Growth Areas Authority
Wollert Precinct Structure Plan 1070
Utilities Infrastructure Servicing Assessment

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Prepared by CPG Australia

This report has been prepared from the office of CPG

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Acknowledgements and Recognition

Yarra Valley Water

SP AusNet (Transmission Network)

SP AusNet (Distribution Network)

APA Group (Transmission Network)

APA Group (Distribution Network)

NBN Co

Telstra

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14 May 2012	1	Stuart Neave	Elizabeth Hamila	Stuart Neave
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1 Introduction

CPG Australia has been engaged by the Growth Areas Authority and the City of Whittlesea to research and report on servicing for the Wollert Precinct Structure Plan Area (PSP).

Known as Precinct 1070 in the Growth Areas Authority framework, Wollert sits within the Northern Growth Corridor in the City of Whittlesea. The area to the south of the Wollert Precinct is also sometimes referred to as Epping North. Wollert is bounded by:

- Craigieburn East Road and Lehmanns Road to the south
- Summerhill Road to the north
- The Outer Metropolitan Ring / E6 transport corridor in the vicinity of Epping Road to the east
- The western boundary is comprised of the Curly Sedge Creek in the southern part of the precinct and APA landholding approaching Summerhill Road.

See Attachment 1 for The Wollert Precinct Structure Plan – site plan.

1.1 Authority Consultation

The following Utility Service Authorities were consulted and this report reflects their advice on existing and proposed assets to service Wollert.

- Yarra Valley Water
  - Sewer Authority
  - Water Authority
  - Recycled Water Authority
- SP AusNet
  - Electricity Network Extensions Authority
  - Electricity Transmission Network Authority
- APA Group
  - Gas Network Extensions Authority
  - Gas Transmission Network Authority
- NBN Co
  - Telecommunications Authority
- Telstra
  - Legacy Telecommunications

It should be noted that sizing and alignment of proposed services described within this report is indicative only, subject to formal offers of supply from the relevant utilities servicing agencies and detailed subdivision design.

Yarra Valley Water

Yarra Valley Water (YVW) is the responsible authority for providing sewerage, water and recycled water to Wollert. The authority has planned for development in the Epping North region with documented strategies. These strategies are continually updated by YVW as necessary. The following section consolidates information for Wollert from YVW's strategic plans current at the date of issue. YVW should however be consulted regularly for updates to servicing provisions.

2 Sewer

The following plans can be found in Attachment 2. These should be reviewed in conjunction with this section of the report.

- Yarra Valley Water Epping North Sewer Infrastructure Plan Figure 2.1
- Utilities PSP Wollert, Sewer Catchments and Branch Sewers Figure 2.2

The Wollert site generally grades from north to south and will be serviced by gravity branch sewers grading to the south.

From YVW strategic plans and contour models we have established six sewer catchments within the Wollert Precinct. These catchments are illustrated in Figure 2.2 "Sewer Catchments and Branch Sewers". The Wollert catchments gravitate to low points along Craigieburn East Road delineating the southern boundary of the precinct. Five separate branch sewers will extend north from existing developments south of Craigieburn East Road to service the precinct. From east to west these branch sewer systems are known as follows;

- Findon Creek Branch Sewer
- Harvest Home Road Branch Sewer
- Edgars Creek North Branch Sewer
- Love Branch Sewer
- Curly Sedge Creek Branch Sewer**

** The proposed Curly Sedge Creek Branch Sewer has now been relocated west of the creek and falls outside the Wollert Precinct, there is still a catchment within Wollert which will drain to this system.

This report outlines the current status of these systems however specific timing of their extensions is subject to demand.

2.1 Existing Conditions

Major infrastructure that receives flows from the above branch systems is well established through developing areas south of Wollert. Constructed sections of these systems presently gravitate to the Cotters Road sewer pump station (SPS) at the corner of Cotters Road and O'Herns Road, Epping North. The Cotters Road SPS then pumps via the Cotters Road rising main (RM) to the Aurora Sewerage Treatment Plant (STP).

The Aurora STP currently treats effluent and produces class A and class B recycled water. YVW's strategy is to maximise the use of recycled water at a local and regional scale. This will delay the need for further infrastructure to convey surplus treated water or effluent to the main metropolitan trunk sewer system.

To maximise the regional potential for recycled water consumption and treatment capacity, the Aurora STP operates in conjunction with the Craigieburn STP situated north of the Merri and Aitkin Creek junction. The two plants are linked via four pipes with the following functions:

- Raw sewerage gravity line from Craigieburn to Aurora allowing increased treatment across the plants
- Sludge RM from Aurora to Craigieburn for evaporation of waste material
- Recycled Class A water via pressure line from Aurora to Craigieburn for storage which also gravitates back
- Recycled Class B water via rising main from Aurora to Craigieburn for distribution from Craigieburn

2.2 Proposed Augmentation Works in Epping North

As required the receiving network will be upgraded as follows.

- Edgars Road SPS upgrade and Northpoint to Cotters Road RM
- Cotters Road RM duplication
- Aurora STP Stage 2
- Aurora STP Stage 3
- Branch Sewer to Merry Creek Main Sewer
- Epping Branch Sewer section 1, Tunnel under Freeway

- Epping Branch Sewer section 2
- Epping Branch Sewer section 3 up to Edgars Road
- Epping Branch Sewer section 4B from O'Herns Road to Edgars Road

These upgrades will be rolled out as demand required and will not impede the logical extension of up stream branch sewers to service Wollert.

2.3 Wollert Branch Sewers

Findon Creek Branch Sewer

Findon Creek Branch Sewer section 3 has been constructed as far as Craigieburn East Road. This system presents the most immediate opportunity for connection to gravity sewer for the Wollert Precinct. The Findon Creek system, including the Epping Road Branch Sewer, is responsible for servicing approximately 62% of the Wollert Precinct.

North of Craigieburn East Road, the Findon Creek Branch Sewer is proposed to divide. Findon Creek Branch Sewer section 4 (proposed) will extend north west and Epping Road North Branch Sewer will extend north east.

Findon Creek Branch Sewer Sections 4 and 5 (proposed) are approximately 4.4km long. Section 4 commences at Craigieburn East Road at 450mm in diameter downsizing as it works its way up the catchment to 375mm in diameter. Findon Creek Branch Sewer section 5 continues at 300mm in diameter to the northern boundary of the Wollert Precinct.

Epping Road North Branch Sewer (proposed) is approximately 3.6km long commencing at Craigieburn East Road at 300mm in diameter. This size will be maintained to the northern boundary of the Wollert Precinct.

Harvest Home Road Branch Sewer

Harvest Home Road Branch Sewer section 3 to Craigieburn East Road has recently been constructed but is yet to be commissioned. YVW expect this branch to be commissioned and available in the next few months.

Harvest Home Road Branch Sewer section 4 (proposed) is approximately 2.5km long commencing at Craigieburn East Road at 300mm in diameter. This size is maintained as the sewer extends generally along the edge of the SP AusNet transmission lines.

The Harvest Home Road Branch Sewer is not immediately accessible but considered immanent.

The harvest Home Road Branch Sewer catchment represents 11% of the Wollert Precinct.

Edgars Creek North Branch Sewer

Edgars Creek sections 1-3 are approximately 4km long. Section 2 has been constructed. Section 1 and part of section 3 are planned for construction within 2012. Following their construction a further 800m of 450mm diameter sewer will be required to complete section 3 to the Wollert boundary. There are no immediate plans for this extension.

