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# SERVICE AND UTILITY INFRASTRUCTURE ENGINEERING REPORT

February 2013

**DOCUMENT CONTROL DATA**

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		<b>Synopsis</b>	

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## 1. INTRODUCTION

As detailed in the Council Study Brief dated 29 October 2012 (File No: 95-45-219) a Precinct Structure Plan process for the Pakenham East Precinct area is being implemented by Council, and a Service Report is required as part of this process.

The Services Report assesses the existing services capabilities for the area and proposes a detailed and strategic servicing strategy for the future residential development proposed for this area.

The services assessment includes the provision, capacity and phasing of infrastructure services in this area, including any issues or constraints which might impact on development of this area.

The information contained within this report is as a result of preliminary advice provided by the responsible servicing and statutory authorities and may be subject to variation during the course of the planning process, given Council, service authority and consultant input, and upon finalisation of the Structure Plan for the Pakenham East Precinct and submission of formal applications.

The services considered in this report are as follows:

- Sewerage
- Water Supply (potable and other)
- Electricity
- Natural Gas
- Telecommunications

The aim of the document is to inform the Council planning team about service and utility infrastructure issues and opportunities..

Town planning, traffic engineering, drainage, WSUD, flora and fauna, heritage, geotechnical, surveying and other matters are being assessed by other consultants as appropriate.

### 1.1 Objectives

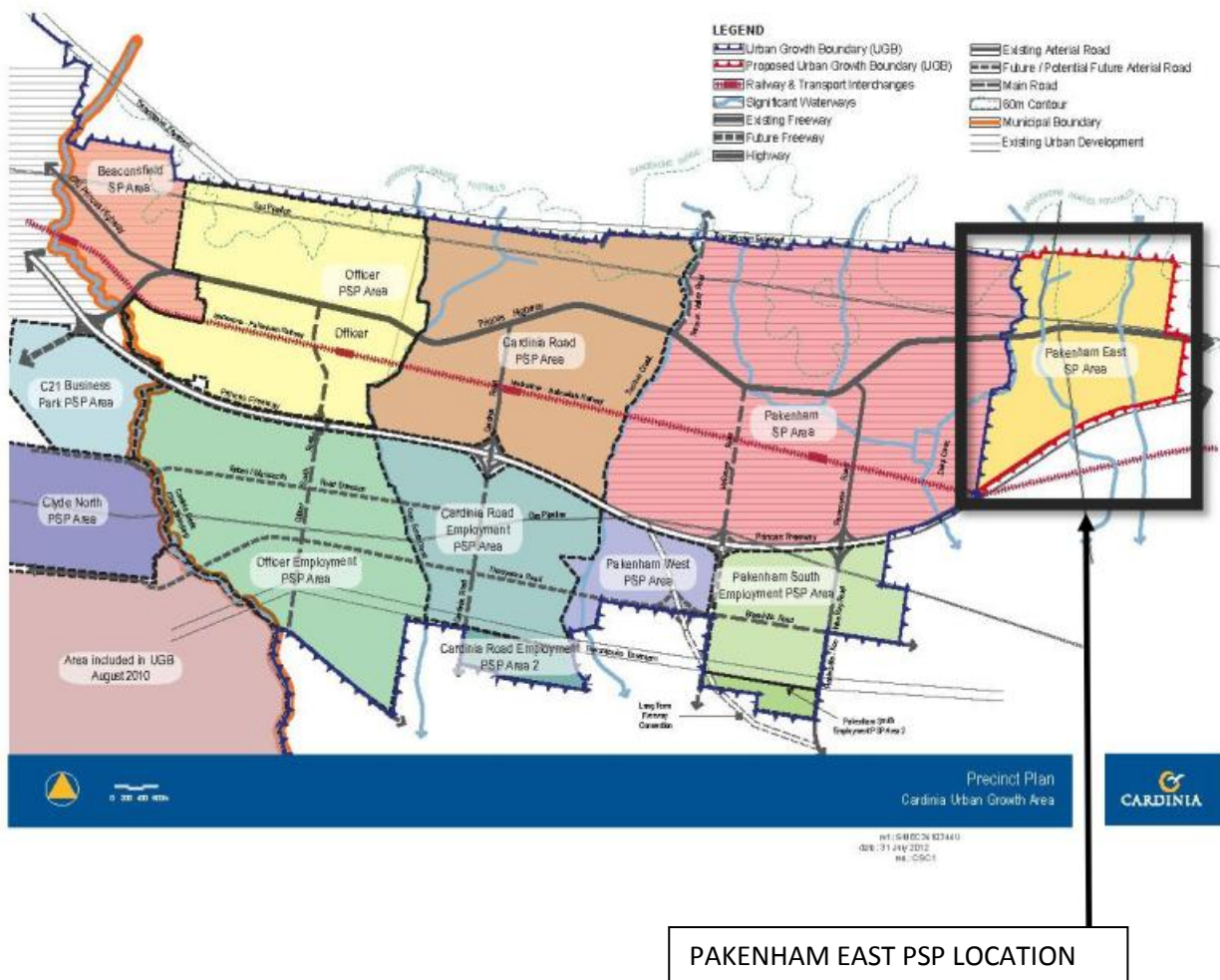
The objectives of this study as defined in the Consultant Brief are as follows:

- Identify current service and utility infrastructure capacity issues
- Map and document the location of existing services
- Identify key opportunities and constraints for the provision of service and utility infrastructure
- Investigate access to services and recommend provision of these services can be achieved in the short and long term
- Provide advice on relocation of existing services and options for land use over easements



## 1.2 Precinct Overview

The current Cardinia Council PSP areas are shown on the Council's Urban Growth Area precincts map, below. A copy of this plan is attached as Appendix A.



A further area for which a Precinct Structure Plan process has commenced is Pakenham East. This area was added to the UGB following the Logical Inclusions process in 2012. This Precinct has a total area of about 650 hectares and could accommodate in the order of 5,000 lots, and is shown on the attached plan in Appendix B.

The area has only recently been included within the Urban Growth Boundary and no specific developments requiring servicing have occurred that would result in the extension and/or upgrading of services.

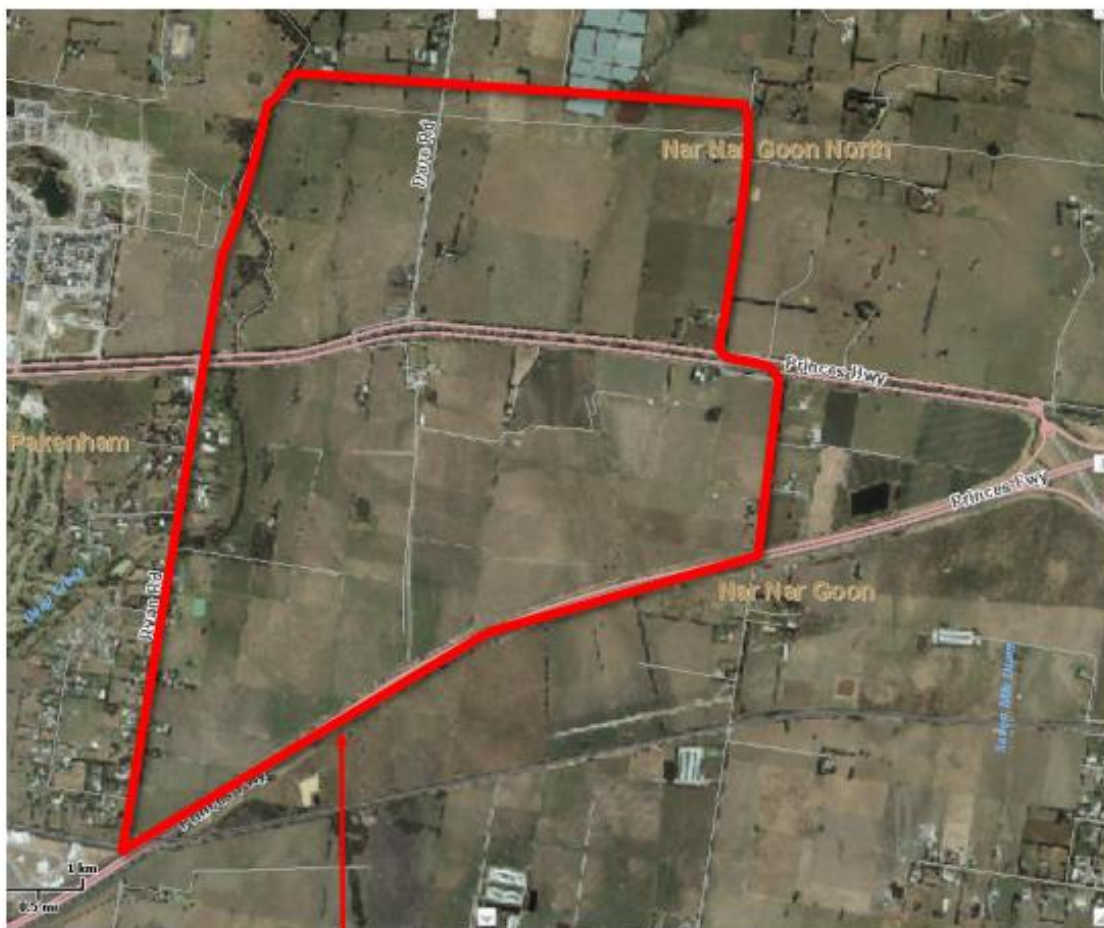
This new Precinct is located immediately east of the Pakenham Structure Plan area. The area straddles the Princes Highway and is bounded by Ryan Road and Deep Creek Road to the west, the Princes Freeway (Pakenham Bypass) to the south, Mount Ararat Road to the east and the HV Transmission Line to the north.

