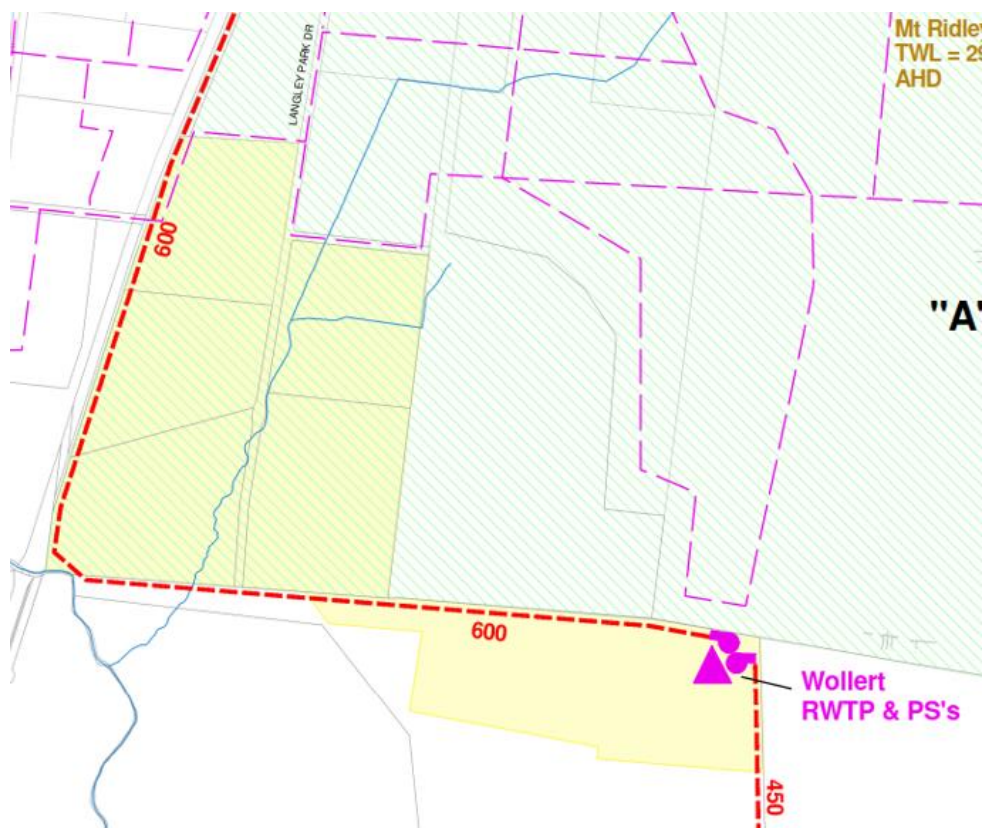


Figure 5-1 Wollert RWTP Site

The RWTP is not required for approximately 10 years, subject to the rate of development of the catchment it will service.

In addition to these regional sewerage assets, YVW has advised that the following trunk sewerage infrastructure is required to service development of the Shenstone Park precinct:

Asset	Design	Build	Funding / Timing
Donnybrook Road East Branch Sewer	YVW	YVW	YVW - 2018
Shenstone Branch Sewer	Developer	Developer	YVW - 2025
Shenstone Sewer Pump Station & Rising Main	YVW	YVW	YVW - 2025
Donnybrook South Branch Sewer	Developer	Developer	YVW - 2023

These assets are shown in the following figure and on the Sewerage Plan in Appendix A.

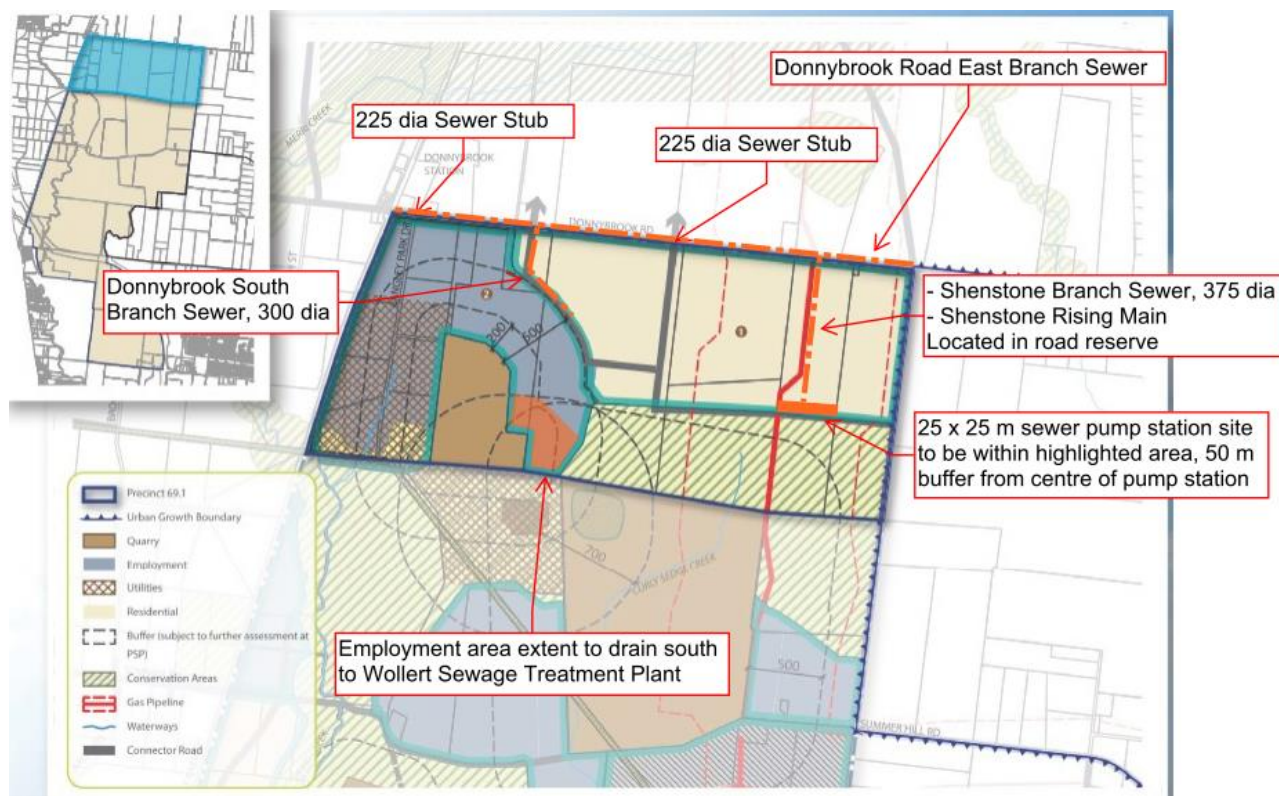


Figure 5-2 Sewer Infrastructure

The Donnybrook Road East Branch Sewer will service the Donnybrook and Woodstock precincts in addition to Shenstone Park, and is to be located within the services corridor to be provided within properties immediately to the north of the Donnybrook Road reservation. Refer Section 5.6 below for further details of this services corridor. The design of this branch sewer is complete and the works have been tendered, with construction of this asset expected to be completed within 12 months.

Smaller diameter sewers will extend south from Donnybrook Road into this precinct. A sewer pump station (SPS) will be required in the south east corner of the developable land to service development in this area which is considerably lower than Donnybrook Road. The SPS requires a 25 m by 25 m site with a 50 m buffer to development from the centre of the site to allow for odour and noise.

A small section of the employment area to the east of the quarry is proposed to be sewered by gravity directly south to the RWTP as shown in orange in the figure above. Should development of this area precede the RWTP then a temporary sewer solution would be required.

The proposed reduction in the Conservation Area may result in development in the precinct extending further south than is currently proposed. This area falls away from Donnybrook Road, and is hence more difficult to sewer back to the Donnybrook Road East Branch Sewer.

YVW has assessed the potentially increased development area and have advised that it can be sewered with the following changes to the sewer strategy, as shown in the figure below:

- > Location of the sewer pump station further to the south west, at the low point of the development area.
- > Addition of the Shenstone South Branch Sewer, to sewer the south east corner of the precinct.
- > Upsizing of the Shenstone Branch Sewer to 450 mm diameter.

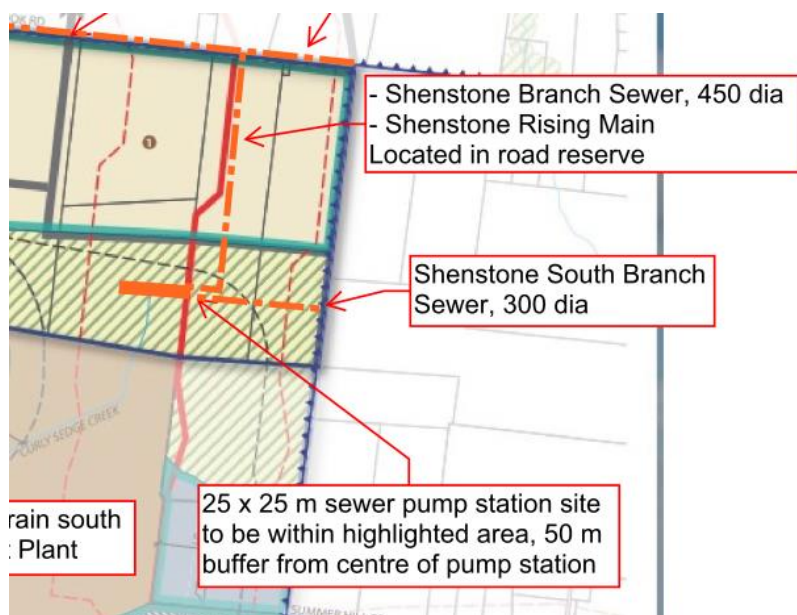


Figure 5-3 Sewer Infrastructure for Reduced Conservation Area

5.1.3 Constraints & Opportunities

Buffer distances associated with the proposed RWTP restrict the type of development within its proximity. The land take and buffer required for the SPS should also be noted. Council and the VPA are undertaking investigations to review the potential impacts and mitigation measures for the RWTP as it relates to the Shenstone Park precinct.

YVW's pipe track along the western boundary of the precinct adjacent to the railway line will constrain development in this area. There is potential for the pipe track to be utilised as a public open space corridor as proposed in the extract below from the Donnybrook / Woodstock PSP.

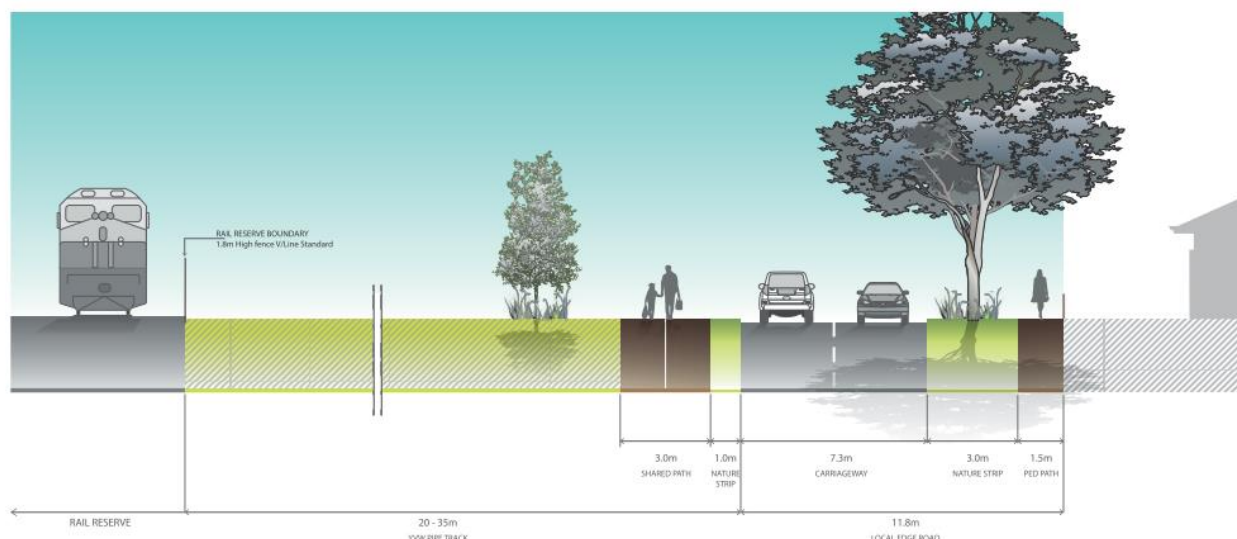


Figure 5-4 Donnybrook PSP Rail – Pipe Track Interface

Bring forward costs (also known as Incremental Financing Costs) will be charged to developers who require trunk sewer infrastructure that is funded by YVW to be constructed earlier than planned by YVW, as noted in the table above. For further details of these charges refer YVW's Land Development Manual.

5.2 Water Supply

Yarra Valley Water is the authority responsible for the provision of water supply reticulation facilities for the precinct. The precinct is within a Class A Recycled Water mandated area. Developers within the precinct will be required to reticulate both drinking water (DW) and non drinking water (NDW) to all allotments.

5.2.1 Existing Infrastructure

An existing DW distribution main is located in the existing northern verge of Donnybrook Road having been installed in early 2016 in a shared trench with a gas distribution main. The main extends east from the railway line across almost the full frontage of the precinct, terminating approximately 630 m from the eastern boundary of the precinct. The western section of the main is 375 mm in diameter reducing to 300 mm diameter for the eastern section of the main as shown in Figure 5.4 below.