Edgars Creek section 4 (proposed) is approximately 3.5km long commencing at Craigieburn East Road at 300mm in diameter.

The Edgars Creek sewer catchment within Wollert is not expected to be immediately serviced. Timing of the final 800m of Edgars Creek section 3 to Craigieburn East Road is unknown. This highlights the need to consider temporary options to initially sewer this catchment. Consideration should be given to temporary pumping facilities for the Edgars Creek catchment of Wollert. Temporary redirection to the Harvest Home Road system should be considered.

The Edgars Creek sewer catchment represents approximately 10% of the Wollert precinct.

Love Branch Sewer

This branch sewer is planned to service the western section of Aurora. As with the northern section of Edgars Creek section 3, there are no immediate plans for the extension of this branch. The Love Branch Sewer catchment within Wollert is relatively small, approximately 3% by area. Gravity sewers would only be available after Aurora is fully developed. Consideration should be given to redirecting this catchment west to the curly sedge creek catchment.

Curly Sedge Creek Catchment

This catchment covers approximately 14% of the Wollert Precinct and is located in the western corner adjoining the Curly Sedge Creek. Yarra Valley Water has relocated the proposed Curly Sedge Creek Branch Sewer to the west side of the Curly Sedge Creek. A pump station is proposed west of the creek north of Craigieburn East Road. This would ultimately pump to the Love branch sewer however if required in the interim the rising main could extend to the Harvest Home Road Branch Sewer.

2.4 Sewer Alignments

Final alignments of branch sewers are not fixed and will be influenced by the urban design. Branch sewers often follow natural depressions but would be constructed clear of the actual watercourse. Typically branch sewers would be at the edge of a drainage reserve within a registered easement. Alignments are flexible within the limits of gravity and cost. Typically sensitive areas can be avoided by realigning or under boring. Branch sewers may also follow streets. It is undesirable to construct branch sewers within private property.

2.5 Sequential Extension of Services

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 Yarra Valley Water's responsibility under the Essential Services Commission guidelines. Should a developer want to commence in advance of the planned infrastructure or "leap frog" another development, a request can be made for Yarra Valley 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 Yarra Valley 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.

Temporary pump stations are an alternative but not a given. YVW will design and construct all such facilities at the developers cost. Temporary pumping options are also subject to lowest community cost analysis. YVW will not support multiple temporary pump stations as might be desired from a land ownership perspective. Temporary pump stations should be designed to service a logical catchment based on topography.

Example:
Assume a development is ready to commence in the Edgars Creek North sewer catchment of Wollert. The Branch Sewer is planned for construction in the next five to ten years. The developer would have the following options;

- Request Yarra Valley Water bring forward the construction of Edgars Creek North section 3. If considered appropriate, fund 40% of the Branch Sewer including; design, approvals, construction and securing easement.
- Fully fund the design, approval and construction of a temporary pump station and rising main to the Harvest Home Road Branch Sewer as well as providing a ten year operational payment.

2.6 Yarra Valley Water Service Extensions, General

Yarra Valley Water networks are well established and strategic plans are in place to service development as required. Yarra Valley Water will only extend services as development requires. Services will not be extended into new areas based on development speculation.

3 Water

The following plans can be found in Attachment 3. These should be reviewed in conjunction with this section of the report.

- Yarra Valley Water Epping North Potable Water Infrastructure Plan Figure 3.1
- Utilities PSP Wollert, Potable Water Plan Figure 3.2
- Utilities PSP Quarry Hills, Potable Water Plan Figure 3.3

3.1 Potable Water Strategy

Potable water is currently limited but planned for the Wollert precinct. Wollert sits within the broader Epping North corridor which is supplied via Melbourne water distribution mains to a Melbourne Water reservoir in nearby Quarry Hills Park. The Melbourne Water site has an approximate elevation of 190m AHD (full supply level not determined). Yarra Valley Water supply existing developments to the west and below this elevation via exiting infrastructure constructed in the SP – AusNet transmission easements.

Development to the north of Harvest Home Road is at a higher elevation and is supplied from a higher level storage. Yarra Valley Water pumps from the Melbourne Waters Quarry Hills Reservoir to Yarra Valley Water's own tank site further north at elevation 240 AHD (full supply level not determined). From Yarra Valley Waters reservoir an existing trunk water main 600mm in diameter traverses the Quarry Hills precinct and reduces to 525mm in diameter at Bindts Road. This main then heads south approximately 400m turning west down Harvest Home Road to service existing developments.

From the existing Harvest Home Road water main, a 225mm diameter service heads north up Epping Road to service the Eucalypt development. This then downsizes to 150mm in diameter and continues to Craigieburn East Road and the southern boundary of Wollert. Although this system provides service to the boundary of the Wollert Precinct it is limited in capacity and is not intended to service the area.

The trunk service for Wollert is proposed to tee off the existing 600mm diameter trunk main at Bindts Road. It will travel north as a 525mm diameter trunk main approximately 1.2km to Lehmanns Road. The service will then turn west along Lehmanns Road and continue as a 450mm diameter trunk main across Epping Road and down Craigieburn East Road to service Wollert.

Staging from a potable water supply perspective would best commence along Lehmanns Road, east of Epping Road. Depending on other constraints such as environmental issues, staging would be more flexible if this service could be installed in the existing road reserve. Constructing water services across private land to facilitate "leap frog" development can be problematic. Finished surface levels are often unknown and unless already subdivided road reserve isn't available. Should the existing road reservations of Craigieburn East Road and Lehmanns Road be available for this trunk main, then development could commence anywhere along this 2km section. Consideration should also be given to the proposed upgrades of these roads as the Precinct develops and ideally site services and utilities in the existing road reserve.

The entire Wollert precinct will be fed from this service, with land north of Boundary Road being boosted with a pump. The system will loop back to Craigieburn East Road and eventually connect back into the Aurora network once completed.

Supplementary infrastructure will be brought on line by Yarra Valley Water as required. This will include a second potable water storage tank at the northern Quarry Hills site.

The proposed potable water pump station will require the reservation of land. This will require authority access off a future road in the vicinity of Boundary Road and Bodycoats Road. The facility will be an above ground building with land suitably sized for two separate pump stations (see recycled water section) with adequate space for vehicle access. Land reserved for this purpose will need to be zoned PUZ in favour of Yarra Valley Water.

3.2 Water Main Alignments

With the exception of major pipe tracks, water mains will generally follow road reserves. There is flexibility in the location of mains to accommodate urban design. Utilising the closest available roads to the strategic route would be desirable for larger mains to minimise cost.

The design of services needs to consider minimum cover under proposed roads and clearances to gravity services. As a water system is pressurised there is flexibility to manoeuvre pipes vertically to avoid underground clashes provided cover is maintained.

Pressure services will not be permitted through easements in private property.

4 Recycled Water

The following plans can be found in Attachment 4. These should be reviewed in conjunction with this section of the report.