Council nominated this area for inclusion in the UGB and advised that there was strong development interest in the land to the south of the Princes Highway, with submissions made previously by Parklea Pty Ltd.

A Draft Structure Plan for this general area was prepared on behalf of Cardinia Council in 2005, and this was resubmitted by Council as part of the Growth Areas Logical Inclusions Review process.

There is very little in the way of existing services in this area, although HV Transmission Lines, Telstra and Optus Optic Fibre cables and a major gas transmission pipeline cross the precinct from east to west. There are also gas transmission pipelines running north and south through the area.

The area is generally divided into two catchments, with a north-south ridge centrally located and drains into two watercourses, Deep Creek and Mount Ararat Creek. The land could be considered undulating with moderate to gentle slopes which pose no significant development constraints.



Project Area

## **2. ENGINEERING, PHYSICAL INFRASTRUCTURE AND DEVELOPMENT ISSUES**

The following services information has been obtained from preliminary advice by the responsible service and statutory authorities and may be subject to variation during the course of the planning process, given Council, service authority and consultant input, and upon finalisation of the Structure Plan for the Pakenham East Precinct and submission of formal applications.

### **2.1 Water Supply**

South East Water Limited is the responsible authority for the provision of water supply facilities.

Advice was requested from South East Water on servicing of this area and a Land Servicing Advice document was received on 7 January 2013. A copy of this is attached as Appendix C. A response to follow up queries on this advice is also included in Appendix C

There are no existing watermains in the area, with all water supply infrastructure located on the west side of Deep Creek within the existing Pakenham township area.

South East Water has advised that a water supply would be available from the Pakenham Tank distribution zone, with connection via the existing 900mm dia MSCL pipeline located at the junction of Princes Highway and Abrehart Road. This would only service land below the RL 65m contour level.

Land lying between the 65m and 95m contours would need to be supplied from the Pakenham High Level Zone, with the initial supply being from the existing 225mm dia main located at the corner of Windermere Boulevard and Waterside Drive. There would also be a requirement to install a 4.5ML/day booster pump for the High level Zone.

For this potable water supply, the plan and description from South East Water indicates that it would be difficult to supply the area between the 65m and 95m contour levels from the existing 225mm main as this is about 2km away. There is also no reference to supplying the area above the 95m contour. These issues were raised with SEW and other options possible for supplying the higher level area, such as putting a tank to the north along Dore Road were put to them

South East Water's advice is that planning has finalised the servicing strategy a while ago and has concluded that the existing servicing strategy is the best option. However the options have been forwarded to their Senior Planning Engineer for consideration and comment.

The location of the existing and possible future mains are shown on the Existing Conditions Plan and the Proposed Infrastructure Plan – Water Mains attached as Appendix E.

The alignment and sizing of potable water reticulation mains with the Precinct would be in accordance with the Melbourne Retail Water Agencies (MRWA) Edition of the WSAA Water Supply Code.

#### **2.1.1 Water Supply Planning**

The planning for extending and upgrading the water supply system to provide an adequate and secure supply to the Pakenham East Precinct will need to take into account the likely type of development and also the rate of development.

The methods and criteria used in the System Planning by South East Water, including assessment of demands, peak usage requirements and system hydraulics, are specified in the Water Supply Code of Australia (Melbourne Retail Water Agencies Edition) – Part 1, Section 2.



South East Water are responsible for such planning and will need to take into account the outcome of the structure planning for this area and review their current planning for this area to determine if it is still relevant and prepare new planning as necessary.

### 2.1.2 Water Supply Reuse Opportunities

South East Water Limited is the responsible authority for the provision and control of recycled water supply facilities in this area.

As one of the aims of the Council in the development of this Precinct is to ensure that the development area incorporates water recycling and reuse practices, we have requested South East Water to provide information on the availability of suitable recycled water from the Pakenham Treatment Plant or other sources.

There is already some recycled effluent provided from the Pakenham Sewage Treatment Plant to areas around Pakenham, mainly to the existing Golf Course. The Treatment Plant has been upgraded so that Class A treated effluent is achieved, to provide water for a third pipe system in Places Victoria's development at Officer.

SEW has advised that the area is not adjacent to a mandated recycled water area, which currently means that a third-pipe recycled water system will not need to be installed. While recycled water can possibly be provided from Pakenham Treatment Plant, this would need to be further considered by them.

## 2.2 Sewerage

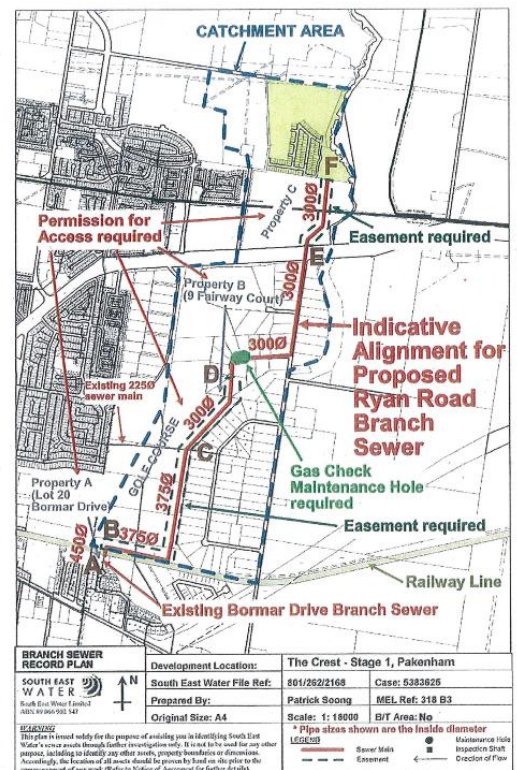
South East Water Ltd is also the responsible authority for the provision of sewerage facilities.

There are no existing reticulation or branch sewers in the study area, with all sewer infrastructure located on the west side of Deep Creek within the existing Pakenham township area.

South East Water has advised that it will be necessary to extend 450mm and 375mm diameter branch sewers from the existing 525mm diameter Peel Street Branch Sewer in Bald Hill Road near Embrey Close, as shown on their Sewer Plan. This would involve the construction of about 1,300 metres of 450mm dia sewer just to reach the south west corner of the Precinct.

This poses a development staging problem for the area of the Precinct north of the Princes Highway, as it would need about 3,400 metres of branch sewer to reach this location.

The matter of the construction of the Ryan Road Branch Sewer, as shown on the SEW Record Plan (see right) which is to service the Peet development, The Crest, and the possibility of utilising this sewer to service the area east of Deep Creek was raised with South East Water. This has previously been raised by Parklea. This option could allow servicing of at least part of the western half of the Precinct at an earlier time.



However, SEW has advised that the proposed Ryan Road Branch Sewer is currently in the Functional Design Stage and there has been significant consultation with affected properties over the last 12 months. As such the existing servicing strategy cannot change.

The location of the existing and possible future branch sewers are shown on the Existing Conditions Plan and the Proposed Infrastructure Plan – Sewers attached as Appendix E.

### 2.2.1 Sequential Extension of Services

The final location of temporary and permanent pump stations, Rising Sewer Mains, and Branch Sewers will depend on the layout and staging of any development.

The sewer strategies outlined above rely on a logical or sequential extension of services (in this case sewer). Land ownership or other factors will influence which landholdings are development ready. There will be instances where a development is ready to commence in advance of the sequential extension of services to the boundary of the development site.

Sequential extension of services is South East Water's responsibility under the Essential Services Commission guidelines. Should a developer want to commence in advance of the planned infrastructure, a request can be made for South East Water to bring forward construction. Part of the cost for these extension works would need to be funded by the developer.

Under the current policy if the asset is in the authority's plan for construction within five years the developer is not required to pay. Timing of construction however is reliant on the authority's program. If the asset isn't planned for construction within five years, but is planned within ten, the developer is liable for 40% of the total cost of the asset. If not planned for construction within 10 years the developer would be liable for 70%.

If bringing forward the construction of the outfall isn't considered viable by either South East Water or the developer, an alternative can be temporary facilities such as pump stations and rising mains.

In the case of temporary facilities the developer is liable for the capital cost of the temporary facility plus fees to cover ten years operational costs.

## 2.3 Electricity

### 2.3.1 Supply to Precinct

SP AusNet is the responsible authority for the provision of electricity to the proposed development area.

Preliminary advice from SP AusNet is that

- There is HV Network available through the Cardinia Lakes housing estate, which could be extended in to the proposed residential precinct, with a link over Deep Creek
- HV Network is available on the Princes Highway, but this is under constraint and potential reworks will have to be completed to service the area.
- HV is also available on Ryan Rd, for the area south of Princes Hwy, again but network constraints apply.