The nearest existing NDW water main is a 375 mm diameter main located at the intersection of Donnybrook Road and Dwyer Street, approximately 1.4 km west of the railway line.

5.2.2 Development Infrastructure

5.2.2.1 *Drinking Water Supply*

YVW has advised that drinking water supply for development of the precinct can be provided from the existing DW distribution main in Donnybrook Road with the following 225 mm diameter DW mains required for ultimate supply:

Asset	Design	Build	Funding / Timing
Donnybrook Road Loop Main S3 (green)	Developer	Developer	YVW - 2023
Northern Quarries PSP Link Main(red)	Developer	Developer	YVW – post 2025
Langley Park Drive Main (blue)	Developer	Developer	YVW – post 2025
Wollert RWTP Main (yellow)	YVW	YVW	YVW – post 2025

These assets are shown in the following figure (with point A being YVW's reference location for hydraulic modelling for the catchment) and on the Drinking Water Plan in Appendix A. Proposed 150 mm diameter DW reticulation mains are shown in dashed blue. The water mains will typically be accommodated within road reserves and the alignments are subject to change depending on the ultimate road network.

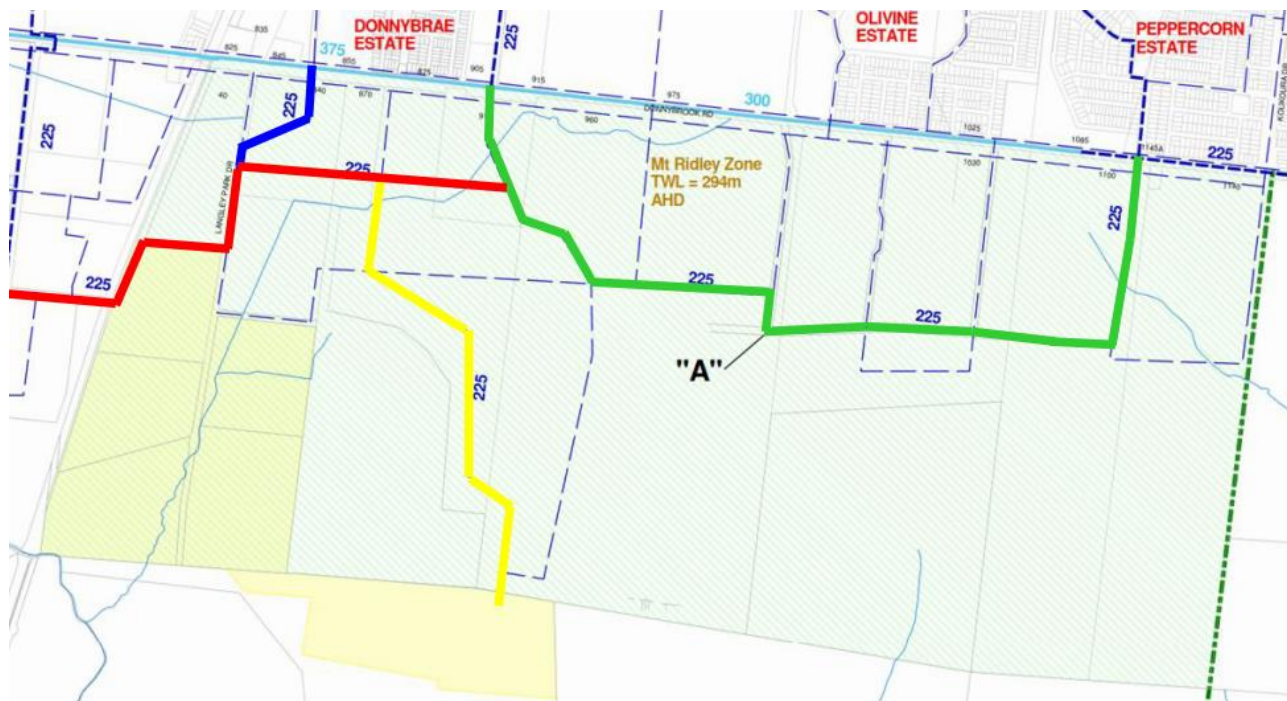


Figure 5-5 Drinking Water Infrastructure

5.2.2.2 Non Drinking Water Supply

YVW has advised that non drinking water supply for development of the precinct can be provided by extending trunk mains from the existing NDW main at Donnybrook Road / Dwyer Street. The following trunk NDW mains are required for ultimate supply:

Asset	Size	Design	Build	Funding / Timing
Donnybrook Road East Main S1 (green) – from Dwyer Street to English Street	375 mm dia	YVW	YVW	YVW - 2018
Donnybrook Road East Main S2 (red) – to east of Langley Park Drive	300 mm dia	YVW	YVW	YVW - 2019
Donnybrook Road East Main S2 (blue) - balance	300/225 mm dia	Developer	Developer	YVW - 2019
Donnybrook Road East Main S3 (yellow)	225 mm dia	Developer	Developer	YVW – 2020 & 2021
Bald Hill Reservoir Inlet Main (red dash)	600 mm dia	YVW	YVW	YVW – post 2025

These assets are shown on the following figure (with point A being YVW's reference location for hydraulic modelling for the catchment) and on the Non Drinking Water Plan in Appendix A. Proposed 150 mm diameter NDW reticulation mains are shown in dashed purple. The water mains will typically be accommodated within road reserves and the alignments are subject to change depending on the ultimate road network.



Figure 5-6 Recycled Water Infrastructure

To the west of the railway line, the Donnybrook Road East Main is proposed to be aligned through development sites in the English Street PSP. After crossing the railway, the main runs north through the YVW pipe track to Donnybrook Road.

The balance of the main will be located within the services corridor to be provided within properties immediately to the north of the Donnybrook Road reservation. Refer Section 5.6 below for further details of this services corridor.

The Donnybrook Road East Main will service the Donnybrook and Woodstock precincts in addition to Shenstone Park, and it is expected that development in these precincts will ensure the timely construction of this asset to make non-drinking water available to all three precincts. NDW reticulation mains constructed prior to the trunk NDW infrastructure providing this supply to the area can be cross connected to DW mains to charge these mains in the interim.

The Bald Hill Reservoir Inlet Main will transfer non drinking water produced by the RWTP to reservoir tanks to be located on Bald Hill to the north of Gunns Gully Road. This main will be constructed within the YVW pipe track.

5.2.3 Constraints & Opportunities

Bring forward costs (also known as Incremental Financing Costs) will be charged to developers who require trunk water supply infrastructure that is funded by YVW to be constructed earlier than planned by YVW, as noted in the table above. For further details of these charges refer YVW's Land Development Manual.

5.3 Electricity Supply

Ausnet Services is the authority responsible for the provision of electricity supply facilities for the precinct

5.3.1 Existing Infrastructure

Existing high voltage 66kV and 22kV overhead power lines are located on the northern side of Donnybrook Road and on the west side of Langley Park Drive. An overhead high voltage line also extends south from Donnybrook Road into the quarry providing supply for its operations. These existing power lines are shown in blue on the plan extract below. The green dashed line represents the property location.

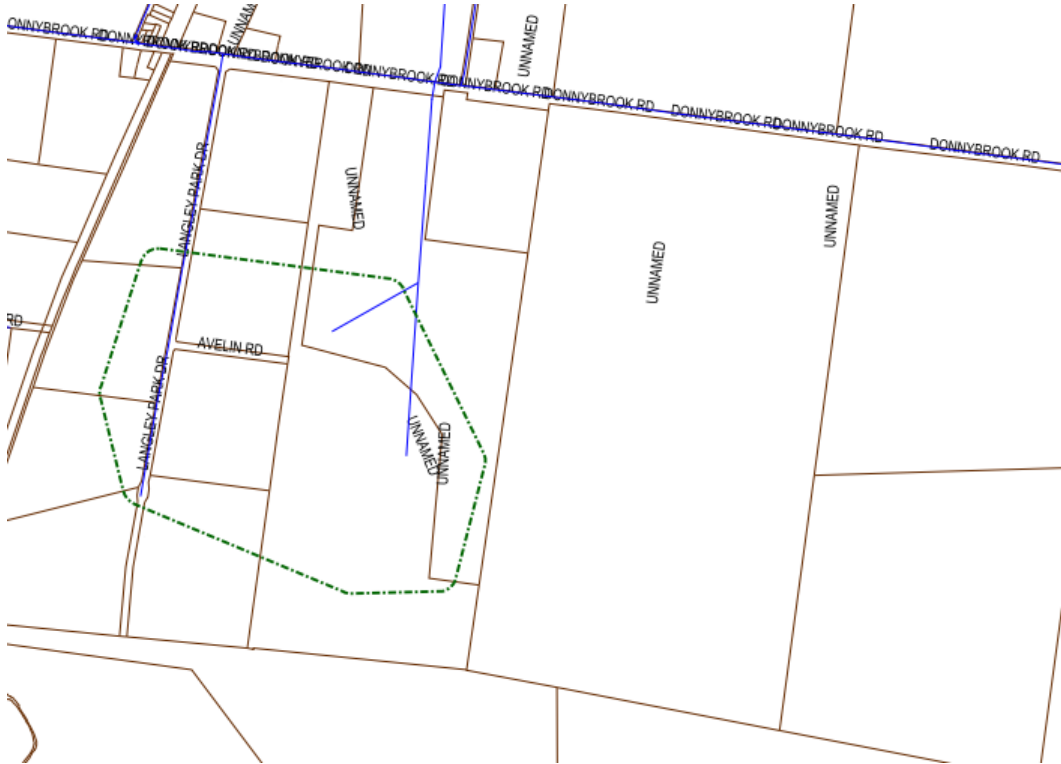


Figure 5-7 Existing Overhead Electricity

Existing power transmission lines clip the south west corner of the precinct to the south of Langley Park Drive, as highlighted in the figure below.

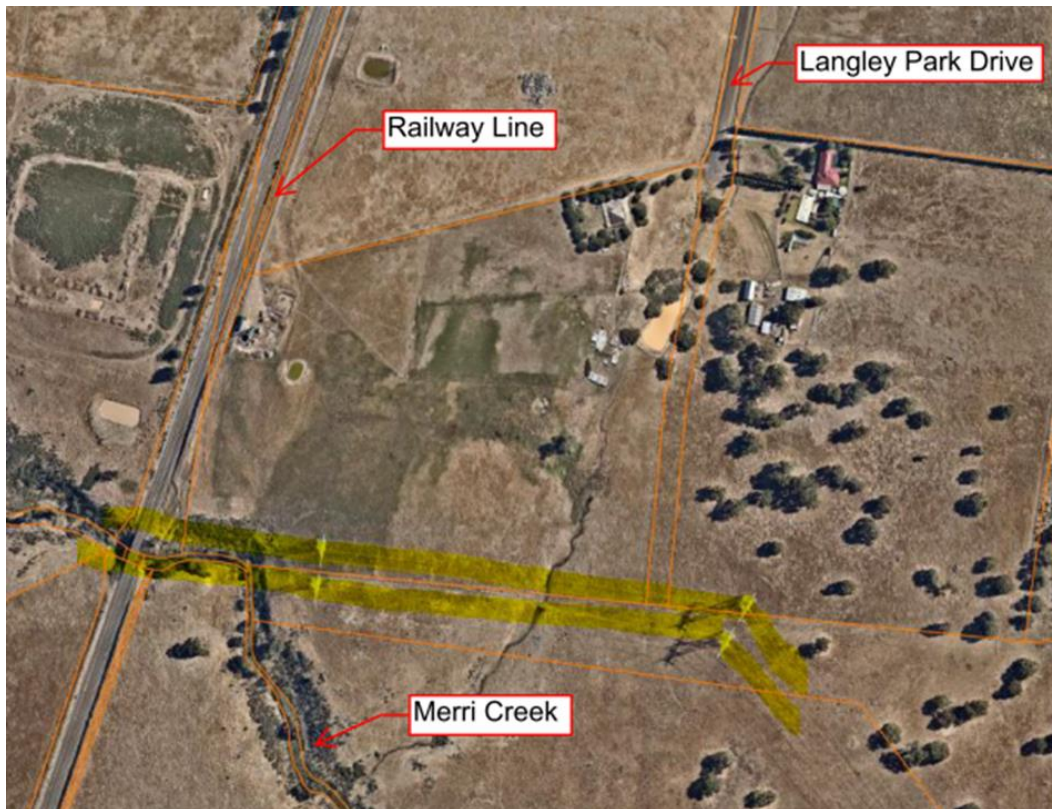


Figure 5-8 Existing Power Transmission Lines

An existing power transmission line easement covering these lines extends from the railway line to the eastern boundary of the quarry site (870 Donnybrook Road), at a width of 190 to 150 m off the southern boundary, as shown in the figure below.