- Yarra Valley Water Epping North Recycled Water Infrastructure Plan Figure 4.1
- Utilities PSP Wollert, Recycled Water Plan Figure 4.2
- Utilities PSP Quarry Hills, Recycled Water Plan Figure 4.3

4.1 Epping North System

4.1.1 Existing Conditions

Presently the Aurora wastewater treatment plant produces Class A and Class B recycled water from effluent. These are both pumped through separate mains to the Craigieburn Treatment Plant. The Class B main is presently a one way rising main and the class B water doesn't return to Epping North. The Class A water is pumped from Aurora to a tank at Craigieburn for possible use in Craigieburn but also for return to Epping North. The Class A water gravitates back down the same 525mm diameter main to Aurora then passes under the Hume Freeway in a 600mm diameter main. Currently the infrastructure has been installed in a staged manner. The 600mm diameter main presently downsizes to a 225mm diameter main in Harvest Home Road to service existing developments.

4.1.2 Proposed Upgrades

Recycled water will be mandated in the Wollert Precinct. The recycled water system will be expanded as demand increases. The demand for recycled water must be considered in parallel with Melbourne Water stormwater objectives contained in a separate report on "integrated water management".

Future upgrades include: extending the trunk main along Harvest Home Road 600mm in diameter to Yarra Valley Waters northern Quarry Hills potable water tank site. Storage at this site will be staged with construction of an initial tank followed by a second as required. Recycled water from this storage will be reticulated through the Quarry Hills, Wollert, Aurora and Epping North East PSP areas.

Recycled water services must be provided to all mandated development areas prior to release. Depending on the proximity of supply, Yarra Valley Water may

allow a temporary cross connection to the potable water network or will require the developer extend the supply mains to the development. All land within the Urban Growth Boundary is now mandated for recycled water.

4.2 Recycled Water Strategy

4.2.1 Ultimate Conditions

Upgrades in Epping North would also include a 525mm diameter distribution main from the Quarry Hills recycled water tank. The 525mm diameter distribution main will be constructed next to the 600mm diameter main supplying the tank. Both of the recycled water mains will follow the route of the existing 600mm diameter potable trunk water main through the Quarry Hills Precinct.

The recycled water distribution main will continue to follow the potable water route. The main will start as a 525mm diameter and downsize to 450mm in diameter passing under the E6 transport corridor then along Bindts Road. This main then downsizes to 375mm in diameter at Lehmanns Road and heads west for approximately two kilometres crossing Epping Road. The service then continues north into Wollert as a 375mm diameter main.

The recycled water will also need to be pumped at a site near Boundary and Bodycoats Road for the land north of Boundary Road. This pump station would be separate from the potable water pump station but ideally on the same site.

4.2.2 Interim Conditions

To date the developments within the Aurora and Epping North East Precinct areas have been serviced by relatively small 225mm diameter and 150mm diameter recycled water services. The closest of these is a 150mm diameter main constructed to the corner of Epping Road and Lehmanns Road. It might be possible to continue limited recycled supply into Wollert from this point however Yarra Valley Water will need to advise at what point they anticipate needing to construct the following major Epping North assets;

- Harvest Home trunk main 600mm in diameter for approx 6.2 km
- Quarry Hills Class A storage
- Trunk distribution main to Epping Road and Craigieburn East Road, approx 3.8km

SP AusNet

SP AusNet is the responsible authority for both the electricity transmission and distribution networks. These are managed by two separate groups. The transmission network is regarded as 220+ kilovolt (kV), usually identified by large steel trussed towers supporting the conductors. The distribution network is 66kV and below. Usually these conductors are supported on conventional poles or installed underground.

5 Electricity Transmission Network

The following plans can be found in Attachment 5. This should be reviewed in conjunction with the following section of this report.

- Utilities PSP, SP AusNet Transmission Plan
  Figure 5.1
- Utilities PSP, SP AusNet Tower and Cable Locations Plan
  Figure 5.2
- Guidelines for subdivision and development of land affected by transmission line easements
  Figure 5.3

The Wollert Precinct Structure Plan area is traversed by a major transmission easement. The easement is approximately 110m wide and runs in a north westerly direction through the middle of the precinct.

The easement contains two 500 kV lines, with provision for a future 220kV line. There are no current plans for this future line and it is not possible to provide an indication as to when it may be constructed; timing will depend on future power demand.

The easement is a significant element to be considered in any urban design response, some items to consider are as follows;

- No buildings are permitted within the easement. Generally speaking, roads within and running parallel to the easement are permitted up to a distance of 6 metres into the easement. All metallic services (eg power) must be off the easement.
- Roads crossing the easement are acceptable subject to sufficient vertical clearance from the overhead conductors to the road surface. The minimum acceptable clearance for 500kV lines is 15 metres. It should be noted that, at

mid span of the existing lines, the clearances at maximum temperatures in most spans is insufficient; that is, less than 15 metres. To achieve a 15 metre clearance, roads should be planned to be located away from mid span, but still retain a 30 metre horizontal clearance to the nearest tower steel work.

- Any trees / shrubs planted in the easement as part of landscaping works must not exceed 3 metres mature growth height. Mounds associated with landscaping must retain 15 metres vertical clearance to conductors.
- The use of easements for drainage purposes / wetlands is permissible subject to vehicle access to towers being maintained, and to towers being protected from inundation.
- Habitat links are permissible but are somewhat constrained by the requirement that vegetation should cover no more than 10% of the easement.
- The easement boundaries *are* the buffer zones required to the transmission lines. Generally speaking, buildings are permitted right up to the easement boundary. Possible exceptions to this rule include structures such as communications towers that may need to be placed further away from the transmission lines due to their height.

Specific guidance on vertical clearances and proposed use of easements such as landscaping and roads can be provided upon presentation of concept plans of proposed development to SP AusNet.

Over and above the considerations listed above, SP AusNet (SP PowerNet) has provided guidelines for subdivision and development of land affected by transmission line easements. A copy of this can be found in attachment 5 and should be consulted prior to planning development on or adjacent to SP AusNet easements.

This document contains information relevant to subdivisions, detailed design and construction activities. We have provided the following extract considered relevant to precinct planning.

*****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 below*, 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 below*, 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.*

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 100m*
- *Within 20 metres of the easement 250m*

** sourced from guidelines for subdivision and development of land affected by transmission line easements, SP AusNet

6 Electricity Distribution Network

The following plan can be found in Attachment 6. These should be reviewed in conjunction with this section of the report.

- Utilities PSP Wollert, SP AusNet Network Plan
  Figure 6.1

6.1 Network hierarchy

Power generation
Transmission lines 220+ kV
Terminal Substation, 220kV - 66kV
Distribution lines, 66kV
Zoned Substation, 66kV – 22kV
HV lines – 22kV
Kiosk or pole mounted substation 22kV – 415/240V (LV)

Supply for residential estates can be obtained from 22kV high voltage lines transforming to low voltage at kiosks throughout the developments.

6.2 Epping North Network

Terminal Substation, South Morang, Melways Ref 183 C10
Zoned Substation 1, South Morang (proposed) on South Morang terminal site
Zoned Substation 2, Epping, (existing) Melways ref 182 B12
Zoned Substation 3, Wollert, (proposed) Harvest Home Road, Melways Ref 182 C4
Zoned Substation 4, Kalkallo, (existing) Donnybrook Road, Melways Ref 367 C5

Overhead distribution lines 66kV run from the Epping Zoned Substation north up Epping Road. A division occurs at the Epping Road / Harvest Home Road intersection. A 66kV line runs east along Harvest Home Road then turns north up Bindts Road ultimately linking to Kalkallo. A second line continues north up Epping Road to Kilmore.