Ryan Road electricity

A new zone substation has been installed at Officer to meet growth in the Pakenham and Officer areas, and this has partially taken some of the load of the Pakenham Zone Substation.

The first stage of commissioning for Officer was completed during December 2009 when the first transformer and four 22kV underground feeders were energised; the second transformer was placed into service in March 2010 to further reinforce supply.

A new zone substation is planned to be installed at Pakenham South in about 2015 to meet ongoing growth particularly in the Employment Precinct. The exact timing will depend on electrical demand growth in the precinct. A site close to the transmission easement that carries the 66kV line between Koo Wee Rup Rd and Cardinia Rd will be sought.



Officer Zone Substation

SP-AusNet also has plans to establish a major new transmission connection terminal station in the Pakenham region in the next 5 to 10 years' time and investigation into a suitable site for this development has commenced, possibly in the Nar Nar Goon area.

If a zone substation is required in the Pakenham East Precinct, the area required and associated easement requirements will need to be determined.

### 2.3.2 Transmission Lines

There are three existing 220 kV overhead transmission lines through the northern end of the site. These lines are owned by SP AusNet and are contained within a Power Transmission Easement which has a total width of approximately 120m.



Transmission Lines from Dore Road – looking west

There are also Telstra and Optus Major Optic Fibre Network lines running along the southern boundary of the easement in this area. The DBYD advice has noted that the cables are of national significance with the potential to significantly disrupt communications in Australia if damaged.

The SP AusNet Easement Use Guidelines document has been obtained from their web site and a copy of this is attached in Appendix D.

Refer also the SP AusNet web site at:

<http://www.sp-ausnet.com.au/?id=1010212034BD1789E5BC800ACA25757600390B8C>

Prohibited uses of the Power Transmission Easement include buildings, storage of materials, vehicles exceeding 3m in height and parking and loading of large trucks.

Permitted uses include ground level sporting activities such as football, cricket, golf and netball, subject to special requirements regarding the design of fences, goals and lights. Water storages and dams are also permitted, subject to sufficient clearances from conductors and towers, including effects on water tables at tower sites.

Any specific proposals would need to be submitted to SP AusNet for approval.

Development of the areas in the vicinity of the Transmission lines may require the preparation of an Electromagnetic Field and Transmission Line Easement Impact Assessment. This Impact Assessment must demonstrate that the proposed subdivision of the land is fully compliant with all relevant aspects of the Guidelines For Subdivision And Development of Land Affected by Transmission Line Easements (SP Ausnet, 16/2/2006).

## **2.4 Gas**

### **2.4.1 Gas Distribution Network**

Envestra / APA is the responsible service provider for the provision of gas supply in this area.

APA's distribution business is responsible for network extensions into new estates. Typically this would be via the extension of an existing network if capacity exists. However, advice from APA at a meeting held with them on 17 January 2013 is that the existing gas supply reticulation system has only been designed to supply Pakenham as far as the current extent of development west of Deep Creek, and there is no further capacity to service any development beyond this boundary.

Any development east of Deep Creek will require the installation of a new City Gate, probably to be located within the Metering Station compound at Dore Road. A City gate is a pressure regulating kiosk, which reduces the pressure from 10,000 KPa in the transmission pipeline to 550 KPa in the distribution network.

APA advised that, for the planning and implementation of a new City Gate for the Pakenham East Precinct, there would be at least 12-18 month lead time required, and this will need to be taken into account in planning for this area.

Under current policy the City Gate and distribution network for the Precinct would be funded by APA subject to a cost benefit analysis considering forecast revenue from the growth area. The need for a new City Gate offtake is gas load dependent and a contribution may be required if the load for the Precinct is not considered sufficient..

### **2.4.2 Gas Transmission Network**

There are APA GasNet Australia Gas Transmission Pressure Pipelines through the Precinct running east west just to the north of the Princes Highway, and also heading north from near the Metering Station M38 at Dore Road.

Natural gas from the Bass Strait gas fields is delivered to Melbourne via the 174.2 km, 750 mm diameter Longford to Dandenong Pipeline. The API 5L Grade X60 steel pipeline connects Esso's Longford gas processing plant in Gippsland to the Dandenong terminal station and is part of the Victorian Transmission System (VTS).



The Pakenham-Wollert pipeline from Pakenham is a 750mm diameter pipe sitting within a 27m easement. The existing pipe is located 7m off the western edge of this easement and the balance of the easement is reserved for future upgrades.

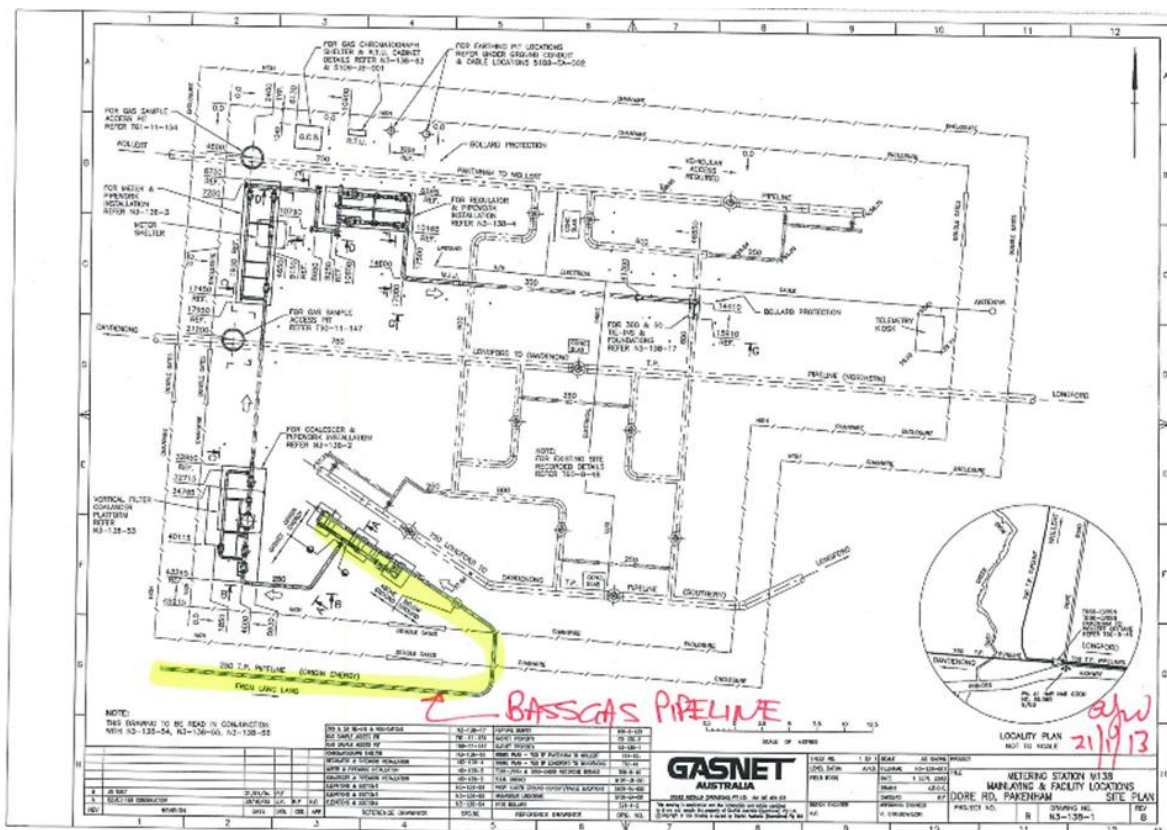
The BassGas pipeline runs through the area from across the railway line from the southern boundary to the Metering Station M38 at Dore Road. The pipeline runs from the Lang Lang gas processing plant which processes the raw gas to sales gas specifications before it is transported through the 35 kilometre on-shore, underground 'sales gas pipeline' to the Victorian Principal Gas Transmission Pipeline. The BassGas facility consists of the Yolla gas field and an unmanned offshore wellhead platform connected via undersea and underground pipelines to the on-shore processing facility at Lang Lang.

APA have advised that this particular site is extremely important to them, as it is a fully active and operational natural gas transmission asset/network and this particular facility supports approximately 80% of all Metropolitan Melbourne's gas consumption/supply and 100% of all northern Victoria's gas consumption/supply

Because of the importance and functionality of the site (gas transport, safety, noise, etc.), they would prefer that residential development consider the existence of these types of assets/easements accordingly, in relation to likely developments/dwellings and proximity to their assets and future upgrading work.



Gas Easement from Dore Road – looking west



Gas Metering Station at Dore Road



Gas Metering Station at Dore Road

The Metering Station compound needs to be accessed for operation and maintenance purposes, including by trucks carrying 5 metre long steel pigs, weighing about a tonne, used for cleaning of the transmission pipelines.

There is apparently quite a loud noise from the gas pressure regulator, particularly at times of high gas use (May – June).