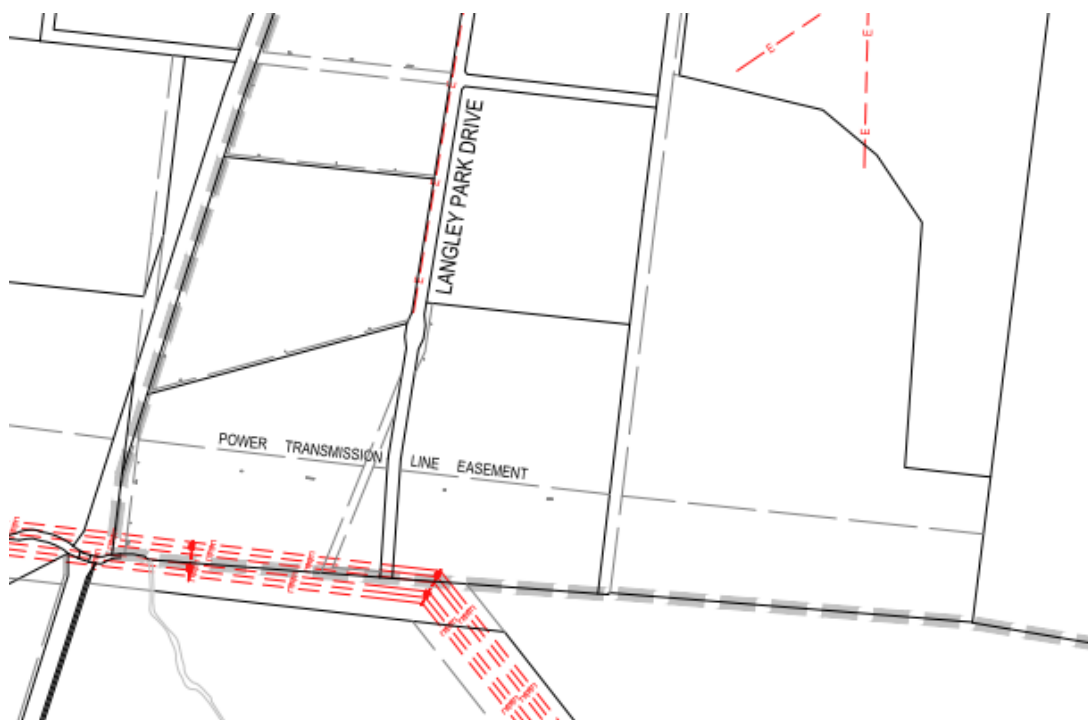


Figure 5-9 Power Transmission Easement

Development within this easement is heavily restricted in accordance with SP Ausnet's 'Guidelines for Subdivision and Development of Land Affected by Transmission Line Easement' contained in Appendix B. Appendix A of this document summarises permitted and prohibited uses within this easement.

5.3.2 Development Infrastructure

Ausnet has advised that the existing overhead power lines located on the northern side of Donnybrook Road include both a 66kV circuit and a 22 kV feeder rated line which is supplied from the Kalkallo zone substation located on the north west corner of the Hume Highway / Donnybrook Road interchange. The 22kV feeder line has capacity to supply initial development of the precincts to the north and south of Donnybrook Road.

A second 22kV distribution feeder line will be required to be extended from the zone substation along Donnybrook Road in the medium term to cater for the loads of further development. This will be installed underground as the existing pole line in Donnybrook Road is at capacity.

The zone substation has capacity for 12 feeder lines with 5 currently in use and a sixth about to be energised. Ausnet require 12 to 18 months lead time for feeder installation and need to monitor load growth to ensure that augmentation of their network is appropriately programmed to cater for demand.

It is expected that the overhead power lines servicing the quarry and in Langley Park Drive will be replaced with underground cables as development in these areas progresses.

5.3.3 Constraints & Opportunities

With the prevalence of existing and proposed services on the northern side of Donnybrook Road, it is expected that the second 22kV distribution feeder would be located underground in the future southern verge of the ultimate Donnybrook Road cross section. The additional land required to widen the Donnybrook Road reservation to the south is to be acquired by VicRoads, typically when each property applies to develop.

The progress of the land acquisitions will need to be monitored against the development loads and feeder capacity, to ensure that the verge space is available when the feeder needs to be installed to maintain supply levels.

The existing power transmission easement in the south west corner of the site restricts development opportunities in this area.

5.4 Gas Supply

APA Group are the authority responsible for the provision of gas supply facilities to the precinct.

5.4.1 Existing Infrastructure

Two existing high pressure gas transmission pipelines (a 300 mm diameter pipeline and a 400 mm diameter pipeline) traverse the eastern end of the precinct from north to south within 1100 Donnybrook Road. The approximate alignment of the pipelines are shown in green in the figure below. The pipelines are contained within an existing 35 m wide easement that follows the alignment of the pipelines.



Figure 5-10 Existing Gas Transmission Pipeline

A City Gate station has been constructed abutting the western edge of the transmission pipeline easement on the southern side of Donnybrook Road as shown in the figure above and highlighted in the figure below. This facility is owned by Australian Gas Networks (AGN) and is managed by APA, and reduces the gas pressure so that it is suitable for distribution and reticulation.



Figure 5-11 Existing Citygate

An existing 300 mm diameter gas distribution main extends west along Donnybrook Road from the Citygate across the full frontage of the precinct and further west, located in the existing northern verge adjacent to the potable water distribution main.

5.4.2 Development Infrastructure

APA Group has advised that gas supply for the precinct will be provided from the existing 300 mm diameter gas distribution line in Donnybrook Road.

5.4.3 Constraints & Opportunities

APA Group has advised that they need to assess changes in land use within the area of the Measurement Length of the pipeline (ML). The ML area is the heat radiation zone associated with a full bore pipeline rupture and applies on both sides of the pipes.

The ML for the 300 mm diameter pipeline is 341 m and for the 400 mm diameter pipeline is 590 m. The greater length of 590 m will apply and this extent is shown on the Gas Plan in Appendix A.

APA seeks to limit sensitive uses within the ML to retain a high level of compliance with applicable safety standards. To this end, APA's preferred position is that the following land uses be located outside of the ML:

- > Aged Care Facilities
- > Retirement Villages
- > Child Care / family day care centres
- > Cinema based entertainment facilities
- > Schools or other educational facilities
- > Prisons / corrective institutions
- > Hospitals and medical centres
- > Places of assembly or worship
- > Retail premises and services stations
- > Higher density residential uses (more than 30 dwellings per ha or 4 storeys or higher)

Other uses that are deemed as substantially used by community members unable to protect themselves from the consequences of pipeline failure may also be restricted within the ML.

APA has advised that a Safety Management Study is required to assess the risk associated with the change in land use within the ML proposed under the PSP. The SMS will also develop appropriate controls on development to reduce risks to as low as reasonably practical.

Preparation and review of the SMS is the statutory responsibility of APA as outlined in Australian Standard 2885.1 2012 (AS 2885). This is the Australian Standard that governs the construction, design, operation and maintenance of petroleum and natural gas pipelines.

Part 3 of AS 2885 contains provisions relating to the obligations of pipeline licensees for when the land use changes. Clause 10 requires the pipeline licensee, in this case APA, to undertake an assessment of the design condition changes. One design condition specifically mentioned is a change in the surrounding or adjacent land use.

APA requires that the 35 m easement over the pipelines is managed to their requirements, which includes maintaining the easement free of inappropriate vegetation and structures. It is APA's preference that road and services construction within the pipeline easement is avoided wherever possible.

APA will consent to periodic road or services crossings of the easement subject to the ultimate asset owners entering into an agreement or licence with APA to cover the area of easement affected. Crossings of the easement are to be perpendicular as much as possible and minimised to APA's satisfaction.

There is potential for the easement to be utilised as a public open space corridor as proposed in the extract below from the Donnybrook / Woodstock PSP which also shows preferred interface arrangements (see also Appendix C).

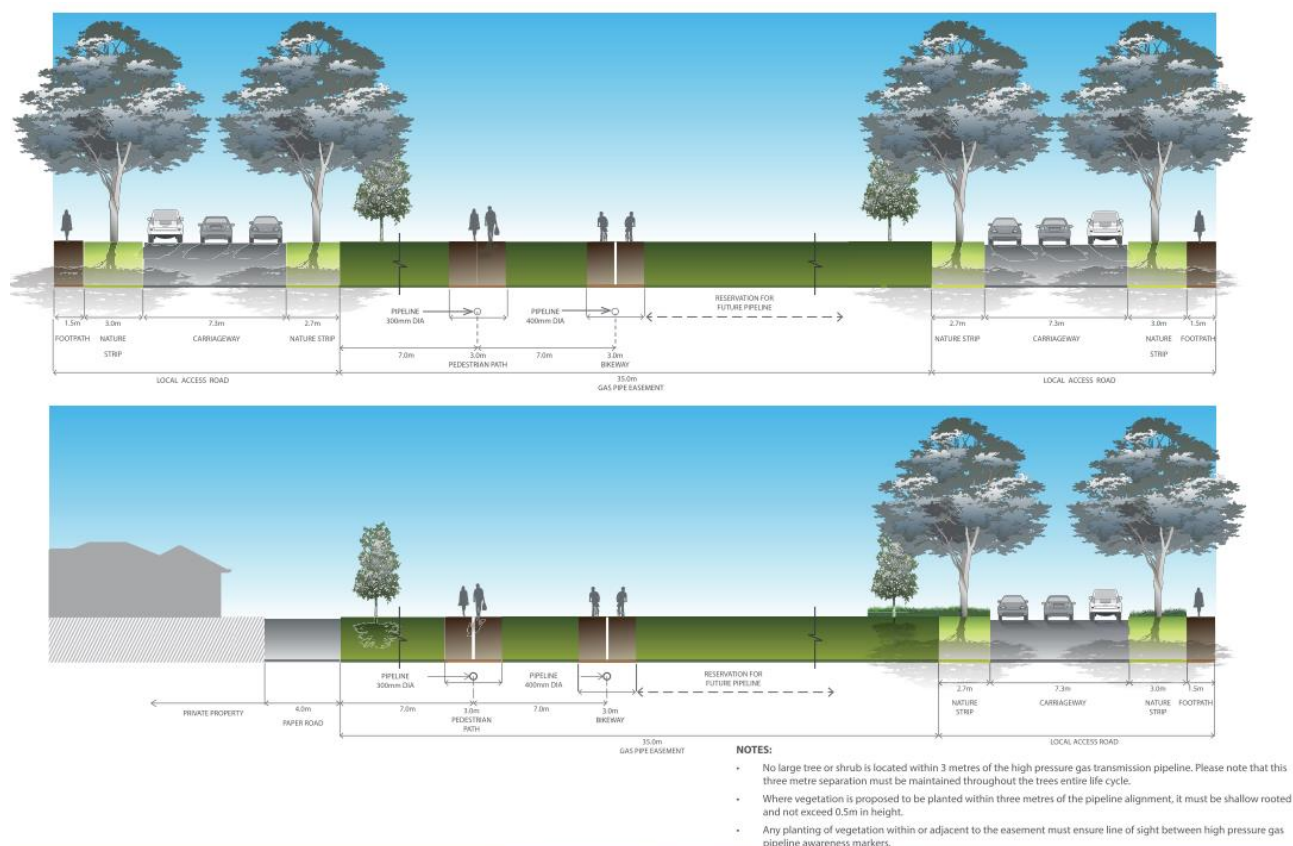


Figure 5-12 Donnybrook PSP Gas Easement

APA has advised that the City Gate is typically a noisy facility and that noise mitigation may be required to ensure that any future nearby development is not impacted upon. As such they recommend that an acoustic assessment of the facility be undertaken during peak operating conditions to allow consideration of the best method of noise mitigation which may include buffers or noise walls.

5.5 Telecommunications

Telstra are the incumbent authority for telecommunications in the area with existing cables providing supply to the rural properties. NBNCo is the provider of last choice for telecommunications to the precinct, however developers have the option of obtaining this service from other licensed telecommunications providers.

5.5.1 Existing Infrastructure

Existing Telstra underground cables are located on the south side of Donnybrook Road extending approximately 500 m to the east of Langley Park Drive, and on the west side of Langley Park Drive. Overhead Telstra cables extend west along Donnybrook Road from this location.

Nextgen telecommunications cables run roughly parallel to the railway line just within the precinct, extending south from Donnybrook Road for approximately 800 m before crossing the railway reserve at Norman Road.

5.5.2 Development Infrastructure

NBNCo has confirmed that the precinct is within their fibre footprint, and that telecommunications facilities can be provided to the precinct without the need for any excessive new infrastructure.

5.6 Donnybrook Road Services Corridor

The Donnybrook Road reservation is a key services corridor for the development of this precinct, and for the Donnybrook and Woodstock precincts to the north. Previous services planning work undertaken for the latter precincts has largely resolved the locations of the various trunk services required to be extended along Donnybrook Road, as shown in the following extract from page 50 of the Donnybrook Road PSP.