There are additional 66kV lines which run from Epping Road east along the transmission easement to south Morang Terminal station where a future zoned substation is proposed.

SP AusNet advises the Epping North area is suitably prepared for extension of infrastructure into new residential areas. Each zoned substation is capable of

servicing approximately 30,000 customers. In addition to the 66kV lines there are planned and existing 22kV distribution feeders which will each service approximately 5000 – 6000 customers. Details of existing and currently proposed 22kV lines are shown in figure 6.1.

6.3 Funding Policy

Under SP AusNet's current policy, developers would fund HV extensions if out of sequence and SP AusNet would rebate / fund sequential HV extensions. This is coupled with a low voltage rebate the developer receives for low voltage reticulation.

SP AusNet has flagged that this funding policy will change in the near future. The new policy will abolish low voltage rebates for developers, however all HV works would be funded by SP AusNet. Should this change be implemented staging would become more flexible as non sequential development would not be penalised.

6.4 Limitations

No supply limitations have been identified.

Existing transmission networks are intended to remain as development proceeds and are contained in road reserves or dedicated transmission easements.

All transmission and distribution lines 66kV and above are usually cost prohibitive to be placed underground. Urban designs should consider and respond to the location of these existing assets wherever possible.

All new networks 22kV and below will need to be underground networks.

No additional buffers over and above easements will be required for exiting lines. SP AusNet should be consulted when developing cross sections for existing road reservations containing 66kV lines. Kiosk substations will be required throughout the precinct. Land allocations for these would not be made until planning permit stage based on a reasonably detailed electrical network design.

6.5 Servicing Wollert

Wollert has existing 22kV supply that runs along the southern boundary of the site. This is an overhead line on the north side of Craigieburn East Road. In addition there is a 22kV line which runs up Epping Road north of Craigieburn East

Road. Development could commence along either of these axes without the need to extend high voltage. Modifications to the existing network may however be required when these roads are widened.

Currently these lines are charged from Epping and Kalkallo zoned substations. The zoned substation in Wollert will ultimately charge these lines. Wollert zoned substation in Harvest Home Road is expected to be required within four years but will require 18 months lead time to construct if demand requires this earlier.

APA Group

APA Group is the responsible authority for gas distribution and transmission networks in this region. Two separate APA Group entities perform these functions.

7 Gas Transmission Network

The following plans can be found in Attachment 7. These should be reviewed in conjunction with this section of the report.

- APA recommended buffers
  Figure 7.1
- Discussion plan with graduated buffers
  Figure 7.2
- APA submission to the Growth Areas Authority
  Figure 7.3

7.1 APA Site, Wollert

Bordering the north east corner of the Wollert precinct is APA Group's Wollert Compressor Station. This facility is located on approximately 192 Ha owned by APA as identified on figure 7.1.

The Wollert Compressor Station currently receives gas from Longford via the Pakenham Wollert pipeline entering the site from the east. The gas is then compressed and distributed both north and south via two existing pipelines.

7.1.1 Pakenham-Wollert Pipeline

The Pakenham-Wollert pipeline as the name suggests emanates from Pakenham. It is a 750mm diameter pipe sitting within a 27m easement. The easement traverses the Wollert Precinct from east to west (see figure 7.1). The existing pipe is known to sit 7m off the southern edge of this easement and the balance of the easement is reserved for future upgrades.

7.1.2 Keon Park-Shepparton-Wodonga Pipeline

There is currently a 600mm diameter pipe commencing at Wollert Compressor Station travelling south to supply Melbourne metropolitan consumers. This pipe currently has capacity to provide 30% of Melbourne's peak gas demand, increasing to 50% when supply to Wollert Compressor Station is increased.

This 600mm diameter pipe sits within a 35m easement which also traverses the Wollert Precinct but travels from north to south. This easement is reserved for additional services as required.

Currently a 300mm diameter pipeline commences at the Wollert Compressor Station travelling north to supply gas to Northern Victoria and North East Victoria.

Increased supply to Wollert is planned. A new 500mm diameter pipeline from Port Campbell will enter Wollert Compressor Station from the north via the Keon Park-Shepparton-Wodonga Pipeline Easement. This pipe will be capable of bringing additional gas to Wollert for distribution south or north but also capable of transporting gas received from Pakenham back to the west.

7.2 Gas Compressor Station

7.2.1 Existing Facility and Proposed Upgrades

At present the Wollert compressor station has 2 x 4.5MW and 3 x 0.9MW compressors adequate for current demand. APA is also planning to expand the facility to deliver additional gas interstate. This upgrade would be coupled initially with supply from Port Campbell followed by supply from Longford. The compressor facility is proposed to ultimately be upgraded with the addition of a further 4 x 4.5MW compressor units.

It is intended that gas will be delivered north to meet various demands. Currently 100km of new pipelines are planned with proposals for a further 160km. The APA network extends to Young in NSW. Upgrades will allow APA to support a declining supply of natural gas to Canberra and Sydney as well as supplying “start-up gas” to the emerging coal seam gas project in northern NSW and Queensland.

Coal seam gas extraction requires construction of an export facility to receive the gas before the fields are commissioned. Once the rock is fractured and gas can flow it cannot be turned off. Development of the gas fields will occur over many years and supplementary supply of gas is required for the initial viability of the export facility. Furthermore the initial extraction of coal seam gas is not of high quality but improves with time. Initially it requires blending with natural gas (start-up gas). APA intends to deliver natural gas to meet this demand.

APA’s Wollert Compressor Station is integral to their current and proposed operations. It’s a key site for delivery of natural gas to Victorians and interstate

customers as well as supporting the growth of an export market of coal seam derived liquid natural gas.

7.2.2 Compressor Station Noise

The existing compressors are approximately 700m west of the Wollert PSP boundary and 800m north (see figure 7.1).

Measures have been taken to reduce the noise of the existing compressors. APA advises noise levels at the boundary of their site currently meet guidelines for acceptable noise for residential dwellings. APA also advises they expect noise levels would increase beyond acceptable limits for residential development at their boundary if the proposed compressor upgrades occur. There has not been sufficient technical investigation by APA to supply predicted noise levels at this time.

For upgrades of this nature APA are exempt from requiring planning permits under the Planning and Environment Act. The process under the Pipelines Act is deemed to be a parallel process to the Planning and Environment Act. The decision on whether an environmental effects statement (EES) is required is made by the Department of Planning and Community Development (DPCD). A decision from DPCD on the required level of environmental assessment is still required under the Pipelines Act. APA do not need to go through a local planning permit process with the City of Whittlesea. The regulator, Department of Primary Industries (DPI), will seek opinion from the City of Whittlesea only. APA will however need building permits for which the local Council is the responsible authority.

A potential conflict exists between the development of the urban growth zone and proposed compressor upgrades at the APA site. Noise attenuation devices or buffers need further investigation when planning the northern area of Wollert adjoining APA's compressor site. See also section 7.4 of this report.

The Wollert compressor/infrastructure upgrade is ongoing. The next 4.5MW unit is schedule to be in service mid 2014 (total three units), and the other additional three units from 2017 onwards with the total six 4.5MW units by 2020 onwards. APA will be required to meet its current approval of keeping noise to 39 decibels at their boundary. Although this is within acceptable limits by the Environmental Protection Agency, APA believes this background noise will still attract complaints from residents. APA fear residential development adjoining their site will restrict their ability to develop the compressor site if residential development occurs first.