We understand from APA that development is prohibited within the gas supply easements, and that they need to be fully protected for upgrades. From the meeting with APA representatives, there are plans to install new pipes within

their easements and they are therefore not permitting development within the easement which might restrict their ability to construct new pipelines or add excessive cost to the process.

The easements will need to be incorporated into a reserve or open space. No native vegetation offset planting will be permitted, nor will roads with structures or other utilities, and road construction parallel to the pipeline within transmission pipeline easements be allowed. Road crossings (90deg) will be allowed if no alternative exists.

Where crossing of the easement with roads and services would be proposed in the Precinct Structure Plan, these may be permitted with the approval of APA. The pipeline might need to be engineered for the crossing, and assessments would be required of the pipeline and impacts of road crossings. Acceptance of a crossing would be given on a case by case basis.

Lowering or realigning a transmission pipeline perpendicular to a new asset is possible although most likely prohibitively expensive, and alternatives should be considered.

APA has confirmed that there are currently no restrictions imposed outside the gas easements. Although high pressure gas transmission lines have potential to cause catastrophic damage in the case of explosion they are required to be maintained and monitored to ensure their integrity. The likelihood of explosion is extremely remote and there is no current requirement to provide additional buffers to safeguard against this unlikely outcome. APA have recommended, however that potential risks be considered in land use planning, including the suggestion that uses such as schools and hospitals be sited away from pipelines if possible.

APA has advised that Energy Safe Victoria and Department of Primary Industries are reviewing the risks associated with development within heat flux zones around transmission pipelines. Significant work by the gas industry is still required in this area, and imposing exclusion zones is a complex issue that would have significant implications for the industry. The cost of transporting gas would be significantly increased if additional land needed to be quarantined to facilitate pipelines.

We have contacted Energy Safe Victoria (ESV) to determine whether ESV or any other authority may have any specific requirements for these particular pipelines and the Metering Station that could significantly affect the planning for development in this area. To date no response has been received.

## 2.5 Telecommunications

NBN Co is the responsible agency for the delivery of the National Broadband Network (NBN).

Telecommunication design and installation in all new residential estates greater than 100 lots will be administered through the NBN Co system.

Developers will need to make application to NBN Co for the provision of telecommunications. The developer will then need to design and construct a suitable pit and pipe network for NBN to utilise.

NBN Co has been contacted to confirm the provision of telecommunications for the precinct but, based on their web site information and that fact NBN rollout activity is occurring in the Pakenham area, with new stages of the Cardinia Lakes Estate completed or under construction, there are not likely to be any obstacles to obtaining this service when required.

For development less than 100 lots, developers might be directed to make application through Telstra.

Telstra are no longer responsible for the supply of new networks although their existing infrastructure will continue to be utilised while required. There are current some Telstra assets within the Pakenham East Precinct. These are generally services to rural allotments and the cabling follows existing road reserves within the precinct.

NBN Co has not yet planned how the network will roll out across the Pakenham East Precinct, but will use existing Telstra conduits subject to location and condition.

Should development require removal of existing road reservations containing Telstra assets, further enquiries with Telstra and NBN Co will be required regarding relocation of existing assets. Furthermore developers should also undertake a Dial Before You Dig enquiry before commencing any works on their property.

There are Telstra and Optus Major Optic Fibre Network lines running along the southern boundary of the transmission line easement in this area. These cables are of national significance with the potential to significantly disrupt communications in Australia if damaged.



Telstra & Optus Cables in Transmission Easement  
– looking west from Dore Road

There are also apparently private Optic Fibre telecommunications assets within the railway reserve, known as a “dark fibre” cables but the ability to utilise or upgrade this facility is not known at this stage. Telstra advises that there could be issues related to maintenance of this cable as it is not Telstra’s responsibility to do so,

### 3. SUMMARY AND CONCLUSIONS

The investigations carried out confirm that the subject area has availability and access for connection to all necessary services, but that future development within the majority of the Pakenham East Precinct will require the significant upgrading and extension of all services, particularly sewerage and water supply.

There are no apparent significant constraints to the supply of any utility service in relation to the development in the Precinct area, but the lead times and scope of work involved in the extension of sewer and water reticulation and gas supply will need to be taken into account by individual developers.

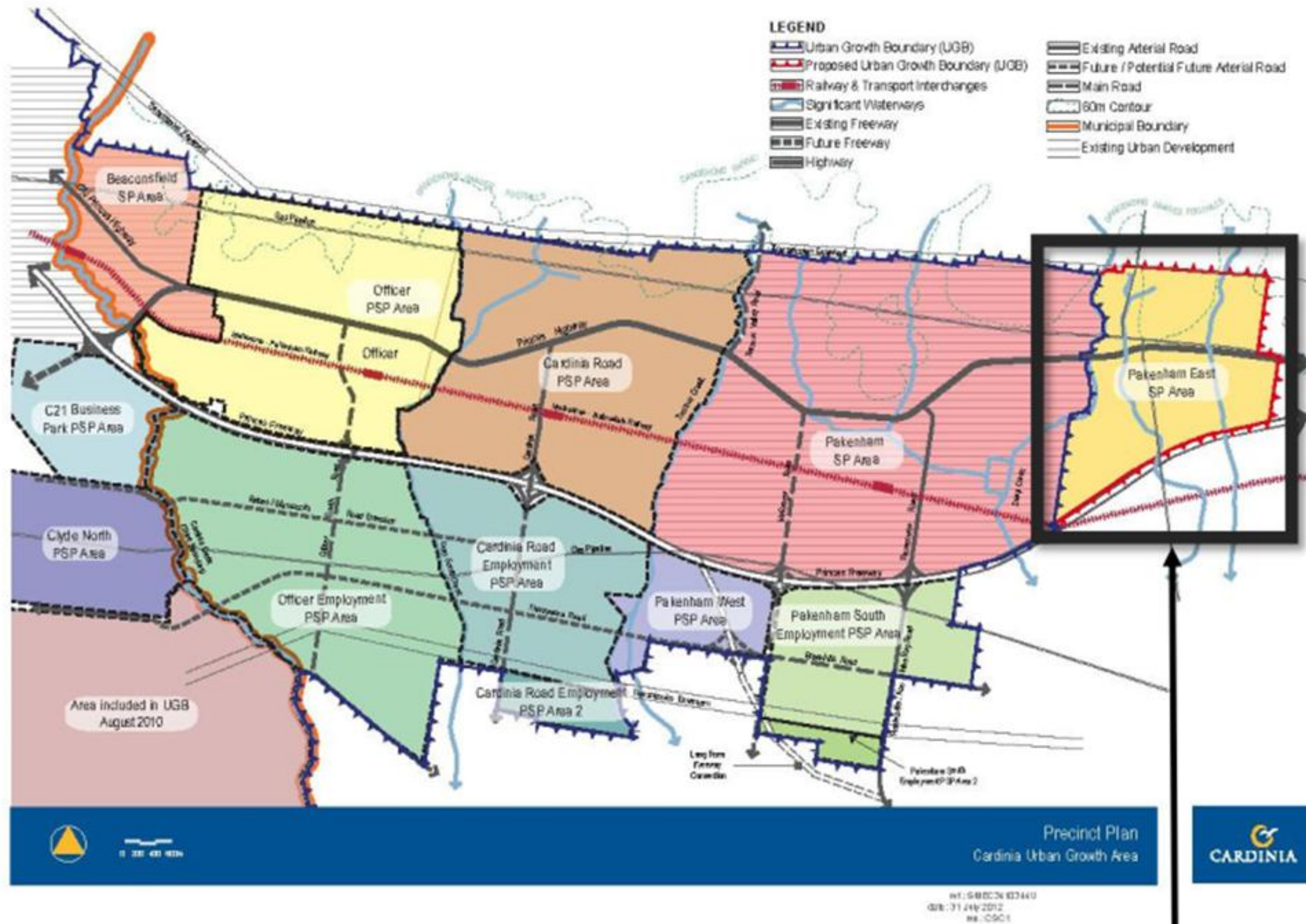
Development from the western boundary appears to be the most logical starting area for development, although the provision of a gas supply will need to be determined for early developments.

Implementation and staging of all works will need to be coordinated with all relevant service providers.