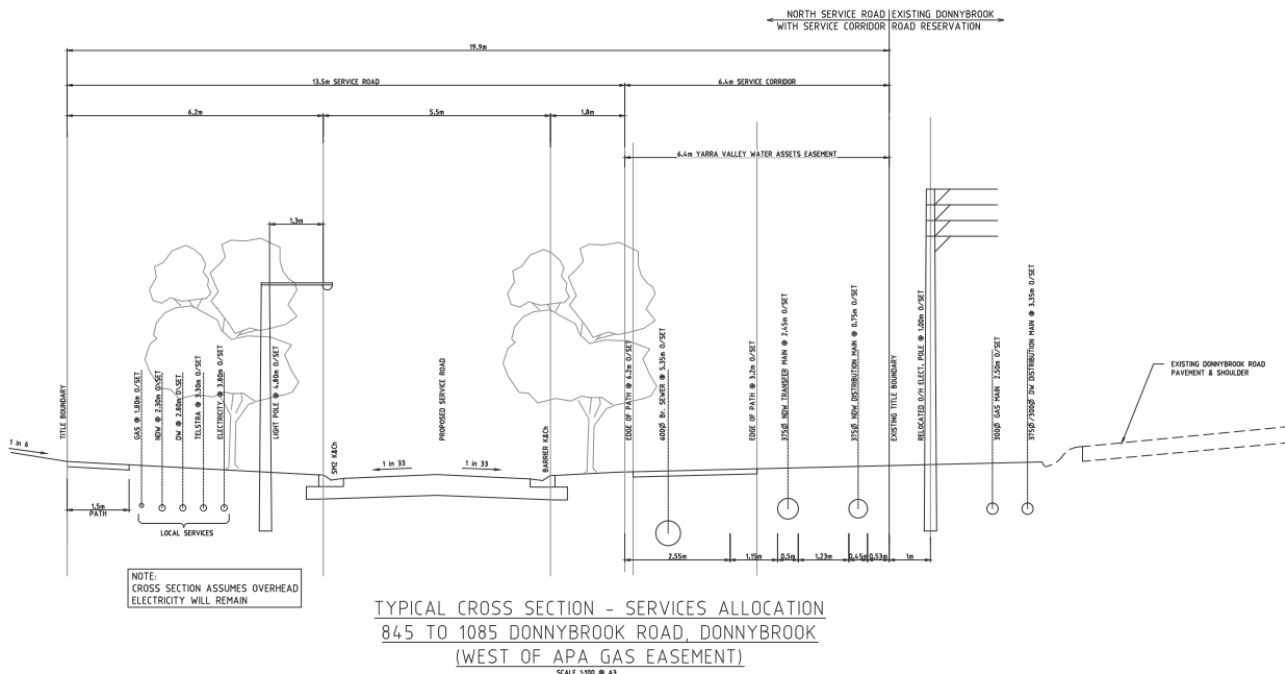


Figure 5-13 Donnybrook Road Northern Services Corridor

The available verge space on the northern side of the existing Donnybrook Road pavement has been utilised for the installation of the existing drinking water and gas mains and the relocated overhead electricity lines. A services corridor is to be provided within the properties on the northern side of Donnybrook Road to allow for the installation of the sewer and non-drinking water mains that are required.

The southern verge of the ultimate duplicated Donnybrook Road cross section will be available for the future installation of the second electricity supply feeder when this land is acquired by VicRoads, and other local services if required.

6 Conclusion & Recommendations

Our investigations have determined that the infrastructure required to cater for the development of the Shenstone Park precinct can be readily provided within the framework of the infrastructure planning for the precinct by the relevant authorities. The planning of the Donnybrook and Woodstock PSP's has substantially progressed the extension of services along Donnybrook Road which is the main services corridor for both these precincts and the Shenstone Park precinct.

There are a number of existing and proposed trunk services facilities and pipelines within or adjacent to the precinct that have the potential to impact on adjacent development and these impacts need to be considered in the further planning of the precinct. These include the following:

- > YVW's proposed Recycled Water Treatment Plant
- > YVW's proposed pipe track along the western boundary of the precinct
- > YVW's proposed Sewer Pump Station in the south east of the precinct
- > Existing power transmission lines in the south west of the precinct
- > APA's existing gas transmission pipelines and associated easement
- > AGN's existing City Gate station

Specifically, a Safety Management Study is required to assess the interface between the gas transmission pipelines and development. An acoustic assessment of the City Gate station is also recommended prior to development.

The provision of a second electrical distribution feeder line along Donnybrook Road will be required in the medium term. However this could be constrained if VicRoads has not acquired the full road reserve on the south side of Donnybrook Road. The timing of the new feeder should be regularly reviewed against the progress of the road reserve acquisition.

Shenstone Park Precinct Structure
Plan

APPENDIX

A

PRECINCT SERVICES PLANS

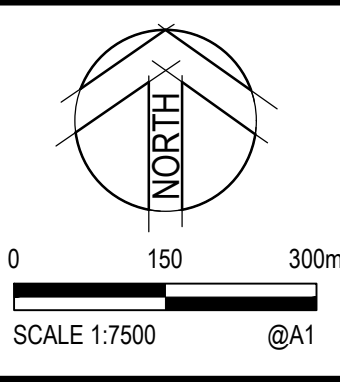
DATE PLOTTED: 17 July 2017 3:10 PM BY: JORDAN ORMEROD

XR-V162183-CI-CONTOURS; XR-V162183-CI-VICMAP; XR-V162183-CI-SERVICES; XR-V162183-CI-NEARMAP
CAD File: M:\2016\2001_2500\162183_Shenstone_Park_Sewer\Civil\Drafting\162183-CI-1001-1006.dwg



LEGEND	
	PRECINCT BOUNDARY
	EXISTING SEWER
	PROPOSED SEWER
	EXISTING SEWER PUMP STATION
	EXISTING RISING MAIN
	PROPOSED RISING MAIN
	PROPOSED RISING MAIN PUMP STATION
	EXISTING POTABLE WATER
	PROPOSED POTABLE WATER
	EXISTING RECYCLED WATER
	PROPOSED RECYCLED WATER
	WATER STORAGE TANK SITE
	EXISTING GAS
	PROPOSED GAS
	EXISTING CITY GATE
	EXISTING ELECTRICITY NETWORK
	PROPOSED ELECTRICITY NETWORK
	EXISTING TELECOMMUNICATION
	PROPOSED TELECOMMUNICATION
	PROPOSED SIGNALISED INTERSECTION

Rev.	Date	Description	Des.	Verif.	Appd.
2	17/07/2017	PRELIMINARY ISSUE			N.G.
1	15/06/2017	PRELIMINARY ISSUE			N.G.



© Cardno Limited All Rights Reserved.
This document is produced by Cardno Limited solely for the benefit of and use by the client in accordance with the terms of the retainer. Cardno Limited does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by third party on the content of this document.



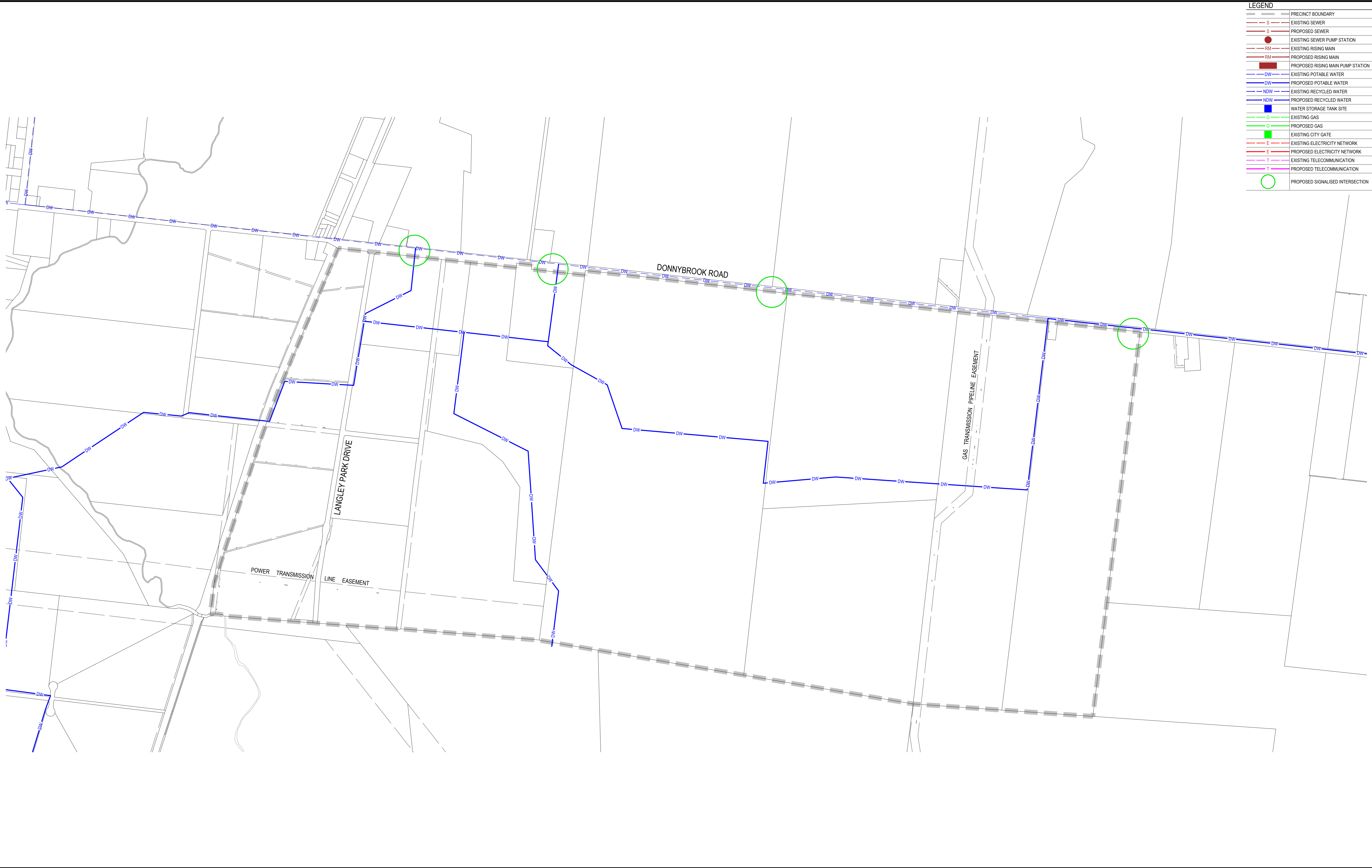
Cardno
Shaping the Future

Cardno Victoria Pty Ltd | ABN 47 106 610 913
Level 4, 501 Swanston Street
Melbourne VIC 3000
Tel: 03 8415 7777 Fax: 03 8415 7788
Web: www.cardno.com.au

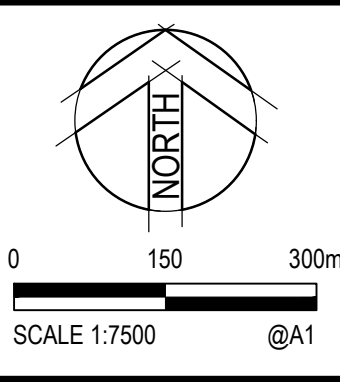
Drawn T.C.W.	Date	Client CITY OF WHITTLESEA AND VPA
Checked	Date	Project SHENSTONE PARK PSP
Designed N.G.	Date	Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES
Verified	Date	Scale 1:7500
Approved	Date	Size A1
Title PRECINCT SERVICES SEWER PLAN		Drawing Number V162183-CI-1001
		Revision 2

DATE PLOTTED: 15 June 2017 1:46 PM BY: TIM WILSON

XREFs: XR-V162183-CI-CONTOURS; XR-V162183-CI-VICMAP; XR-V162183-CI-SERVICES; XR-V162183-CI-NEARMAP
CAD File: M:\2016\2001_2500\162183_Shenstone_Park_Servicing\Civil\Drafting\162183-CI-1001-1006.dwg



Rev.	Date	Description	Des.	Verif.	Appd.
1	15/06/2017	PRELIMINARY ISSUE	N.G.		



© Cardno Limited All Rights Reserved.
This document is produced by Cardno Limited solely for the benefit of and use by the client in accordance with the terms of the retainer. Cardno Limited does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by third party on the content of this document.



Cardno
Shaping the Future

Cardno Victoria Pty Ltd | ABN 47 106 610 913
Level 4, 501 Swanston Street
Melbourne VIC 3000
Tel: 03 8415 7777 Fax: 03 8415 7788
Web: www.cardno.com.au

Drawn T.C.W.	Date	Client CITY OF WHITTLESEA AND VPA
Checked	Date	Project SHENSTONE PARK PSP
Designed N.G.	Date	Title PRECINCT SERVICES DRINKING WATER PLAN
Verified	Date	Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES
Approved	Date	Scale 1:7500
		Size A1
		Drawing Number V162183-CI-1002
		Revision 1

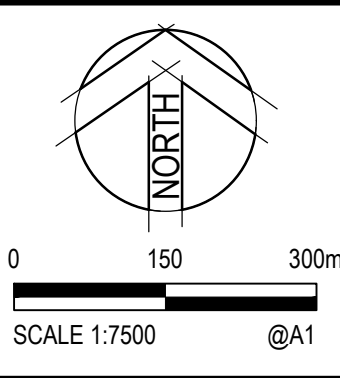
DATE PLOTTED: 15 June 2017 14:17 PM BY: TIM WILSON

XREFs: XR-V162183-CI-CONTOURS; XR-V162183-CI-VICMAP; XR-V162183-CI-SERVICES; XR-V162183-CI-NEARMAP
CAD File: M:\2016\2001_2500\162183_Shenstone_Park_Servicing\Civil\Drafting\162183-CI-1001-1006.dwg



LEGEND	
	PRECINCT BOUNDARY
	EXISTING SEWER
	PROPOSED SEWER
	EXISTING SEWER PUMP STATION
	EXISTING RISING MAIN
	PROPOSED RISING MAIN
	PROPOSED RISING MAIN PUMP STATION
	EXISTING POTABLE WATER
	PROPOSED POTABLE WATER
	EXISTING RECYCLED WATER
	PROPOSED RECYCLED WATER
	WATER STORAGE TANK SITE
	EXISTING GAS
	PROPOSED GAS
	EXISTING CITY GATE
	EXISTING ELECTRICITY NETWORK
	PROPOSED ELECTRICITY NETWORK
	EXISTING TELECOMMUNICATION
	PROPOSED TELECOMMUNICATION
	PROPOSED SIGNALISED INTERSECTION

Rev.	Date	Description	Des.	Verif.	Appd.
1	15/06/2017	PRELIMINARY ISSUE	N.G.		