7.3 Restrictions on Development in Easements

The two pipeline easements described above have been mapped and are attached in figure 7.1. APA has advised that development will be prohibited within both easements.

- The 27m east west easement needs to be fully protected for upgrades. APA have plans to install new pipes within this easement and 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 easement needs to be incorporated into a reserve or open space. No native vegetation offset planting will not be permitted nor roads with structures or other utilities. APA will not allow road construction parallel to the pipeline within transmission pipeline easements but will allow crossing (90deg) if no alternative exists.
- The north south easement has the exact same restrictions as the east west easement.

In both cases crossing of the easement with roads and services would be permitted with the approval of APA. The pipeline might need to be engineered for the crossing. 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 (e.g. depth of pipeline cover, etc.) Lowering or realigning a transmission pipeline perpendicular to a new asset is possible although most likely prohibitively expensive. Alternatives should be considered.

On a case by case basis and with carful design, there are opportunities for easements to form part of a drainage reserve with wetlands and water sensitive urban design measures adjoining pipelines. Preferably not over them (unless however if the pipeline coating is changed to allow such a requirement at the developers cost).

Depth of cover over existing pipelines is in most if not all cases stated on the easement agreements with the landowners and where applicable registered on title. Service crossings of the easement need to be assessed on a case by case basis (no simple rule of thumb).

Gas easement locations and widths wherever possible are registered on title. However on crown land, roads, etc. easements may not exist, in these circumstances the only way to determine the position of the gas pipeline is via “dial before you dig”, etc. Ideally the subdivision layout in Wollert where easements don’t exist should allow for the 27m width for the east west pipeline and 35m to the north south pipeline.

No restrictions are imposed outside the gas easements. High pressure gas transmission lines have potential to cause catastrophic damage in the case of explosion. Gas lines of this nature are maintained and constantly monitored to ensure their integrity. The likelihood of explosion is extremely remote. Accordingly 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. It has been suggested 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. Imposing exclusion zones is a complex issue and would have significant implications for the industry. The cost of transporting gas would be significant if additional land needed to be quarantined to facilitate pipelines.

7.4 Gas Fired Power Station

The following material has been sourced from APA Groups response to the Growth Areas Authority draft Melbourne Growth Corridor Plans and an overview from APA.

7.4.1 Overview

APA advises that an energy provider plans to construct a gas fired power station on their Wollert site. It's intended the facility will be a 1000MW combined cycle gas fired power station. For comparison, the brown coal Hazelwood facility is 1400MW. APA calculates the power station is required by 2018 to meet state demand for energy and greener energy. The construction time is three years and the planning phase approximately 18 months. This project is therefore gaining momentum and the energy provider was programmed to commence development of plans in April 2012.

7.4.2 Purpose

The 2011 Electricity Statement of Opportunities states; "with medium economic growth conditions, Victoria will reach its low reserve condition point in 2014 – 2015 requiring at least an additional 100MW of new generation capacity to delay this shortfall for one year". Simply, this means peak demand for power will exceed existing supply by 2014-2015. Additional power from new smaller generation facilities across the state delays this position but a new substantial generation facility will ultimately be required.

The proposed Wollert power station responds to the forecast shortfall in generating capacity in the national electricity market. Using natural gas reserves, electricity will be generated producing lower greenhouse gas emissions than coal fired power.

7.4.3 Proposed Facility and Site Selection

APA's Wollert site has been selected as it is one of very few around metropolitan Melbourne where a major gas pipeline crosses a high capacity electricity transmission network. This is a major attribute of the site as infrastructure will not need to be brought to the Power Station.

A further advantage of the Wollert site is its proximity to the end user, Melbourne consumers. Significant losses occur when electricity needs to be transmitted long distances. This is often the case where power stations are located in remote areas.

The facility proposed is a combined cycle gas fired power station. In a combined cycle gas fired power station, the exhaust gases are captured from the gas turbine and used to heat water generating steam to drive a second turbine. In an open cycle power station the gas turbine exhaust gases are discharged direct to the atmosphere. The energy efficiency of a combined cycle system is approximately 50% more than a comparable open cycle system.

Combined cycle gas fired power stations will produce up to 70% less carbon emissions and use less than 1% of the water per megawatt hour compared with traditional wet cooled brown coal fired power stations.

Wollert is intended to supply base load power so it would be expected to be in almost continuous operation.

APA asserts that Wollert Power Station is of state significance and suggests that every effort should be made to ensure it can be constructed to meet Victorias growing needs.

7.4.4 Gas Fired Power Station Noise

In order to determine the required buffer distances between a new power station at Wollert and sensitive uses such as residential development, APA have looked at other established sites as a precedent. The Shaw River Power Station is a recent example of a combined cycle, gas fired power station approved by the minister in 2010 following an EES process and planning enquiry.

The development of a power station at Wollert is in its early stages and APA has not undertaken a noise impact assessment of the proposed development. Based on the Shaw River power station, APA considers it prudent to apply the same maximum buffer distance to Wollert of 1.2km. The most appropriate buffer distance could be higher or lower than 1.2km, subject to the results of a detailed noise assessment of the Wollert site. A full copy of APA's submission to the Growth Areas Authority can be found in figure 7.3.

7.4.5 Land Use Analysis

The Shaw River analysis shows that residential development within 1.2km of the power station is not desirable. Land uses within any buffer zone need to be investigated for activities which can tolerate a higher level of noise. APA refers to another example facility operated by Snowy Hydro in Laverton North. This facility is smaller and sits within an industrial precinct with higher levels of background noise. Regardless of this land use tolerating higher noise levels, Snowy Hydro has been receiving complaints from occupants near the facility regarding prolonged low frequency noise thought to cause nausea.

This issue needs further investigation. We recommend that the Growth Areas Authority seek advice of an acoustics consultant to report generally on what activities might be appropriate based on noise modelling for the proposed Wollert Power Station.

To graphically represent the potential impact on development adjoining APA's site, a series of plans have been prepared for discussion only. These can be found in figure 7.2. The plans show the impact on development potential for various buffer distances from the proposed Wollert Power Station. Furthermore the plans show alternate hypothetical options for positioning the Power Station within the APA site. The option with the least impact on development potential for the Wollert Precinct Structure Plan area is Option 2. No feasibility study of hypothetical alternatives has been undertaken.

APA are in the process of commissioning further studies to inform the buffer requirement rather than relying on Shaw River requirements and are looking into the possibility of locating the gas fired power station further north on their site. It is likely that even if the recommended buffer is reduced based on the outcome of these studies, some extent of buffer area will still be required.

7.5 Liquid Natural Gas Distribution

APA's Wollert Compressor Site has also been earmarked as a possible site for liquefying natural gas for use in modern Liquid Natural Gas (LNG) engines. New engine technology is becoming available to allow diesel styled engines to run on liquid natural gas. The Hume Freeway linking Melbourne and Sydney caters for thousands of truck movements per day. APA's Wollert site is in close proximity to the Hume Freeway and potential demand for LNG.

APA has nominated this as a potential use for their site but no details are available at this early stage. Information on risks associated with a liquefying operation should be obtained and assessed against proposed adjoining land uses.