## **APPENDICES**

### **Appendix A – Cardinia Council's Urban Growth Area Precinct Plan**



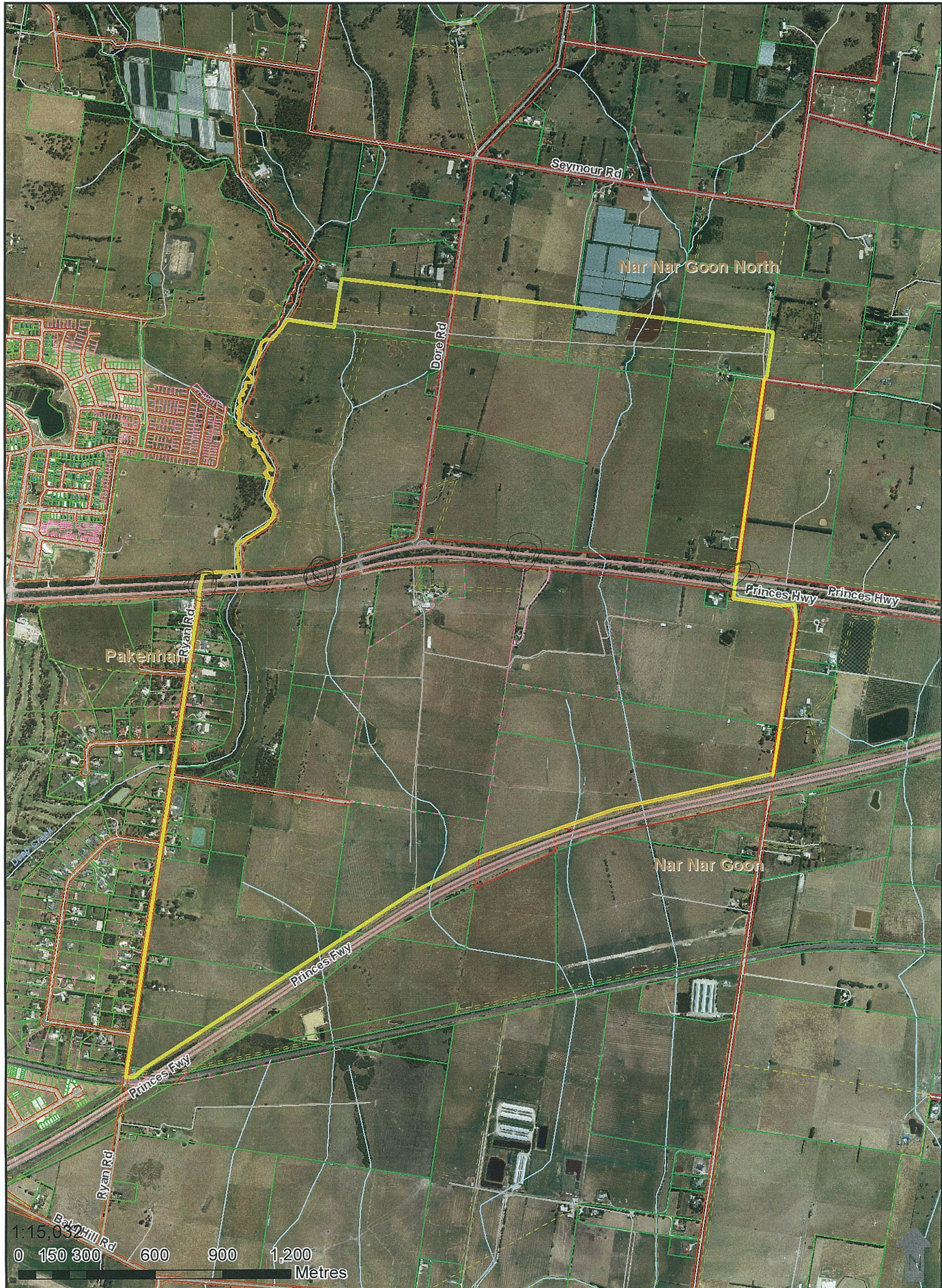


**Pakenham East Precinct**

## Appendix B – Pakenham East Precinct Area



## Pakenham East



Data Source: State & Local Government. © CARDINIA SHIRE COUNCIL

3/12/2012



**Appendix C – South East Water Correspondence**

- **Land Servicing Advice (20 Dec 2012)**
- **Email Response to Queries (25 January 2013)**

20 DECEMBER 2012

SW REF: 1201148  
eyw  
7/1/13

Mr C. White  
BEVERIDGE WILLIAMS & CO  
PO BOX 61  
MALVERN VIC 3144

Dear Mr White,

**LAND SERVICING ADVICE**  
**Pakenham East Precinct Structure Plan**  
**Our Reference: Case Number 19976115 File 06PD0164**

I refer to your application requesting Land Servicing Advice for the provision of South East Water's potable water, recycled water and/or sewerage facilities to the above property. We are able to provide you with the following general servicing advice for the proposed development based on the information provided.

This land servicing advice has been prepared based on the information available at the time, however we reserve the right to vary this advice in the future as circumstances change without further notification.

**POTABLE WATER**

The source of supply for the proposed development is from the Pakenham Tank distribution zone (103.5m) and the existing 900mm MSCL pipeline located at the junction of Princes Highway and Abrehart Road, as shown on the attached 'Potable Water Plan'.

Development of the proposed land within an elevation of 65m and 95m is to be supplied from the Pakenham HL Zone and the initial source of supply is from the existing 225mm potable water main located at the intersection of Windermere Boulevard and Waterside Drive. Additionally, the HL system will have to be supplemented by installing a 4.5ML/d Booster Pumping Station in the vicinity of Constance Way boosting supply from the existing 900MSCL pipeline in Abrehart Road.

The alignment and sizing of reticulated potable water mains must be in accordance with the MRWA Edition of the WSAA Water Supply Code.

**SEWER**

To provide adequate sewerage facilities to the area, it will be necessary to construct 375mm and 450mm diameter sewer mains discharging into the existing 525mm diameter Peet Street Branch Sewer - maintenance hole PEE32 as shown on the attached 'Sewer Plan'.

Due to limited capacity to the existing system, augmentation works downstream will be required to be undertaken by South East Water in the future.

Please note that the alignment and sizing of the mains are indicative only and is subject to detailed design. The alignment and sizing of all reticulated sewerage mains must be in accordance with the MRWA Edition of the WSAA Water Sewerage Code.

South East Water Corporation ABN 89 066 902 547  
Locked Bag 1, Moorabbin, Vic 3189  
Fax (03) 9552 3001  
Internet [www.southeastwater.com.au/ice](http://www.southeastwater.com.au/ice)

DN\_FASISLITY

**New Customer Contributions**

Area contributions are assessed on the potential for additional loading on the water supply and sewerage system created by developments. Area contributions are required to recover the cost of constructing systems to cater for urban growth now and in the future.

The actual rates to be applied will be those that are applicable at the time of application for a detailed Development Deed.

**General Information**

The development will be subject to the servicing and financial requirements in accordance with South East Water's Land Development Policy Manual and all works are to be carried out in accordance with the Melbourne Retail Water Agency (MRWA) edition of the Water Services Association of Australia (WSAA) codes.

**Please note:**

Any construction work over or within 1 metre of a South East Water asset requires prior consent from South East Water. South East Water assets include but are not limited to water mains, sewer mains, property connection points (branches), maintenance holes and inspection shafts.

This includes the installation of any footings / foundations and /or ground anchors. Any rectification work/s required due to damage caused to South East Water's assets through works for your development may result in additional costs and delay of your application. All rectification costs will be the responsibility of the owner/s and /or developer/s.

For further details regarding South East Water's buildover criteria please refer to the 'Customer Guide – Guidelines for Proposed Works Over / Adjacent to Water Authority Assets up to and including 225mm diameter'. The guide is available on South East Waters web site [www.southeastwater.com.au](http://www.southeastwater.com.au) select the Property Tab, then Works near assets and easements from the left hand side tool bar.

If you require further information, please contact Peter Kandyliotis on 9552 3430.