© Cardno Limited All Rights Reserved.

This document is produced by Cardno Limited solely for the benefit of and use by the client in accordance with the terms of the retainer. Cardno Limited does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by third party on the content of this document.

Cardno
Shaping the Future

Cardno Victoria Pty Ltd | ABN 47 106 610 913
 Level 4, 501 Swanston Street
 Melbourne VIC 3000
 Tel: 03 8415 7777 Fax: 03 8415 7788
 Web: www.cardno.com.au

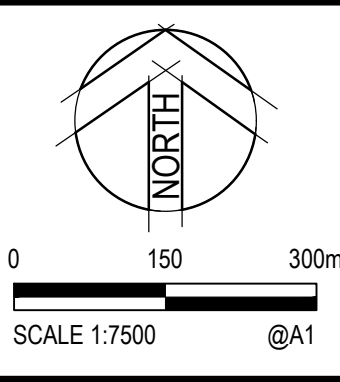
Drawn T.C.W.	Date	Client CITY OF WHITTLESEA AND VPA	
Checked	Date	Project SHENSTONE PARK PSP	
Designed N.G.	Date	Title PRECINCT SERVICES NON DRINKING WATER PLAN	
Verified	Date		
Approved	Date	Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES	
		Drawing Number V162183-CI-1003	Revision 1
		Scale 1:7500	Size A1

DATE PLOTTED: 15 June 2017 1:48 PM BY: TIM WILSON

XREFs: XR-V162183-CI-CONTOURS; XR-V162183-CI-VICMAP; XR-V162183-CI-SERVICES; XR-V162183-CI-NEARMAP
 CAD File: M:\2016\2001_2500\162183_Shenstone_Park_Servicing\Civil\Drafting\162183-CI-1001-1006.dwg



Rev.	Date	Description	Des.	Verif.	Appd.
1	15/06/2017	PRELIMINARY ISSUE	N.G.		



© Cardno Limited All Rights Reserved.
 This document is produced by Cardno Limited solely for the benefit of and use by the client in accordance with the terms of the retainer. Cardno Limited does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by third party on the content of this document.

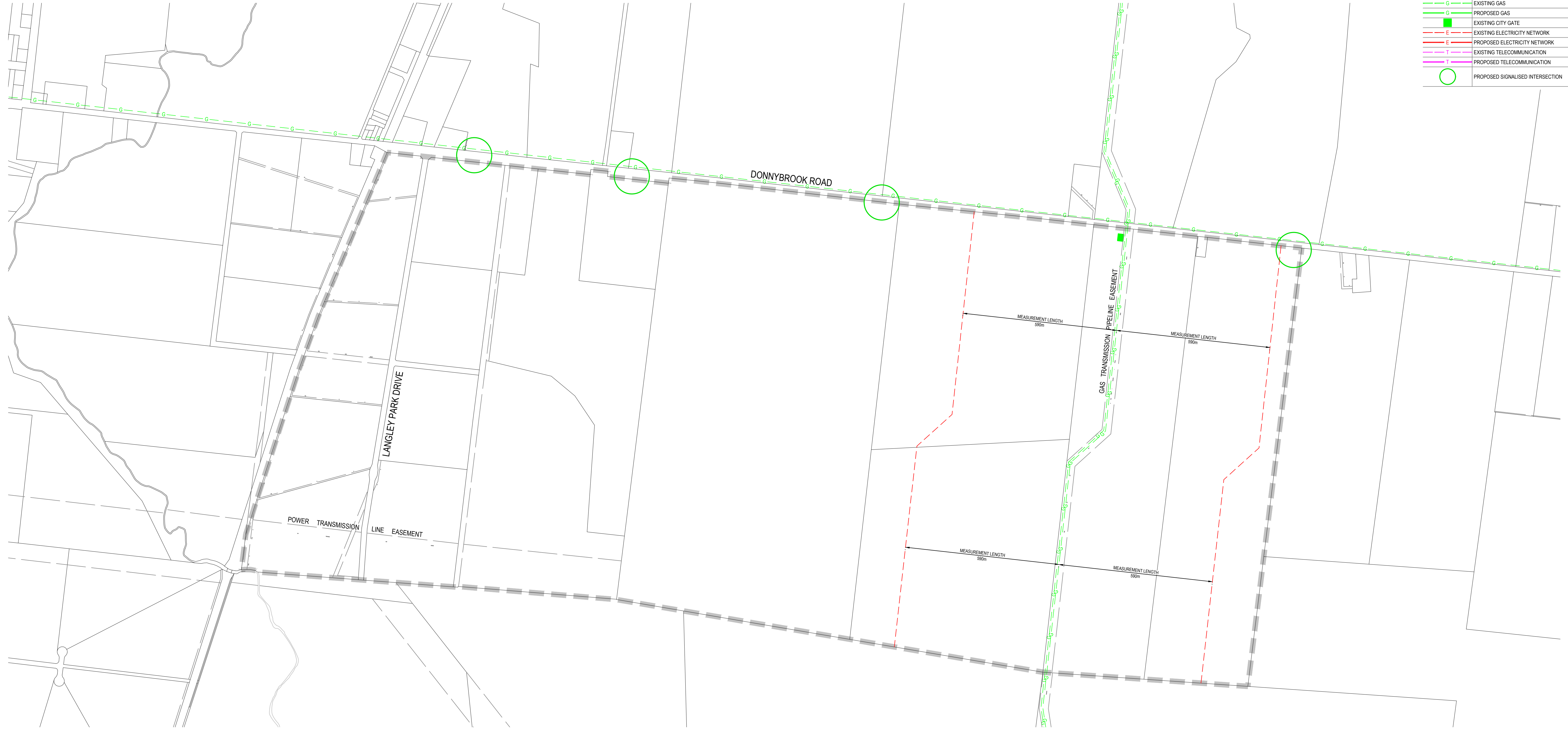
Cardno
Shaping the Future

Cardno Victoria Pty Ltd | ABN 47 106 610 913
 Level 4, 501 Swanston Street
 Melbourne VIC 3000
 Tel: 03 8415 7777 Fax: 03 8415 7788
 Web: www.cardno.com.au

Drawn T.C.W.	Date	Client CITY OF WHITTLESEA AND VPA
Checked	Date	Project SHENSTONE PARK PSP
Designed N.G.	Date	Title PRECINCT SERVICES ELECTRICAL PLAN
Verified	Date	
Approved	Date	
Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
Drawing Number V162183-CI-1004		Scale 1:7500
Revision 1		Size A1

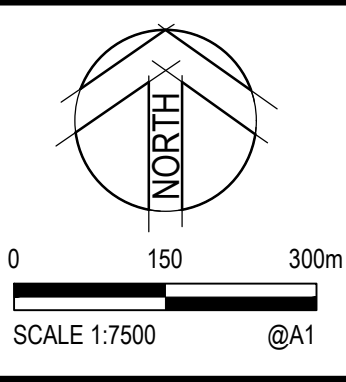
DATE PLOTTED: 17 July 2017 3:07 PM BY: JORDAN ORMEROD

XREFs: XR-V162183-CI-CONTOURS; XR-V162183-CI-VICMAP; XR-V162183-CI-SERVICES; XR-V162183-CI-NEARMAP
CAD File: M:\2016\2001_2500\162183_Shenstone_Park_Servicing\Civil\Drafting\162183-CI-1001-1006.dwg



LEGEND	
	PRECINCT BOUNDARY
	EXISTING SEWER
	PROPOSED SEWER
	EXISTING SEWER PUMP STATION
	EXISTING RISING MAIN
	PROPOSED RISING MAIN
	PROPOSED RISING MAIN PUMP STATION
	EXISTING POTABLE WATER
	PROPOSED POTABLE WATER
	EXISTING RECYCLED WATER
	PROPOSED RECYCLED WATER
	WATER STORAGE TANK SITE
	EXISTING GAS
	PROPOSED GAS
	EXISTING CITY GATE
	EXISTING ELECTRICITY NETWORK
	PROPOSED ELECTRICITY NETWORK
	EXISTING TELECOMMUNICATION
	PROPOSED TELECOMMUNICATION
	PROPOSED SIGNALISED INTERSECTION

Rev.	Date	Description	Des.	Verif.	Appd.
2	17/07/2017	PRELIMINARY ISSUE			N.G.
1	15/06/2017	PRELIMINARY ISSUE			N.G.



© Cardno Limited All Rights Reserved.
This document is produced by Cardno Limited solely for the benefit of and use by the client in accordance with the terms of the retainer. Cardno Limited does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by third party on the content of this document.

Cardno
 Shaping the Future

Cardno Victoria Pty Ltd | ABN 47 106 610 913
 Level 4, 501 Swanston Street
 Melbourne VIC 3000
 Tel: 03 8415 7777 Fax: 03 8415 7788
 Web: www.cardno.com.au

Drawn J.C.W.	Date	Client CITY OF WHITTLESEA AND VPA
Checked	Date	Project SHENSTONE PARK PSP
Designed N.G.	Date	Title PRECINCT SERVICES GAS PLAN
Verified	Date	
Approved	Date	
		Status PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES
Drawing Number V162183-CI-1005		Scale 1:7500
		Size A1
		Revision 2



***SP AusNet
Business Services
Property Group***

GUIDELINES FOR SUBDIVISION AND DEVELOPMENT OF LAND AFFECTED BY TRANSMISSION LINE EASEMENTS

For the purposes of this document, all reference to SPI PowerNet means SP AusNet. SPI PowerNet is the electricity transmission company operating under the SP AusNet brand name. SP AusNet also has an electricity distribution business (SPI Electricity) and a gas distribution business (SPI Networks).

Information for use by land owners, planners and developers in the planning and implementing of subdivisions, consistent with SPI PowerNet requirements for high voltage, overhead power line easements.

GUIDELINES FOR SUBDIVISION AND DEVELOPMENT OF LAND AFFECTED BY EASEMENTS

CONTENTS

1. INTRODUCTION	3
1.1 Purpose of Guidelines	3
1.2 Preliminary Planning for Subdivision	3
1.3 Process for Approval of Subdivision Planning Applications	4
1.4 Process for Approval of Construction Works	5
1.5 Costs for Evaluations, Asset Relocations and Line Outages	6
2. PLANNING APPROVAL OF SUBDIVISIONS.....	7
2.1 Summary of SPI PowerNet Requirements	7
2.2 Easement Verification and Adjustment.....	8
2.3 Allotment Size.....	9
2.4 Allotment Boundary Locations.....	9
2.5 Roads in the Vicinity of Easements	10
2.6 Roads Crossing Easements	10
2.7 Provision of Services to Allotments	11
3. APPROVAL OF ENGINEERING DESIGN DRAWINGS.....	12
3.1 Buildings and Structures.....	12
3.2 Fences.....	12
3.3 Roadside and Allotment Services.....	13
3.4 Ground Surface Level Changes	13
3.5 Tree Plantings	14
3.6 Protection of Line Support Towers and Poles	14
3.7 Access for Line Maintenance and Construction	15
4. APPROVAL OF CONSTRUCTION WORKS	17
4.1 Conditions on Design Approval	17
4.2 Control of Construction Works.....	17
4.3 Construction Equipment Authorisation	18
4.4 Use of Explosives	18
4.5 Protection of Underground Cables	19
APPENDIX A - Permitted and Prohibited Uses of Power Line Easements.....	21
APPENDIX B - Layout of Subdivisions to Avoid Electric Hazards	23

GUIDELINES FOR SUBDIVISION AND DEVELOPMENT OF LAND AFFECTED BY EASEMENTS

1. INTRODUCTION

1.1 Purpose of Guidelines

SPI PowerNet Pty Ltd has a statewide network of overhead high voltage power lines, operating at voltages of 220,000 volts (220kV) up to 500,000 volts (500kV). These are generally steel lattice tower lines constructed within easements, which are recorded on the Certificate of Title of each affected property. The width of the easement is largely dependent on the number of existing and provision for future lines and their voltages. Some lines within SPI PowerNet's easements operate at lower voltages up to 66kV and are supported on smaller steel towers or wood or concrete poles. Whilst these lower voltage lines are located on SPI PowerNet's easements, they are operated and maintained by the local electricity distribution company.

SPI PowerNet does not own the land affected by the easement, but has the right to enter and use the easement for line construction, operation, patrol and maintenance purposes and to restrict activities carried out on the easement by others so that the initial high public safety, line reliability and bushfire prevention standards are maintained.

These guidelines provide information concerning SPI PowerNet requirements where subdivision and development of land subject to high voltage power line easements is proposed. It has been produced to assist with the planning and implementing of subdivisions, consistent with the SPI PowerNet's easement rights and the responsibility to protect people living, working and playing near the high voltage lines against electrical or other hazards that could cause serious injury or death.

Subdivision Planning Permit and Certification applications and Engineering design drawings that clearly comply with the requirements stated by these guidelines can be readily approved by SPI PowerNet. Proposals that do not clearly comply will require early consultation to determine whether approval can be given.

Landowners and developers are welcome to discuss the requirements with SPI PowerNet's Assets Department, on:

Telephone **9695 6000**

Early and confidential consultation, prior to a Planning Permit application or drafting of detailed design drawings, would enable a subdivision layout to be optimised in the shortest practicable time.