8 Gas Distribution Network

The following plan can be found in Attachment 8. These should be reviewed in conjunction with this section of the report.

- APA City Gate Location
  Figure 8.1

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. APA has identified a need to augment their network in the Epping North area by tapping into an existing high pressure main in the Wollert Precinct. The Wollert Precinct is traversed by major high pressure gas transmission pipelines. APA proposes to construct a new supply off-take from the high pressure transmission pipe described in this report as the Keon Park-Shepparton-Wodonga Pipeline. This off take is a significant piece of infrastructure known as a "City Gate". The City Gate allows the pressure to drop from 10,000 KPa in the transmission pipeline to 550 KPa in the distribution network.

APA has advised that this facility is required in close proximity to their transmission pipe. It is desirable to have the City Gate directly adjacent to the easement to avoid the need for another high-pressure main leading to the City Gate. If the desirable criteria are adhered to, the City Gate would be sited where the Keon Park-Shepparton-Wodonga Pipeline crosses Craigieburn East Road. The City Gate will require a dedicated land parcel typically 50m x 50m. See figure 8.1 for the desired City Gate location.

Figure 8.1 shows the City Gate East of the APA transmission easement. Locating the City Gate on the west side will create an issue in that the residential development is to the east and therefore the low pressure network mains will have to cross back over (likely under) the existing transmission pipeline. This is an issue of cost, other factors might outweigh this and warrant the extra cost.

Should it be necessary to site the City Gate away from the Keon Park-Shepparton-Wodonga Pipeline Easement, a further 7m wide dedicated easement would be necessary with up to 25m width for construction access, i.e. reserved as 25m then reduced to 7m after construction. APA will not accept high pressure transmission lines in road reserves.

From the City Gate, APA propose to extend the distribution network 3km east along Craigieburn East Road allowing the Wollert Precinct immediate access to the distribution network along the southern boundary.

Under current policy the City Gate and distribution network along the Craigieburn East Road would be funded by APA subject to a cost benefit analysis considering forecast revenue from the growth area.

9 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 advised there are no obstacles to the provision of telecommunications for the precinct.

For development less than 100 lots, developers might be directed to make application through Telstra. Developers will be required to construct a pit and pipe network for Telstra and future fibre to City of Whittlesea requirements.

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 Telstra assets within the Wollert Precinct. These are generally services to rural allotments and the cabling follows existing road reserves within the precinct.

The most significant of the existing infrastructure exists in Craigieburn East Road and Epping Road with an exchange on the intersection of these two roads. NBN Co has not planned how the network will roll out across the Wollert Precinct. NBN Co 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.

10 Wollert Landfill

It should be noted that there is an operating quarry and landfill site at 45 – 135 Bridge Inn Road. A separate background study for the preparation of the Wollert PSP has been prepared for the Hanson Quarry and Wollert Landfill site. Environmental Protection Agency Best Practice Environmental Management, landfill gas buffer areas around the site may impact on the location of infrastructure proposed within the buffer area. An environmental Audit may be required prior to the approval and construction of any infrastructure within the buffer zone.

11 Conclusion

11.1 Sewer

- The entire PSP area will be serviced by five branch sewers which will connect via gravity into the existing sewer network within the developed areas outside of the precinct, south of Craigieburn Road East.
- The existing sewer network will need to be upgraded at various locations to accommodate the additional sewerage from this PSP. Any upgrades will not impede the development staging of this PSP.
- Timing of provision of these branch sewers will depend on timing of the land development within the precinct.
- The proposed Curly Sedge Creek branch sewer will be located outside of the precinct, west of the creek.
- Yarra Valley Water's strategy is to maximise use of recycled water at a local and regional scale, to delay the need to connect into the main metropolitan trunk sewer system.
- Two sewerage treatment plants operate in this region – Craigieburn and Aurora, which are linked via four pipes conveying sewerage, sludge, Class A and Class B recycled water.
- Out of sequence developments may need to be serviced by temporary sewer options in the first instance and may attract "bring forward" charges for developers.
- Final alignments of the branch sewers are not fixed and will be influenced by the urban design.

11.2 Water

- Potable water is currently limited but a new 450mm diameter trunk supply main is planned for the Wollert Precinct commencing at Bindts Road and extending along Lehmanns Road and Craigieburn East Road.
- Ideally, the trunk potable water main will be located within road reserves, to facilitate more flexible development staging.
- Construction of the first two km of trunk main along Lehmanns Road and Craigieburn East Road would allow connection for developments anywhere along this route.
- To facilitate a logical roll out of water infrastructure, development and servicing staging would ideally commence from the east and progress westerly along Lehmanns Road and then Craigieburn East Road.
- A proposed potable water pump station will require the reservation of land (zoned PUZ in favour of Yarra Valley Water) in the vicinity of Boundary Road and Bodycoats Road.

11.3 Recycled Water

- Recycled water will be mandated in the Wollert Precinct.
- A separate report on integrated water management including the Wollert Precinct is currently being prepared jointly by YVW and Melbourne Water.
- Supply of recycled water to the Wollert Precinct requires construction of recycled water mains and a dedicated storage by Yarra Valley Water external to the Precinct
- Yarra Valley Water may allow temporary cross connection to the potable water network or will require the developer extend the supply main to the development.

11.4 Electricity

- SP AusNet is the responsible authority for the electricity transmission and distribution network.
- Wollert PSP is traversed by a major transmission easement, approximately 110 metres in width.
- The easement is a significant element to be considered in the urban design of the precinct.

  - No dwellings will be permitted within the easement.
  - Strict height limitations apply for all works including landscaping.
  - Roads are permitted to cross the easement, perpendicular and not within 30 metres of a pylon.
  - Height limits need to be considered for all road crossings.
  - Mid spans are not likly to meet minimum vertical clearance
- There are no electricity supply limitations relating to the future development of the Wollert PSP area.
- Existing transmission and distribution lines 66Kv and above will remain overhead as they are cost prohibitive to be placed underground.

11.5 Gas

- APA Group is the responsible authority for gas distribution and transmission.
- A new City Gate is to be constructed by APA in Craigieburn East Road. This will be coupled with a 3km extension to the distribution network along Craigieburn East Road from the City Gate.

11.5.1 Wollert Compressor Station

- The Wollert Compressor station is located on approximately 192 ha bordering the north east corner of the precinct.
- The compressor station receives gas from Longford via the Pakenham Wollert pipeline and then distributes the gas following compression via a north and a south pipeline.
- APA's Wollert compressor station is integral to current and proposed operations. It is a key site for delivery of natural gas to Victorians and interstate.
- Increased gas supply to Wollert is planned.
- If proposed compressor upgrades occur, noise levels are likely to increase beyond desirable limits for residential development at the boundary of the APA site.
- The Wollert site has been nominated as a potential site for Liquid natural gas distribution.