Yours sincerely

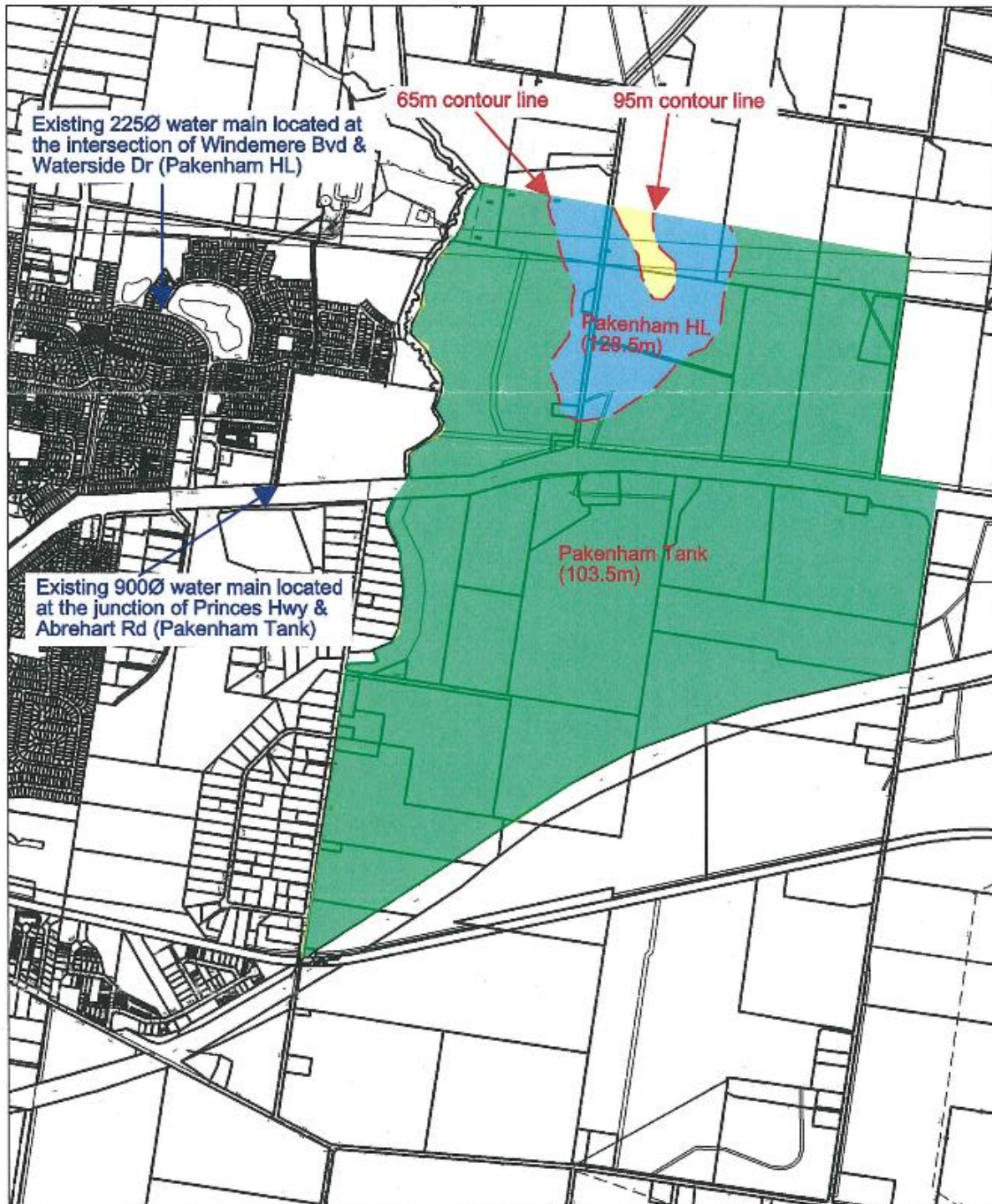








Giuliano Gava  
**MANAGER**  
**LAND DEVELOPMENT**

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Fax (03) 9552 3001  
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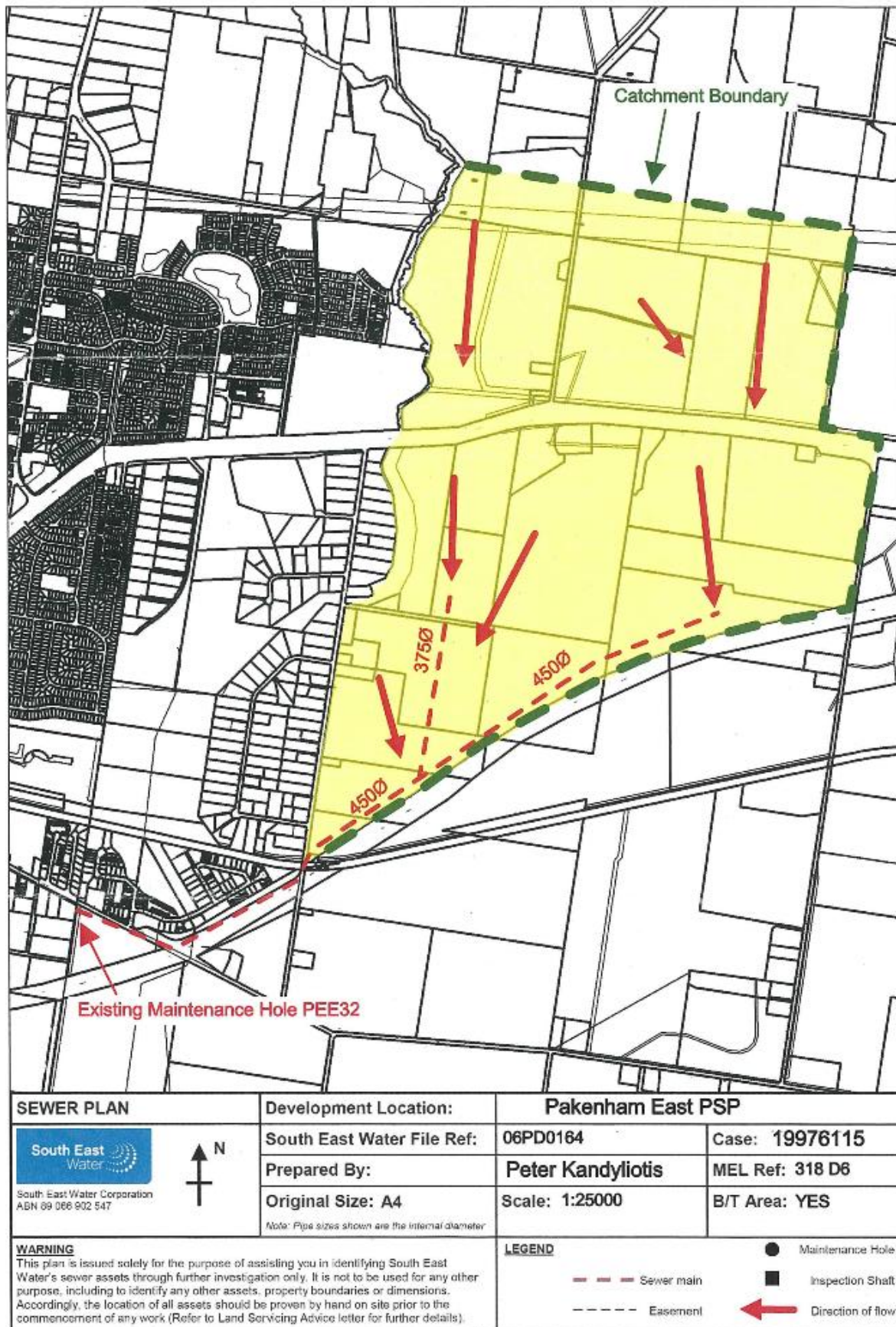
DV\_FEASIBILITY





POTABLE WATER PLAN		Development Location:		Pakenham East PSP	
<div><div>South East Water Corporation ABN 89 085 502 547</div></div> <div></div>	South East Water File Ref:	06PD0164	Case: 19976115		
	Prepared By:	Peter Kandylotis	MEL Ref: 318 D6		
	Original Size: A4	Scale: 1:25000	Max HGRL: 123.5m/148.5m/170.0m 103.5m/128.5m/150.0m + 20m surge		
<b>WARNING</b> This plan is issued solely for the purpose of assisting you in identifying South East Water's sewer assets through further investigation only. It is not to be used for any other purpose, including to identify any other assets, property boundaries or dimensions. Accordingly, the location of all assets should be proven by hand on site prior to the commencement of any work (Refer to Land Servicing Advice letter for further details).		Note: Pipe sizes shown are the internal diameter			
		<b>LEGEND</b>			
		— — — Water main		 Hydrant	
		 Valve		 Fireplug/Washout	
				Tapper/Reducer	





**Chris White**

**From:** Kandylotis, Peter <Peter.Kandylotis@sew.com.au>  
**Sent:** Friday, 25 January 2013 4:46 PM  
**To:** Chris White  
**Subject:** RE: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Chris,

Please refer to my responses in red below.

Regards



**Peter Kandylotis** - Land Development Major Project Coordinator  
20 Corporate Drive, Heatherton VIC 3202 [www.southeastwater.com.au](http://www.southeastwater.com.au)  
Telephone: 9552 3430 Facsimile: 9552 3410

---

**From:** Chris White [<mailto:whitec@bevwill.com.au>]  
**Sent:** Thursday, 10 January 2013 9:28 AM  
**To:** Kandylotis, Peter  
**Cc:** Gava, Giuliano; Brae Jessep  
**Subject:** BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Hello Peter.

Happy New Year.

Thanks for the Land Servicing advice for the Pakenham East Precinct area being implemented by Council. (SEW REF: Case No 19976115 File 06PD0164)

While the information provided is generally as expected there are a couple of matters that it would be appreciated if you could clarify.

The main item is that there is no reference to the availability of or requirement for the provision of recycled water facilities for development of this area. Can this be taken as meaning that SEW has no intention of supplying recycled water to this area?

The property is not adjacent to a mandated recycled water area. While recycled water can possibly be provided from Pakenham Treatment Plant, should your company have alternative water supply ideas we would be happy to consider them.

For the potable water supply, the plan and description indicates that it would be difficult to supply the area between the 65m and 95m contour levels from the existing 225mm main as this is about 2km away. There is also no reference to supplying the area above the 95m contour. Are any other options possible for supplying the higher level area, such as putting a tank to the north along Dore Road? The ridgeline rises to about RL110m in this area. Refer Sheet 1 of 3, attached.

Planning has finalised the servicing strategy a while ago and has concluded that the existing servicing strategy is the best option. I have however forwarded this email to our Senior Planning Engineer for consideration and comment.

For sewer reticulation infrastructure, there has previously been mention of a Ryan Road Branch Sewer, as shown on the SEW Record Plan attached (Sheet 3 of 3). This is apparently to service the Peet development, The Crest, and the



possibility of utilising this sewer to service the area east of Deep Creek has previously been raised by Parklea. Has any further assessment of this option been done and it could it still be a possibility (Sheet 2 of 3)?

The proposed Ryan Road Branch Sewer is currently in the Functional Design Stage and there has been significant consultation with affected properties over the last 12 months. As such the existing servicing strategy cannot change.