1.2 Preliminary Planning for Subdivision

Preliminary planning for subdivision of property with an overhead power line easement should take into consideration the general information given in Appendix A concerning permitted and prohibited uses of high voltage line easements.

Planners should also be aware that the way in which land affected by high voltage power line easements is subdivided can have a significant effect on factors such as:

- Visual amenity of the area;
- Costs for fencing and servicing allotments (particularly electricity, street lighting, telephone, gas and water), consistent with prudent public safety requirements;

- Inconvenience and costs to SPI PowerNet and allotment owners caused by requirements for vehicle access for line construction, patrol and maintenance; and
- Public perception of possible adverse health effects from the electric and magnetic fields (EMFs) coming from the power lines.

Subdivision planners have an obligation to consider community values and attitudes to the visibility and safety of high voltage power lines when laying out allotments and roads. Since it is appropriate that the visibility aspects of planning be controlled by the developer and by the planning authority, it is not considered further by these guidelines.

The question of whether or not exposure to EMFs causes adverse health effects is unresolved. There is worldwide scientific consensus that such effects have not been established, but that more research should be undertaken. SPI PowerNet keeps the issue under close scrutiny, takes advice from health authorities and participates in EMF research.

1.3 Process for Approval of Subdivision Planning Applications

As a Referral Authority under the current legislation (Planning and Environment Act 1987), SPI PowerNet is consulted by the Responsible Authority (usually the appropriate Municipal Council) concerning its requirements for each subdivision planning permit application, whenever a high voltage power line easement is affected.

The steps involved in gaining approval of proposed subdivisions are:

- Issue of a Planning Permit by the Municipality. Permit conditions requested by SPI PowerNet and other Referral Authorities could normally be expected for any permit issued.
- Certification of the final, fully dimensioned Plan of Subdivision by the Municipality, following approval by the Referral Authorities.
- Issue of a Statement of Compliance by the Municipality, following advice from the Referral Authorities that the permit conditions have been satisfied, to enable registration of the Plan of Subdivision by the Land Titles Office.

For subdivisions affecting high voltage power line easements, the following SPI PowerNet requirements would normally be included as Planning Permit conditions:

- Written agreement to the final plan of subdivision must be obtained from SPI PowerNet prior to certification;

and; if roads or installation of services are proposed on the easement:

- Written approval of detailed construction plans (Engineering design drawings) for the proposed works must be obtained from SPI PowerNet prior to issue of the Statement of Compliance.

The SPI PowerNet response to a Planning Permit application may include comments concerning issues identified that must be considered in finalising the subdivision layout for Certification. Objection to an application would generally be made only if the amendments required would significantly affect the nature of the proposed subdivision.

SPI PowerNet consent to Certification of the final Plan of Subdivision is dependent on supply of full and satisfactory dimensional information showing the easement satisfactorily located in relation to the power line(s).

SPI PowerNet consent to issue of the Certificate of Compliance is dependent on prior approval of the Engineering design drawings, including satisfactory provision for the requirements outlined by these guidelines.

SPI PowerNet requirements for approval of Subdivision Planning Permit applications are stated in Section 2 of these guidelines.

1.4 Process for Approval of Construction Works

SPI PowerNet requires to approve all proposals for construction works affecting power line easements, including those for which Planning Permits are required, to ensure that public safety and SPI PowerNet's easement rights are preserved.

Approval is generally a two-stage process, as follows:

- (i) Engineering design drawings of proposed construction works, or any proposed alterations to previously approved designs, must be submitted to and be approved by SPI PowerNet prior to commencement of the works.

Applications for approval of design drawings are required to be submitted to:

**Property Group
SP AusNet
Locked Bag 14051
MELBOURNE MAIL CENTRE VIC 8001**

Information concerning SPI PowerNet requirements for approval of Engineering design drawings is given in Section 3 of these guidelines.

- (ii) The contractor performing the work on site must also contact SPI PowerNet at least five working days prior to any work commencing, so that the proposed construction works methods can be reviewed and any safety precautions deemed necessary can be taken.

However, the prior notice period becomes at least ten working days should there be a requirement for use of vehicles, machinery or other equipment exceeding 3 metres maximum operating height, or any equipment with an elevating component. The use of such equipment in the vicinity of power lines must be in accordance with the requirements of the Electricity Safety (Network Assets) Regulations 1999.

The factors considered by SPI PowerNet for approval of construction works are outlined in Section 4 of these guidelines.

1.5 Costs for Evaluations, Asset Relocations and Line Outages

There are no fees payable to SPI PowerNet for evaluation of Planning Applications or for supply of asset location information, such as record plans required for preparation of detailed construction design drawings.

However, SPI PowerNet will recover all of its costs in cases where SPI PowerNet assets require relocation, protection or modification in some way or where a significant design input is required for assessment of Engineering design drawings for a construction project. In such cases, SPI PowerNet will advise the party initiating the work of the intention to recover costs, the extent of costs involved and timing of the work, so that a funding agreement can be established prior to the commencement of the SPI PowerNet design work.

Costs for assessment of required equipment operating constraints and for any line outages required to carry out the work, including temporary earthing of the conductors, will also be recovered from the constructor.

2. PLANNING APPROVAL OF SUBDIVISIONS

2.1 Summary of SPI PowerNet Requirements

PowerNet requirements for approval of subdivision planning applications that include land affected by high voltage power line easements are summarised as follows. Further information, including the basis of each requirement, is provided in the following Sub-sections 2.2 to 2.7:

- **Easement Verification and Adjustment**

Plans of subdivision submitted for certification and referred to SPI PowerNet will not be approved unless the easement as shown on the plan accords with the actual position of the power line(s) as verified by survey connections and computation.

- **Allotment Size**

SPI PowerNet advises that the unencumbered portion of lots affected by a high voltage power line easement should have a similar area to the area of nearby lots not affected by the easement.

- **Allotment Boundary Locations**

Plans of Subdivision submitted for Certification and referred to SPI PowerNet will not be approved if proposed lot boundaries are located within 4 metres of existing or planned future tower leg steel or poles.

However, the following larger separation distances and other dimensional requirements should be provided where practicable:

- For urban residential subdivisions with wood fences, lot boundaries should be located 15 metres from any face of a steel tower base where practicable. Not less than 4 metres clearance is permitted between any tower face and the boundary.
- Lot boundaries for industrial, rural and rural residential subdivisions that generally have metallic fences (including post and wire fences) should not exceed 100 metres in length on the easement or 250 metres in length on and within 20 metres of the easement. They should also be located at least 30 metres from the centre of existing and proposed towers, unless a reduced distance is advised by SPI PowerNet (Refer Appendix B).

- **Roads Crossing Easements**

Plans of Subdivision submitted for Certification and referred to SPI PowerNet will not be approved if proposed road reserve boundaries are located within 30 metres of the nearest tower centre, unless prior consultation satisfactory to SPI PowerNet has occurred.

Engineering design drawings for proposed works on the easement, including surface level changes, heights of lighting poles and locations of services need to be approved by SPI PowerNet before agreement can be given to the issue of the Statement of Compliance for the subdivision.

Height restrictions on the operation of vehicles and construction equipment must be carefully considered in planning the subdivision, since significant cost implications for installation of roadside services may be involved.

- **Roads Within and Alongside Easements**

Planning permit applications and/or plans of subdivision referred to us that include proposed roads will not be approved by SPI PowerNet where the total length of the road reserve clearly exceeds the 100/250 metre length limits stated in Appendix B, unless prior agreement by SPI PowerNet has been obtained concerning the arrangements made for installation of services and road lighting and for protection of towers.

As for roads crossing easements, height restrictions on operation of vehicles and construction equipment on the easement must be carefully considered and SPI PowerNet approval of Engineering design drawings for works on the easement is required prior to issue of the Statement of Compliance.

- **Provision of Services to Allotments**

SPI PowerNet approval of Engineering design drawings for all works on the easement is required prior to issue of the Statement of Compliance.

2.2 Easement Verification and Adjustment

There is a need for accurate definition of power line easements, given the land use restrictions required for safe and reliable operation of the power lines.

The area shown on the Certificate of Title as "easement to the SECV (i.e. SPI PowerNet) for transmission of electricity" is intended to cover a specific corridor of land overlaying the route of the transmission line. This corridor is dimensioned by computation of electrical safety clearance distances appropriate to the design of the line and its operating parameters and is positioned by survey connection to title of the proposed power line centreline. Modern title re-establishment surveys sometimes reveal that the recorded easement location does not coincide precisely with the actual position of the existing power lines in the way originally intended.

There are a number of reasons why this may be the case. These relate to the nature of land title boundary definition, the age of the line and the nature of easement creation surveys:

- Differences over time in the position of adopted title boundaries due to the nature of title re-establishment. This is most likely to happen in areas that have not been re-surveyed since the early days of land subdivision;
- Early power line easements were surveyed using methods and equipment less sophisticated than they are now. As the land affected was predominantly rural, accepted tolerances were greater than what is now required for residential and commercial/industrial subdivisions; and
- Easement creation surveys are generally not as comprehensive as surveys for subdivision of land and so are subject to amendment when a difference is revealed.

It is important that the consulting surveyor contacts SPI PowerNet as early as possible in the development process so that any need for easement variation can be identified before detailed design of the subdivision is started. This is especially relevant when lot or reserve boundaries are proposed to be based on the easement boundary.

The location of the easement boundaries will be re-computed using the consulting surveyor's re-establishment of the title. Connections from the re-establishment survey to the power line centreline as defined by the towers or poles are necessary for this computation. This process should be discussed with SPI PowerNet. The new easement dimensions and connections to title will be provided to the developer's surveyor for inclusion in the plan of subdivision.

An appropriate adjustment to the easement location is generally achieved on the plan of subdivision without the need for new easement creation or surrender procedures under the Transfer of Land Act. SPI PowerNet can provide details covering the notations required for the plan and on receipt of the plan showing the amended easement, will provide a letter authorising the variation addressed to the Registrar of Titles.

2.3 Allotment Size

Since buildings and structures, including swimming pools, are not permitted on high voltage power line easements, except for limited concessions regarding domestic outbuildings on 220 kV line easements, residential lots that are not large enough to accommodate a house, garage, swimming pool, etc. on land clear of the easement will be less useable than allotments of the same size that are not affected by the easement.

The expectations of a purchaser to be able to develop their land to a level comparable with that of neighbouring allotments that are unaffected by the easement is considered by SPI PowerNet to be an important consideration in planning a subdivision.

Similarly, planning of industrial lots should take into account the requirements that generally prohibit the storage of materials and the parking, loading and unloading of large trucks on the easement.

Therefore, as a general principle, SPI PowerNet considers that the unencumbered portion of lots affected by a high voltage power line easement should be similar in area to the whole area of nearby lots planned for comparable use that are not affected by the easement.

However, since lot size is primarily a matter for control by the developer and by the Responsible Authority, SPI PowerNet does not normally object to a subdivision based on a comparative land use disadvantage for lots affected by easement.

2.4 Allotment Boundary Locations

Lot boundaries on transmission line easements should be located in consideration of prudent public safety measures, SPI PowerNet requirements for vehicle access to and between towers and the associated inconvenience caused to SPI PowerNet and to lot owners.

Installation of gates in fences on the easement is required where direct access to tower sites from public roads is not available. The number of gates, safety requirements (including special design of metallic fences) and the level of inconvenience is influenced by the number of lot boundaries intersecting the access route provided by the subdivision and on the separation distances provided between lot boundary fences and towers. Established SPI PowerNet access tracks should be preserved, unless a satisfactory alternative is agreed.

The minimum and preferred separation distances between allotment boundaries and towers stated in Section 2.1 are based on the following fencing issues:

- (i) Minimum of 4 metres between fences and the nearest face of the steel tower base - to provide for reasonable access around the tower base and permit use of standard electrical safety procedures by SPI PowerNet line maintenance personnel;
- (ii) Requirements for access gates to enter adjacent allotments for normal line maintenance activities are minimised where fences are located at least 15 metres from the nearest face of 500 kV and 330 kV towers, or 10 metres from 275 kV, 220 kV and 66 kV towers;

- (iii) The increased separation distances to towers and length limits for industrial, rural and rural residential subdivision lot boundaries stated in Appendix B, Tables 1 and 2, are based on avoiding the need for earthing and sectionalising of metallic fences, in accordance with Section 3.2 of these guidelines.

SPI PowerNet's requirements for working space around towers is explained further in Section 3.7 of these guidelines.

2.5 Roads in the Vicinity of Easements

Roads in the vicinity of transmission lines can potentially have an adverse effect on maintaining existing high standards of safety and security of the lines.

Roads within transmission line easements that run parallel or cut at an angle of less than 45 degrees to the power line/s are generally not permitted.

Proposed roads that are adjacent to an existing or future transmission line, but outside the easement, and are shorter than the maximum lengths as stated in Appendix B, Table 1, are generally acceptable, subject to SPI PowerNet approval of Engineering design drawings for works prior to issue of the Statement of Compliance for the subdivision.

Controls on road lengths in close proximity to high voltage power lines are required to limit the voltages that can be induced in roadside metallic objects and services to safe values.

The visibility of the line, exposure of towers to damage, hazards to SPI PowerNet maintenance personnel from road vehicles and the need to control service extensions for further subdivision development and later service upgradings or replacement works are additional factors requiring consideration.