11.5.2 High Pressure Pipeline Easements

- East West Easement
  - The Pakenham Wollert pipeline is located 7 metres from the southern edge of the existing 27 metre wide east west easement.
  - The balance of this easement is reserved for future upgrades.
  - This easement needs to be fully protected for upgrades and incorporated into a dedicated reserve or open space.
  - Development will be prohibited within this easement.
  - No native vegetation offset planting will be permitted in this easement or road reserves containing structures or other assets.
  - Crossing of the easement with roads or services is subject to approval of APA.
  - No restrictions are imposed outside of the existing easement.
- North South easement
  - An existing 35 metre wide easement traverses this precinct in a north south direction and contains a 600mm diameter gas pipeline.
  - This easement needs to be fully protected for upgrades and incorporated into a dedicated reserve or open space.
  - Development will be prohibited within this easement.
  - No native vegetation offset planting will be permitted in this easement or road reserves containing structures or other assets.
  - Crossing of the easement with roads or services is subject to approval of APA.
  - No restrictions are imposed outside of the existing easement.
- It is recommended that uses such as schools and hospitals are sited will away from the pipelines.
- 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. Imposing exclusion zones is a complex issue and would have significant implications for the industry.

11.5.3 Gas Fired Power Station

- The energy provider is planning to construct a gas fired power station on the Wollert site, to meet state demands for energy and greener energy and to meet a predicted shortfall in generating capacity in the national electricity market.
- Noise buffers for the gas fired power station encroach across proposed residential land. Extent of this encroachment is subject to a detailed noise assessment for this site.
- GAA is advised to seek advice from an acoustics consultant to report generally on what activities might be appropriate based on noise modelling for the proposed Wollert power station.
- Planning has commenced for the proposed Wollert Power station.

11.6 Telecommunications

- There are no obstacles to the provision of telecommunications for the precinct.

12 General Attachments

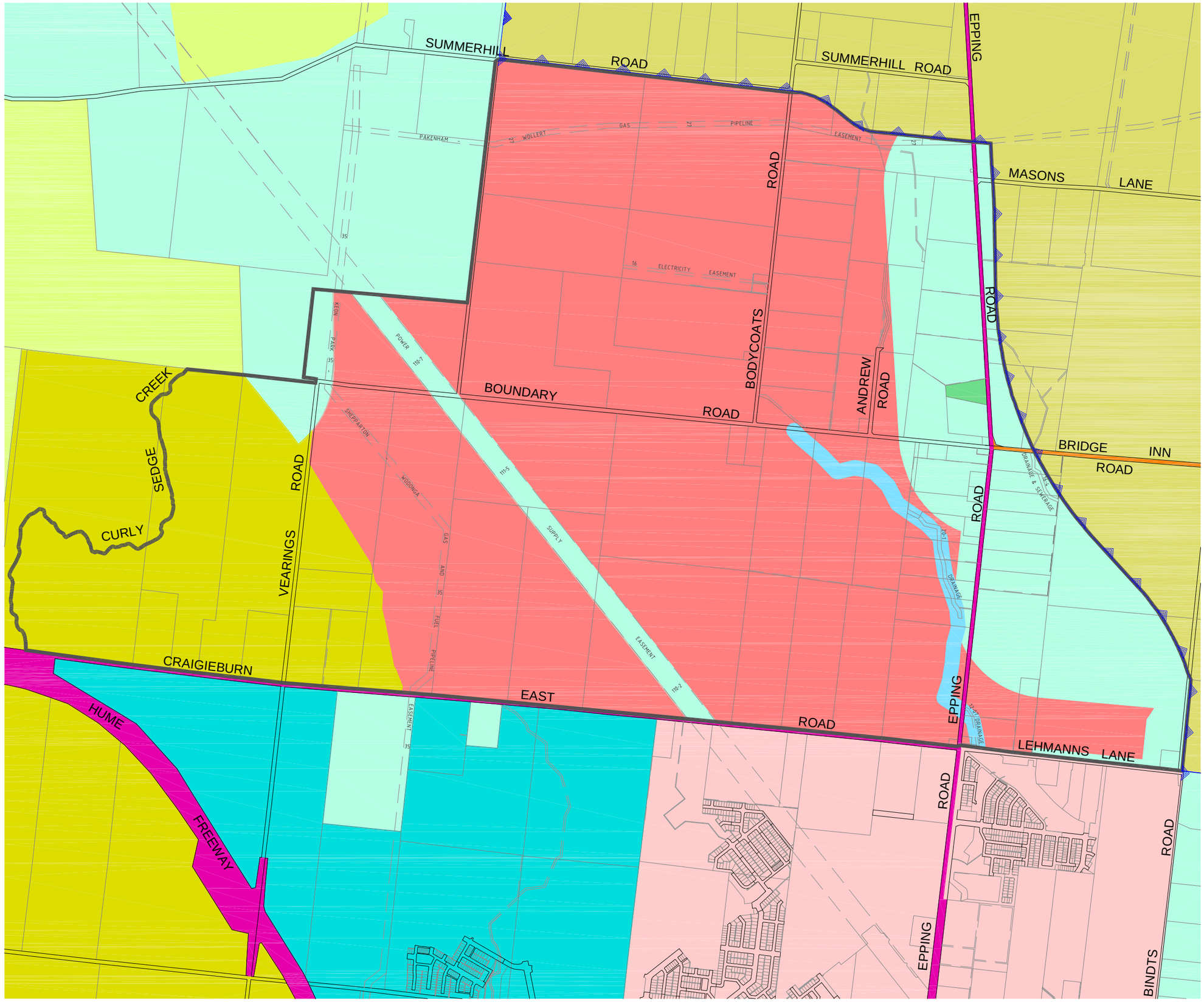
Included in general attachments are maps which might be considered useful to support some of the comments made within this report. These include aerial images, Public Acquisition Overlays for the Outer Metropolitan Ring Road / E6 Transport Corridor and the North Growth Corridor Plan.

General

- Aerial Photos
- Public Acquisition Overlay Plans
- North Growth Corridor Plan

Attachment 1

- Figure 1.1
  Utilities PSP Wollert, Wollert Precinct Structure Plan – site plan



N

Legend

Whittlesea City Council Planning Zones

- Public Park & Recreation Zone
- Road Zone Catagory 1
- Road Zone Catagory 2
- Residential 1 Zone
- Green Wedge Zone
- Rural Conservation Zone
- Farming Zone
- Special Use Zone
- Comprehensive Development Zone
- Urban Floodway Zone
- Urban Growth Zone
- Urban Growth Boundary

- Easement
- PSP Boundary

Figure 1.1
Utilities Capacity Assessment - Wollert
Precinct Structure Plan - Site Plan

Scale A3	200 0 200 400 600
1 : 20000	Lengths are in metres

Co-ordinate Datum MGA55		Sheet 1 of 1	
Drawing No. 135859 - ATT4 - ZONE		Version 1	
CAD Ref. G:\13\135859\ACAD			
Drawn By JL	Checked By SN	Date 15/05/2012	

REV	AMENDMENT	APPROVED	DATE

CPG
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Attachment 2

- Figure 2.1
  Yarra Valley Water Epping North Sewer Infrastructure Plan
- Figure 2.2
  Utilities PSP Wollert, Sewer Catchments and Branch Sewers