These matters will depend on and affect the timing of development in the Precinct.

Please contact me if you have any queries or need any additional information.

Thanks Peter.

Regards

**Chris White**  
Principal Engineer

ph: (03) 9524 8850  
mob: 0408 104 518



**Beveridge Williams**  
development & environment consultants

1 Glenferrie Road  
Malvern, Victoria 3144  
(PO Box 61, Malvern, Vic. 3144)

ph : 03 9524 8888 fax : 03 9524 8899  
web : [www.beveridgewilliams.com.au](http://www.beveridgewilliams.com.au)



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#### **Appendix D – SP AusNet**

- Email Correspondence
- Guidelines for Subdivision and Development of Land Affected by Transmission Line Easements (SP AusNet, 16/2/2006).

**Chris White**

---

**From:** Jose Mampallil <Jose.Mampallil@sp-ausnet.com.au>  
**Sent:** Wednesday, 12 December 2012 2:45 PM  
**To:** Chris White  
**Subject:** FW: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Hi Chris,

Please see email below from our system planner.

Regards,

**Jose Mampallil**  
Design Engineer  
Integrated Network Services  
PO Box 202, Lilydale, 3140  
Ph : 9237 4592  
Mob: 0408766394  
Fax: 9237 4533  
Email: [jose.mampallil@sp-ausnet.com.au](mailto:jose.mampallil@sp-ausnet.com.au)

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---

**From:** Sanath Peiris  
**Sent:** Wednesday, 12 December 2012 2:11 PM  
**To:** Jose Mampallil  
**Cc:** Andrew Webber; Ross Morgan  
**Subject:** RE: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Hi Jose,

There is no capacity left in PHM14 to take any more load.

At this stage there is about 6MVA capacity left in PHM33.

10,000 houses will be about 25-40MW. This type of load cannot be supplied from these two feeders. This will require 3-4 feeders and possibly additional zone sub or augmentation of PHM or OFR zone sub will be required.

Until I get sufficient information it is difficult to provide proper advice on the work required.

Regards,

**Sanath Peiris**  
Lead Engineer Central Network Planning  
Networks Strategy and Development Division | SP AusNet

Level 30, 2 Southbank Boulevard, Southbank VIC 3006  
T: 61 3 9695 6854 | F: 61 3 8635 7528 | M: 0458 315 344  
Email [sanath.peiris@sp-ausnet.com.au](mailto:sanath.peiris@sp-ausnet.com.au) | [www.sp-ausnet.com.au](http://www.sp-ausnet.com.au)

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---

**From:** Jose Mampallil  
**Sent:** Wednesday, 12 December 2012 12:23 PM  
**To:** Sanath Peiris  
**Subject:** FW: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Hi Sanath,

Please see the email below and the advice I send out on December 3 (below).

Can you advise how heavily loaded PHM14 and PHM33 are? Do you think the load requested below can be handled by these feeders?

Regards,

Jose Mampallil  
Design Engineer  
Integrated Network Services  
PO Box 202, Lilydale, 3140  
Ph : 9237 4592  
Mob: 0408766394  
Fax: 9237 4533  
Email: [jose.mampallil@sp-ausnet.com.au](mailto:jose.mampallil@sp-ausnet.com.au)



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---

**From:** Chris White [<mailto:whitec@bevwill.com.au>]  
**Sent:** Wednesday, 12 December 2012 11:46 AM  
**To:** Jose Mampallil  
**Cc:** Harry Iliadis; Sanath Peiris; Brae Jessep  
**Subject:** RE: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Thanks Jose.

The area has been identified as a residential precinct and is proposed to include a Neighbourhood Activity Centre and associated community facilities.

The PSP has a total area of about 650 hectares and could accommodate in the order of 10,000 lots. I remember that there was a need for another Zone substation to service the Pakenham area, at one stage to be located in Green Hills Road east of Healesville – Koo Wee Rup Road.

Could there be a need to locate a future Zone substation in the Pakenham East PSP area?

For staged development of the PSP area it appears that it would best to commence from the western edge and move eastward. This would be from the HV Network available through the Cardinia Lakes development and from Ryan Road and Princes Highway. Can you give an estimate of how many lots could possibly be supplied from the existing infrastructure before infrastructure reconfiguration/upgrading is required?

With the 22KV VicTrack traction substation, how is this supplied and who is responsible for it?

Thanks again.

Regards

**Chris White**  
Principal Engineer

ph: (03) 9524 8850  
mob: 0408 104 518

Merry Christmas and a happy New Year from all the team at Beveridge Williams  
Our offices will be closed for the Christmas holidays from Friday 21 December and re-opens on Monday 7 January 2013.



**Beveridge Williams**  
development & environment consultants

1 Glenferrie Road  
Malvern, Victoria 3144  
(PO Box 61, Malvern, Vic. 3144)

ph : 03 9524 8888 fax : 03 9524 8899  
web : [www.beveridgewilliams.com.au](http://www.beveridgewilliams.com.au)



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**From:** Jose Mampallil [<mailto:Jose.Mampallil@sp-ausnet.com.au>]  
**Sent:** Friday, 7 December 2012 11:37 AM  
**To:** Chris White  
**Cc:** Harry Iliadis; Sanath Peiris; Brae Jessep  
**Subject:** RE: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Chris,

The infrastructure reconfiguration if required will depend on the size of your load and timing of your application.

The 22kV substation that you are referring to is Victrack's traction substation.

Regards,

**Jose Mampallil**  
Design Engineer  
Integrated Network Services



PO Box 202, Lilydale, 3140  
Ph : 9237 4592  
Mob: 0408766394  
Fax: 9237 4533  
Email: [jose.mampallil@sp-ausnet.com.au](mailto:jose.mampallil@sp-ausnet.com.au)



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**From:** Chris White [<mailto:whitec@bevwill.com.au>]

**Sent:** Friday, 7 December 2012 10:47 AM

**To:** Jose Mampallil

**Cc:** Harry Iliadis; Sanath Peiris; Brae Jessep

**Subject:** RE: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Thanks Jose.

I do have a couple of queries relating to the information provided.

When you talk about network constraints applying in the Pakenham area, and infrastructure reconfiguration works being needed, can you provide a bit more detail about what that could involve and the possible timing?

In relation to the area south of the Highway, there is an existing 22KV substation at the end of Ryan Road, as shown on the attached photos. What is the purpose of this substation and will it need to be upgraded to service the southern area? Will it need to remain as-is or is it likely that any additional area would be needed?

Thanks again.

Regards

**Chris White**  
Principal Engineer

ph: (03) 9524 8850  
mob: 0408 104 518

Merry Christmas and a happy New Year from all the team at Beveridge Williams  
Our offices will be closed for the Christmas holidays from Friday 21 December and re-opens on Monday 7 January 2013.



**Beveridge Williams**  
development & environment consultants

1 Glenferrie Road  
Malvern, Victoria 3144  
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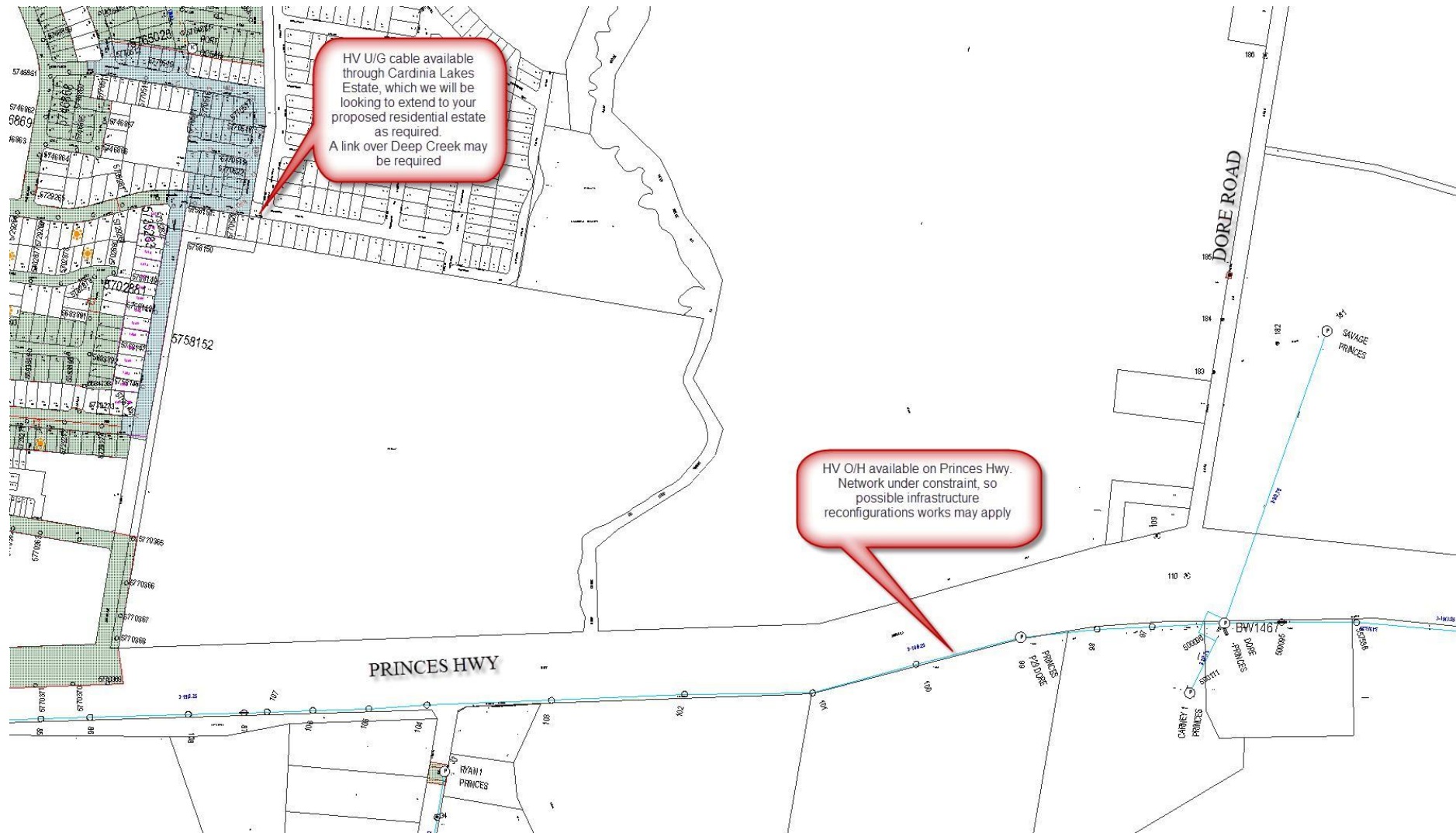
**From:** Jose Mampallil [<mailto:Jose.Mampallil@sp-ausnet.com.au>]  
**Sent:** Monday, 3 December 2012 4:24 PM  
**To:** Chris White  
**Cc:** Harry Iliadis; Sanath Peiris  
**Subject:** RE: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Hi Chris,