Therefore, SPI PowerNet agreement to roads in the vicinity of high voltage transmission line easements is dependent on the total length of road proposed near the easement and satisfactory advice from the developer concerning the design provisions made that will limit induced voltages in metallic objects and services to safe values.

While it may prove possible, in some locations, to vary the maximum road and metallic service lengths stated in Appendix B, Table 1, this would be dependent on satisfactory results of detailed site investigations and calculations by SPI PowerNet based on the electrical design parameters of the affected line. Pre-payment by the developer of a fixed price for the study would normally be required and the response time would be dependent on other SPI PowerNet works commitments at the time.

- **Construction Equipment Height Restrictions**

The cost implications of height restrictions for vehicles and construction equipment required to be used on the easement are potentially more significant for roads along easements than for roads crossing easements and must also be carefully considered in planning the subdivision.

2.6 Roads Crossing Easements

- **Proximity to Towers and Poles**

Planned roads that directly cross an easement further from existing and future towers than the minimum separation distances stated in Appendix B, Table 1 (measured to the nearer road reserve boundary) are generally acceptable, subject to SPI PowerNet approval of Engineering design drawings for works on the easement prior to issue of the Statement of Compliance for the subdivision.

SPI PowerNet agreement to closer roads is dependent on satisfactory advice from the developer concerning the following:

- Surface level changes proposed on the easement;
- Provision for installation of roadside services;
- Provision for road lighting; and
- Road design near towers and measures planned to protect SPI PowerNet line maintenance personnel and prevent damage to towers.

Details of specific SPI PowerNet requirements for these factors are given in Section 3 of these guidelines.

- **Construction Equipment Height Restrictions**

Height restrictions on the use of vehicles, machinery and other equipment plant, must be carefully considered in planning the subdivision, since significant cost implications for installation of roadside services may be involved.

2.7 Provision of Services to Allotments

The restrictions on positioning of metallic pipes and cables near towers and maximum length requirements within and alongside high voltage power line easements stated in Sections 2.5 and 2.6 above also apply to the servicing of individual allotments, particularly rural and rural residential allotments where service line lengths are potentially large.

SPI PowerNet approval of Engineering design drawings for works on the easement prior to issue of the Statement of Compliance is also a requirement for subdivision applications for which the design of services to allotments is identified as a significant issue.

3. APPROVAL OF ENGINEERING DESIGN DRAWINGS

The requirement for SPI PowerNet to approve all proposals for construction works affecting high voltage power line easements results from the responsibility to maintain and protect the following:

- Safety of the general public, contractors and SPI PowerNet personnel;
- Security of SPI PowerNet assets and continuity of electricity supply;
- Vehicle access to SPI PowerNet assets at all times and in all weather conditions;
- Provision reserved within existing easements for planned future lines; and
- Potential for redevelopment of the easement for future power supply purposes.

Because of the variety of ways in which construction works can affect SPI PowerNet assets there is a need for close review by SPI PowerNet of both the design and construction method aspects of proposed developments.

The following additional information to that stated in Appendix A, concerns requirements selected as more relevant to subdivision proposals and is provided to assist with detailed planning and design.

3.1 Buildings and Structures

Buildings and structures, including swimming pools, are not permitted on high voltage power line easements, except for limited concessions regarding domestic outbuildings on 220 kV line easements, as outlined in Appendix A.

3.2 Fences

- **Earthing Requirements**

Long metallic fences close to high voltage power lines, for example farm type (post and wire) and chainwire mesh types, can have a voltage induced in the metallic (that is, electrically conductive) components. To limit the induced voltages to safe values, either the length must be restricted to the maximum values stated in Appendix B, Table 1, or the fence must be earthed to SPI PowerNet requirements.

Typical earthing requirements for post and wire fences would involve connection of the horizontal strain wires to earth spikes driven into the ground at intervals not exceeding 30 metres. For a fence using bare metal mesh or wire supported on bare metal posts, no additional earthing would generally be required.

- **Sectionalising Requirements**

An additional consideration relates to fences in the vicinity of steel towers and concrete poles. Under extraordinary operating conditions, typically during line faults, the ground voltage in the vicinity of the tower or pole can rise relative to the surrounding area.

To prevent any electrical hazard, the voltage occurring must not be transferred via fences (or other conductive objects) to areas remote from the tower or pole.

Accordingly, fences must be **either** kept clear of towers and poles by the minimum distances stated in Appendix B, Table 2, **or** sectionalised by insertion of an insulating section at each location where the fence enters the zone around each tower or pole extending to the appropriate Table 2 distance.

On request, SPI PowerNet can provide further advice and clarification of earthing and sectionalising requirements for particular fence designs and arrangements.

3.3 Roadside and Allotment Services

Similar requirements to those stated above for metallic fences apply to the total lengths and proximity to towers of buried metallic services, including water, drainage, sewerage and gas pipes, telephone cables and low voltage electricity supply cables, except that earthing and sectionalising may either not be practicable or involve a significant cost penalty.

In many situations, the most practical solution will be to locate the services well clear of the power line easement, as stated in Appendix B.

Roadway lighting poles proposed on the easement are also subject to height restrictions depending on the available clearances to the high voltage power line conductors and they must lower to the ground for servicing, including lamp replacement.

The length of non-metallic pipes (such as PVC and earthenware) is not restricted on the easement and reinforced concrete pipes are permitted provided that they are not located closer to towers and poles than the minimum distances stated in Appendix B, Table 2.

3.4 Ground Surface Level Changes

- **Clearances to Line Conductors**

No variation to existing ground surface levels under high voltage power lines is permitted without prior SPI PowerNet approval. Approval is subject to confirmation that the clearances to the line conductors will not be reduced below the required minimum design clearances under the conditions of maximum conductor sag (corresponding to the maximum line operating temperature) and the maximum design wind.

Because of the variety of line voltages, configurations, maximum operating temperatures and the effects of wind on the horizontal displacement of the conductors, SPI PowerNet must be contacted to provide advice on all aspects of conductor clearances.

A brick or timber sound wall or other roadside feature that can be climbed, providing a closer approach to the overhead lines, is generally not permitted in locations where only the minimum design clearance is provided.

- **Requirements Near Towers and Poles**

From consideration of SPI PowerNet requirements for the movement of personnel and vehicles and the handling of materials in the vicinity of towers and poles, the creation of uneven or poorly drained sites is unacceptable.

Lowering of surface levels in the vicinity of towers and poles is generally unacceptable to SPI PowerNet because of the detrimental effects on the stability of the structures.

A further consideration is that tower foundations, above ground members and pole stay wires have been installed with corrosion protection appropriate to the existing surface levels.

Where surface levels are proposed to be raised in the vicinity of towers or pole stay wires, the corrosion protection systems are required to be extended to cover the new height. The fill placement method and type of fill material must be controlled to ensure that no damage to members or protective coatings occurs and that no potential for long term damage is created from either fill settlement or chemical action.

For constructions that involve significant ground surface level changes over a wide area of easement, SPI PowerNet generally requires accurate survey measurements of the final surface levels to be undertaken by the Constructor for amendment of the power line design records. Alternatively, SPI PowerNet could undertake the survey work at cost to the Constructor.

3.5 Tree Plantings

Trees and shrubs with a mature growth height not exceeding 3 metres are permitted on high voltage power line easements. Taller species (generally limited to 6 metres maximum mature height) may be acceptable, subject to SPI PowerNet approval of the planting layout to verify that sufficient clearances to the conductors will be provided and that this can be readily assessed by SPI PowerNet line patrols. Other specific requirements are that the vegetation will not endanger the line in the event of vegetation fires and will permit satisfactory SPI PowerNet vehicle access to and around towers for line patrol and maintenance purposes.

Initial planting of approved species and locations, with regular vegetation maintenance, including removal of inappropriate regrowth, will eliminate the need for corrective action by SPI PowerNet and minimise the possibility of unavoidable damage during line maintenance works.

Vegetation density is generally restricted to scattered trees or limited area clumps and shelterbelts to control the total quantity of burnable materials on the easement.

Trees that grow to exceed the approved heights may be removed and costs charged to the property owner. Tall growing species will be removed at the earliest opportunity.

A tree clear area of 20 metres minimum radius is generally required at tower sites for line maintenance purposes. Closer trees may be permitted in some locations, where the interference caused to access and essential line maintenance is acceptable. A larger tree clear area is required at future tower sites to provide for construction of the new transmission line. Section 3.7 includes further comment on the requirement, to provide reasonable working space around towers.

To assist in the selection of appropriate tree/vegetation species, SPI PowerNet has an information booklet available on request.

3.6 Protection of Line Support Towers and Poles

- **Protective Barriers**

Constructions that include roads or involve the use of vehicles in the vicinity of high voltage power line towers or poles increase the risk of damage to the structures and hazards to SPI PowerNet employees. SPI PowerNet requires Constructors to address this risk by the provision of suitable barriers.

Installation of "New Jersey", "Armco" or an alternative design of barrier approved by SPI PowerNet as appropriate to the situation is required where a hazard may arise due to errant vehicles or loads. Particular hazards could result from road design factors, such as positioning the outside of a curve near a tower, or surface level differences that would not assist errant vehicles to return to the carriageway (for example, a roadway embankment higher than the natural surface level at the tower base).

The barrier must be located as close as practicable to the kerb, be designed to contain out-of-control vehicles and their loads within the carriageway and preferably not be within 15 metres of steelwork for 500/330 kV towers or 10 metres for 275/220/66 kV towers, to provide for normal line maintenance activities without the need for lane or road closure. The barrier design must also provide for site access by SPI PowerNet vehicles.

Metal and concrete barriers must also be at least 4 metres from the nearest tower leg steel/pole, to permit use of standard electrical safety procedures by SPI PowerNet maintenance personnel.

- **Structure Stability Requirements**

Construction works are not to affect the structural performance of SPI PowerNet assets. Where earthworks are proposed in the vicinity of poles or towers SPI PowerNet must be convinced that the performance of existing structure footings (particularly for uplift or overturning forces) is not compromised.

Also, the introduction of higher groundwater levels to footings not designed for the changed conditions would be unacceptable.

3.7 Access for Line Maintenance and Construction

Vehicle access by SPI PowerNet is required to existing and future tower and pole sites at all times for line patrol, maintenance and construction purposes. For many easements, gates 4.6 metres in width will be required in boundary fences to permit vehicle access along the easement. For property security purposes, provision is required for fitting of SPI PowerNet padlocks to gates.

In an emergency situation, work could be undertaken at night or day over extended periods and in extreme weather conditions.

Regular line patrol and maintenance activities can typically include monthly inspections using a 4.5 tonne vehicle, a 20 tonne bucket truck and support vehicle for insulator washing yearly and a 40 tonne crane once in ten years (heavy maintenance contingency).

- **Protection of SPI PowerNet Employees**

Since SPI PowerNet employees work on the easement on a regular basis, SPI PowerNet has an obligation to provide a safe work place within the definition of the Occupational Health and Safety Authority regulations. SPI PowerNet requires provision of safe access and safe worksites.

For constructions that include roads or involve the use of vehicles in the vicinity of high voltage power line towers or poles, approved barriers or other measures that satisfactorily reduce the risk of injury from errant vehicles or loads must be provided.

SPI PowerNet requires to approve the measures adopted but looks to the Constructor to present appropriate solutions having regard to the factors involved, such as the vehicle speeds, proximity of the road, differences in surface levels and the location of road curves relative to towers and poles.

- **Standard of Access**

The majority of high voltage power lines have been in use for many years. During this period, SPI PowerNet line patrol and maintenance personnel have established access tracks suitable for their purposes and an environment that is generally readily and inexpensively restored should surface or vegetation damage be unavoidable.

Associated with any proposed development, SPI PowerNet seeks to ensure that freedom of access at all times and under all weather conditions is not restricted, that the potential for damage (and therefore restoration costs) due to SPI PowerNet activities are not increased and that the pattern of existing patrol activities is disrupted to the least extent practicable.

Therefore, consideration needs to be given to the compatibility of proposed constructions (including multi-use pathways, tree planting, landscape mounding and fencing) with SPI PowerNet access requirements. For example, the provision of reinforced access through grassed areas and replacement access tracks having grades and turning radii suitable for movement of long chassis vehicles such as cranes and bucket trucks would be required for developments that significantly alter the access arrangements.

- **Access around Towers**

Towers require a reasonably large working space because of their size and consequently the type of equipment required to be used. The preferred minimum size clear worksite would be a level, compacted area free of obstructions within 20 metre of the tower steel in all directions including a surfaced hard standing rectangular area extending 20 metres from each side of the tower underneath the conductors and 5 metres from each side of the tower beside the conductors. The surfaced hardstand area provides a site for operation of winches, cranes or "bucket trucks" and parking of passenger vehicles and patrol trucks.

It is acknowledged that some towers may already have smaller available worksites than the preferred minimum size, due to existing landforms or obstructions and that the design of construction works may impose further restrictions. There is a requirement for discussion at the design development stage to ensure that the needs of both SPI PowerNet and the Constructor are accommodated.

4. APPROVAL OF CONSTRUCTION WORKS

4.1 Conditions on Design Approval

SPI PowerNet approval of Engineering design drawings for construction works affecting high voltage power line easements is normally subject to a number of conditions.

When no information is submitted by the Constructor concerning the equipment and construction methods proposed to be used, the following SPI PowerNet requirements are normally advised:

- A 3 metres maximum operating height limit for vehicles, machinery and other equipment used on the easement, with possible additional restrictions for items of plant equipped with an elevating component.
- The Constructor must contact SPI PowerNet at least five working days prior to any work commencing on the easement.

However, should a requirement be identified for use of vehicles, machinery and equipment that either exceed the 3 metres maximum height limit, or are defined as Cranes, the work commencement notice period is increased to at least ten working days to provide for detailed assessment of the safety clearances available to the high voltage conductors and the need for equipment operating limits and/or line outages. In practice, the longer the notice given by the Constructor, the less likelihood of delays to the site works.

Use of Cranes and vehicles, machinery and equipment higher than 3 metres may be acceptable at some work locations where greater than normal clearances to the line conductors are available. However, the required clearances must be determined by SPI PowerNet, since they are line voltage dependent and the line conductor positions can change significantly and without warning with variations in the electrical load, ambient temperature, wind strength and direction. It must also be appreciated that high voltage electricity can arc across distances of several metres, so that even a close approach can be dangerous.

4.2 Control of Construction Works

SPI PowerNet is required to check that the works are in accordance with the approved drawings, review the works procedures and construction equipment proposed to be used against the available clearances and required minimum safety clearances to the high voltage conductors and towers and arrange for any safety precautions deemed necessary to be taken.

An "Application for a Permit to Work Adjacent to SPI PowerNet's Exposed High/Low Voltage Electrical Apparatus" may be required to be signed by the Constructor prior to commencement of the work. SPI PowerNet's local Lines Team Leader would then arrange for written authorisation entitled "Permit to Work Adjacent to SPI PowerNet's Exposed High/Low Voltage Electrical Apparatus" for the time to be nominated and no work would be permitted without this permit.

Line outages, where required, are subject to operational availability. SPI PowerNet does not accept liability for any delays or costs to the constructor for the safety precautions and line outages required.

Any construction works in the vicinity of SPI PowerNet transmission lines are required to comply with the following statutory regulations designed to protect people and property and prevent interference to SPI PowerNet lines and other assets:

- Electricity Safety (Network Assets) Regulations 1999.

- Occupational Health and Safety (Plant) Regulations.

The Victorian “Code of Practice for Plant No. 19, 1 July 1995” provides guidance to plant users on how to meet the requirements of the OH&S (Plant) Regulations, including identification and control of workplace hazards. For safe operation of Cranes, Australian Standard AS2550.1-1993 Cranes - Safe Use is specified as the appropriate technical standard to be followed.

4.3 Construction Equipment Authorisation

No work is permitted on the easement involving any change in surface levels, use of any vehicle, machinery or equipment exceeding 3 metres in maximum operating height, or defined as a Crane by the OH&S (Plant) Regulations 1995, regardless of the operating height, without the prior approval of SPI PowerNet.

Proposals submitted for construction approval should include reference to the design approval by SPI PowerNet, and a description of the task including the maximum equipment and load reach in both the vertical and horizontal planes, the operating location with respect to the lines and proposed controls on the operation of each item of equipment to maintain statutory clearances.

Full and detailed proposals should be submitted at least ten working days prior to the programmed commencement date. The proposed date and time should be confirmed five working days prior to commencement. A charge may be made for evaluation of proposals.

Australian Standard AS2550.1-1993 Cranes - Safe Use, Clause 7.17, specifies the precautions required to be observed when operating a crane in close proximity to overhead power lines. For transmission lines on towers, a minimum safety clearance of 6 metres is required to be maintained, unless designated otherwise by SPI PowerNet, based on the line voltage. An additional distance must generally be added to allow for possible line conductor movements resulting from changes in the electrical current flow and the weather conditions (ambient temperature, wind strength and direction).

SPI PowerNet will assess submitted equipment operation proposals with consideration to the clearances available and contingent controls and precautions that may be required. Line outages, where required, will be subject to operational availability. Costs for outages will be advised at this time.

Since transmission system security requirements, in conjunction with programmed maintenance works, frequently result in restrictions on the availability and duration of high voltage line outages, any significant cost implications for construction works on easements should be carefully assessed by the Constructor.

Commencement of design approved works that can be achieved within the 3 metres maximum operating height limit must be advised to SPI PowerNet with at least five working days notice.

4.4 Use of Explosives

- **No electrical detonation**

Electrical detonation of explosives must not be used on the easement as there is a danger that pre-detonation could occur due to the operation of adjacent overhead or underground lines. There is also the added danger that detonation wire may fly and contact overhead conductors.

Electrical detonation of explosives away from the easement may also be affected by power line fields and accordingly the advice of suppliers of explosives must be sought and acted on before electrical detonation is used in the vicinity of high voltage power lines.

- **Proximity limits**

Explosives could affect SPI PowerNet assets in either of three ways:

- Structural damage due to ground movement;
- Damage due to fly rock; or
- Maloperation of sensitive equipment due to ground acceleration.

Because of the range of circumstances in which explosives could be used, SPI PowerNet does not set specific guidelines except that no explosive shall be used within 10 metres of a tower, pole or underground cable without specific SPI PowerNet approval.

The charge size, placement and detonation rates must be determined with regard to the proximity of SPI PowerNet assets. When given sufficient notice, SPI PowerNet will provide advice on the age and likely condition of assets, so that the Constructor can ensure that proposed blasting is carried out without risk of damage.

However, where damage occurs to SPI PowerNet assets, the Constructor responsible for the blasting will be held liable for the cost of restoration.

Where large scale use of explosives is planned, SPI PowerNet requires to be given 6 weeks notice to assess the likelihood of any effect on any sensitive equipment at terminal or substations in the vicinity.

If explosives are used, movement of blast mats must be controlled and care must be taken to prevent damage to SPI PowerNet assets caused by fly rock.

4.5 Protection of Underground Cables

- **Identification of Cable Locations**

In locations where SPI PowerNet may have underground cables in the vicinity of proposed works, attention is drawn to the following:

- Location information for SPI PowerNet cables can be obtained by contacting **Dial Before You Dig**, telephone 1100 (24 hours). At least 48 hours notice prior to commencement of site works is required to provide for identification and on-site marking of affected cable locations;
- Cables are buried at depth to provide protection and safety. No change in depth of cover is permitted without SPI PowerNet approval. An increase in the depth of cover may adversely affect the performance of the cable and also the ability of SPI PowerNet to access and repair it.

The location of any SPI PowerNet underground cables must be determined before proceeding with excavation works, boring or driving of stakes, piles or the like.

- **Work Requirements Near Cables**

Mechanical excavation, boring or pile driving is not permitted within 1.5 metres of the indicated position of cables.

Where excavations are required closer than 1.5 metres to a cable, to a greater depth than the cable (such that support of the cable may be compromised) or where the location of the cable may be in doubt, subject to implementation of any special precautions deemed necessary by SPI PowerNet, the location of the cable may be proven using hand tools only.

With the cable alignment thus proven, mechanical plant may be used within 0.5 metres.

For the purposes of pavement construction over cables, with prior SPI PowerNet approval, tracked heavy crawler type equipment may be used with 450 mm of cover over cables.

- **Working Space Required for Cables**

An accessible area of at least 1.5 metres width either side of the cable is required to enable it to be repaired as necessary. In cases where cables are installed through ducts under road surfaces a spare duct should be provided. The spare duct covers the situation where the cable fails within the first duct and the duct is damaged beyond reuse.

APPENDIX A - Permitted and Prohibited Uses of Power Line Easements

The following restrictions and conditions concerning activities in the vicinity of high voltage power lines are required to ensure that public safety is not compromised by incursions within SPI PowerNet's easements and that the reliability of the lines is maintained. Prior approval is also required for any proposed alterations to approved developments on the easement to ensure that the initial high safety standards are maintained.

SPI PowerNet does not accept liability for any damage to the development caused by the operation and maintenance of the line.

Permitted Uses of Power Line Easements Include:

- Grazing and agriculture.
- Market gardens, orchards and horticultural nurseries, excluding buildings.
- Water storage dams, subject to sufficient clearances from the conductors and towers, including effects on water tables at tower sites.
- Trees and shrubs with a mature growth height not exceeding 3 metres. Taller species (generally limited to 6 metres maximum mature height) may be acceptable, subject to SPI PowerNet approval of the planting layout to verify that sufficient clearances to the conductors will be provided. Vegetation density restrictions and tree clear area requirements near towers to permit line maintenance works also apply.
- Landscaping and paving, subject to sufficient clearances to the conductors and towers if alterations to the natural surface levels are proposed.
- Fences up to 3 metres in height, suitably earthed and sectionalised if metallic/incorporating metallic materials.
- Sewerage, drainage and water pipes constructed of earthenware or plastic materials.
- Parking of sedan and utility types of vehicles. Barriers of an approved design may be required to protect towers from damage by vehicles.
- Tennis courts on 500 kV and 330 kV easements, provided that the net and umpire's chair are off the easement and the surrounding fence is a minimum of 30 metres from any tower steelwork.
- Tennis courts on 220 kV line easements, provided that metal net posts are used. An umpire's chair is also permitted, provided that it is of all metal construction, with a metal screen above the seating position. The minimum distance from the surrounding fence to the nearest tower steelwork reduces to 20 metres for 220 kV line easements.
- Ground level sporting activities, such as football, cricket, golf, basketball and netball, subject to special requirements regarding the design of metallic fences, goals and lighting.
- Lighting poles, subject to sufficient clearance from the conductors and towers. The power supply must be underground and the lighting poles must lower to the ground for servicing, including lamp replacement.

- Walking and bicycle paths, subject to suitable provision for access by SPI PowerNet vehicles.
- Playground equipment, subject to a 1 metre maximum height limit.
- For 220kV line easements only - car, boat and small trailer sales yards, excluding buildings.
- For 220kV line easements only, domestic garages, carports and garden sheds may be permitted a limited distance onto the easement, subject to a number of requirements including sufficient safety clearance to towers and overhead conductors, 3 metres maximum height, constructed largely of non-flammable materials and not attached to a dwelling.

Prohibited Uses of Power Line Easements Include:

- Houses, other buildings and structures, including eaves, awnings, canopies, shelters, water tanks, boreholes and windmills.
- Scaffolding.
- Swimming pools, both above ground and below ground types, including filtration equipment.
- Storage of flammable fuels.
- Storage of materials, including waste bins and stockpiling of excavated materials.
- Fueling of and repairs to vehicles.
- Use of vehicles and equipment exceeding 3 metres in operating height. A higher operating height limit is subject to sufficient clearances to the conductors. Possible additional restrictions apply to items of plant defined as a Crane by the Occupational Health and Safety (Plant) Regulations 1995.
- Parking of caravans and trucks.
- Loading, unloading and load adjustment of large trucks.
- Operation of large water spray irrigators of the gun type.
- Metal pipes (including reinforced concrete), electric power cables and other electrically conductive services within 30 metres of any tower steelwork, or exceeding 100 metres in length on the easement or 250 metres in length on and within 20 metres of the easement. For 220 kV easements, this minimum distance from towers reduces to 20 metres.
- Electrical detonation of explosives.
- Excavations to a depth exceeding 0.9 metres within 15 metres of any tower or 0.3 metres within 1.5 metres, without prior written approval.
- Flying of kites and model aircraft controlled by wires within 45 metres of any line.

APPENDIX B - Layout of Subdivisions to Avoid Electric Hazards

Metal objects located close to high voltage power lines are subject to induced voltages caused by electrostatic, electromagnetic and conductive couplings. If required, SPI PowerNet can provide further information concerning the fundamental mechanisms of electric induction.

Subdivision developments typically include installation of the following types of metal objects and allotment services, for which special design measures could be required (depending on their size/length and proximity to the power lines) to limit the induced voltages and any resulting electrical currents to safe values:

- chainwire mesh, or post and wire fences;
- low voltage power cables, including street lighting;
- telephone cables; and
- high pressure gas and water pipelines;

Generally, the best and least cost method of avoiding possible hazards caused by proximity to high voltage power lines is to stay far enough away, so that there is no significant interaction between the metal objects and the power line.

Therefore, the following tables provide guidance concerning the maximum lengths of metal fences and services and the minimum separation distances from towers to avoid any requirement for special design measures:

**Table 1 - Maximum Parallel Lengths of Metal Fences and Services
(Applicable to 66 kV - 500 kV Power Lines)**

Location of Metal Object	Maximum Length (metres)
On the easement	100
Within 20 metres of the easement	250

**Table 2 - Minimum Separation Distance
(Measured to the Tower or Pole Centre)**

Line Voltage (kV)	Minimum distance (metres)
500, 330 tower	30
275 tower	25
220 tower	20
66 tower	16
66 pole	3

Shenstone Park Precinct Structure
Plan

APPENDIX

B

TRANSMISSION LINE EASEMENT
GUIDELINES

Shenstone Park Precinct Structure
Plan

APPENDIX

C

DONNYBROOK PSP GAS EASEMENT

APA Gas pipeline easement Interface

Donnybrook-Woodstock Precinct Structure Plan – March 2017

- NOTES:**
- No large tree or shrub is located within 3 metres of the high pressure gas transmission pipeline. Please note that this three metre separation must be maintained throughout the trees entire life cycle.
 - Where vegetation is proposed to be planted within three metres of the pipeline alignment, it must be shallow rooted and not exceed 0.5m in height.
 - Any planting of vegetation within or adjacent to the easement must ensure line of sight between high pressure gas pipeline awareness markers.