Based on your request below, I can provide the following advice for your proposed residential Precinct structure plan.

- There is HV Network available through the Cardinia lakes housing estate, which we will be looking to bring in to the proposed residential precinct
- So a link over Deep Creek may most possibly be required to bring HV in
- HV Network is available on Princes Hwy, but I suspect is under constraint, and potential reworks will have to be completed to make suitable for your site.
- HV is also available on Ryan Rd, for the area south of Princes Hwy. But network constraints apply.
- Due notice required prior to works, as network constraints apply in Pakenham area.





Regards,

Jose Mampallil  
Design Engineer  
Integrated Network Services  
PO Box 202, Lilydale, 3140  
Ph : 9237 4592  
Mob: 0408766394  
Fax: 9237 4533  
Email: [jose.mampallil@sp-ausnet.com.au](mailto:jose.mampallil@sp-ausnet.com.au)



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---

**From:** Harry Iliadis  
**Sent:** Monday, 3 December 2012 12:36 PM  
**To:** Chris White ([whitec@bevwill.com.au](mailto:whitec@bevwill.com.au))  
**Cc:** Jose Mampallil  
**Subject:** FW: BW REF: 1201148 PAKENHAM EAST PSP SERVICES REPORT

Chris

Jose Mampallil of our office is looking after this area, he will respond in due course.

Harry Iliadis  
Design Engineer  
SP AusNet – Lilydale  
PO Box 202 Lilydale Vic 3140  
Phone: 03 9237 4467  
Mobile: 0407 254 758  
Fax: 03 92374533  
Email: [harry.iliadis@sp-ausnet.com.au](mailto:harry.iliadis@sp-ausnet.com.au)



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***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.

16/2/2006

p:\Guidelines Brochures Examples\guidelines subdivision & development.doc

## GUIDELINES FOR SUBDIVISION AND DEVELOPMENT OF LAND AFFECTED BY EASEMENTS

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## **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

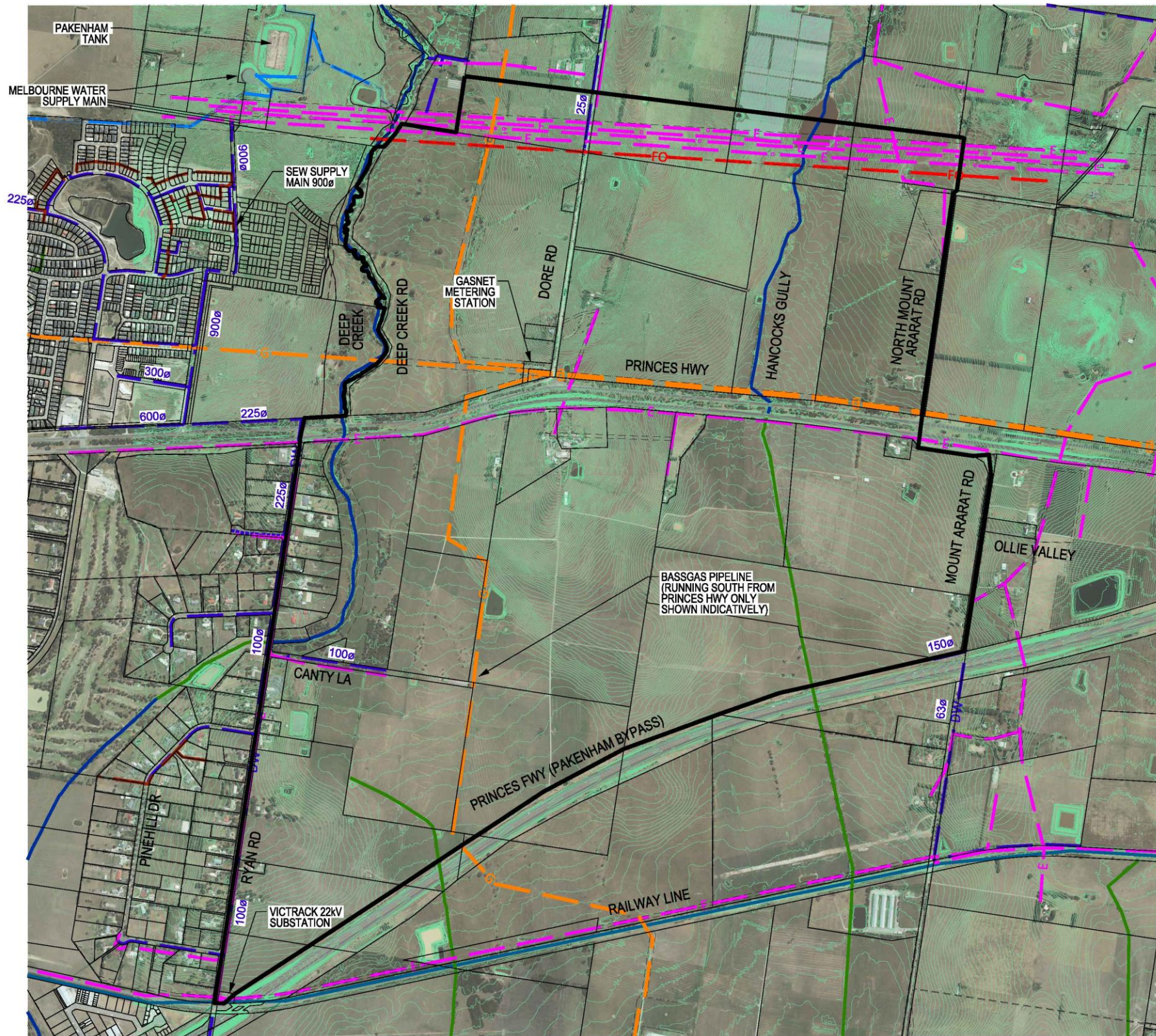
**Table 2 - Minimum Separation Distance  
(Measured to the Tower or Pole Centre)**

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

**Appendix E – Pakenham South Precinct Infrastructure Plans**

- 1201148-01-001 P2 Existing Conditions Plan
- 1201148-01-002 P1 Proposed Infrastructure Plan - Sewer
- 1201148-01-003 P1 Proposed Infrastructure Plan – Water Mains





LEGEND

PAKENHAM EAST BOUNDARY	
EASEMENTS	
ELECTRICITY	
OPTIC FIBRE	
WATER MAINS	
SEWER	
GAS	
WATERWAY	
M.W. CHANNEL	
M. W. DRAINAGE PIPES	
RAILWAYS	

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Rev	Description	Date	By	App
P2	AMENDED EXISTING CONDITIONS PLAN	05/02/13	BJ	CW
P1	EXISTING CONDITIONS PLAN	21/12/12	BJ	CW

0 80 160 320 480 640 800  
APPROXIMATE SCALE

Designed	B JESSEP
Date	21/12/12
Drawn	B JESSEP
Approved	C WHITE
Date	21/12/12
PS Number	PS

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PAKENHAM EAST PRECINCT  
CARDINIA SHIRE

Drawing Title  
PAKENHAM EAST PRECINCT  
EXISTING CONDITIONS PLAN

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Precinct - Services  
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Services.dwg

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Project Ref	Stage No	Drawing No	Rev
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