Brickmakers North BS
PSGW0278

Curly Sedge Creek BS
PSGW0307

Edgars Creek North BS - Stage 4
PSGW0218

Harvest Home Road BS - Stage 5
PSGW0287

Findon Creek BS Section 5
PSGW0094B

Wollert BS
PSGW0220

Brickmakers SPS
PSGW0275

Brickmakers RM
PSGW0277

Epping Road North BS - Stage 3
PSGW0285

Findon Creek BS Section 4A
PSGW0286

Brickmakers South BS
PSGW0279

Epping Road North BS -Stage 2
PSGW0284

Edgars Creek North BS - Stage 3 (RB)
PSGW0045

Harvest Home Road BS - Stage 4
PSGW0182

Craigieburn Rd East RM
PSGW0276

Love BS - Stage 2 (RB)
PSGW0288

Epping Road North BS
PSGW0310

Findon Creek BS Section 4
PSGW0094A

Craigieburn Road East SPS
PSGW0281

STP74 Aurora STP - Stage 3
PSGW0160

Aurora North BS (RB)
PSGW0047

STP74 Aurora STP - Stage 2
PSGW0159

Harvest Home Road BS - Stage 3
PSGW0152

Upper Darebin Creek BS - Section 3
PSGW0283

Cotters Road RM Duplication
PSGW0090

SPS729 Harvest Home Road Rising Main (TPF)
PSGW0262

Vearings Road BS
PSGW0212

SPS729 Harvest Home Road (TPF)
PSGW0261

Upper Darebin Creek BS - Section 1
PSGW0306

Edgars Creek North BS - Stage 2 (RB)
PSGW0074

Love BS (RB)
PSGW0070

Upper Darebin Creek BS - Section 2
PSGW0282

Upper Central Creek BS - Section 4 (RB)
PSGW0199

Edgars Creek North BS - Stage 1A (RB)
PSGW0073

Oherns Road West BS (RB)
PSGW0062

Epping BS - Section 4B
PECP0006

Upper Central Creek BS - Section 3 (RB)
PSGW0198

Northpoint To Cotters Road Rising Main
PSGW0117

Melbourne Market Duplication
PSGW0280

Edgars Road SPS Upgrade
PSGW0113

Epping Branch Sewer To Craigieburn STP - Tunnel Extension
PECP0002

Upper Central Creek BS - Section 2
PSGW0197

Epping BS - Section 3 (RB)
PECP0001

Epping BS - Section 2
PECP0008

Upper Central Creek BS - Section 1 (RB)
PSGW0196

SPS121 Upgrade
PSGW0072

Epping Branch Sewer Section 1 - Tunnel Under Freeway
PSGW0203

Epping Branch Sewer To MCM - Tunnel Extension
PECP0004

Yarra Valley Water

N

0.00 0.25 0.50 0.75
Kilometers

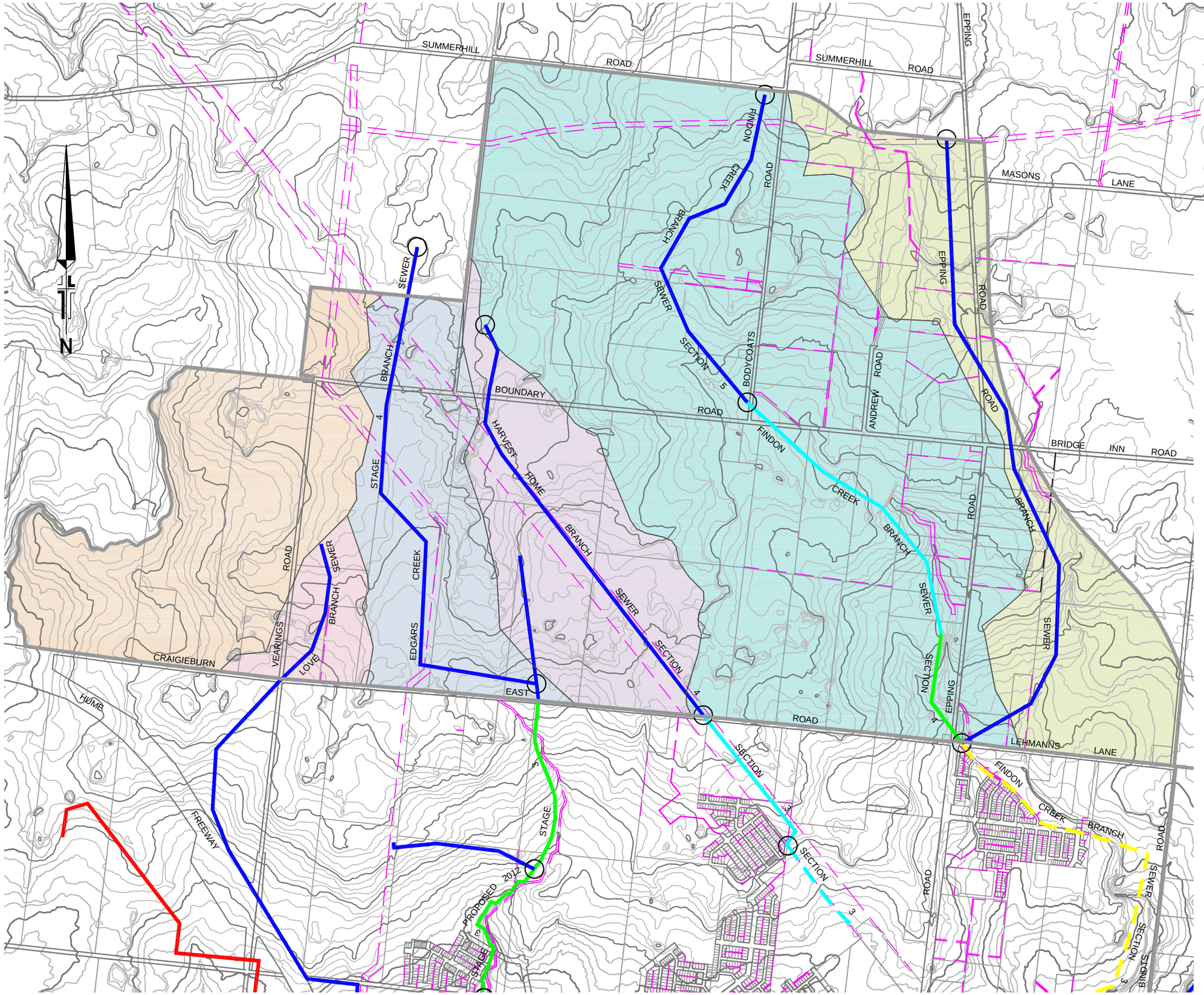
EPPING NORTH

SEWERAGE INFRASTRUCTURE PLAN

This plan is provided for information purposes only and is subject to change without notice. Prior to undertaking any land development activities, we encourage you to contact us directly to discuss your plans prior to the lodgement of a formal application.

I:\SGP\1. Major Growth Strategies\Epping North\Sewer\Epping North Sewerage Infrastructure External.gws

6 June 2012



Legend

Sewerage Infrstructure - Supplied by Yarra Valley Water

Recently built sewer shown dashed

- Proposed Sewer 525mm
- Proposed Sewer 450mm
- Proposed Sewer 375mm
- Proposed Sewer 300mm
- Proposed Rising Sewer Main

- Sewer Catchment Boundary
- Easement
- PSP Boundary

Contours are Australian Height Datum interval 1m.

Figure 2.2
Utilities PSP
Wollert
Sewer Catchments and Branch Sewers

Scale A3	200 0 200 400 600
1 : 20000	Lengths are in metres

Co-ordinate Datum	MGA55	Sheet 1 of 1	
Drawing No.	135859 - ATT1 - SEWER	Version 1	
CAD Ref.	G:\13\135859\ACAD		
Drawn By JL	Checked By SN	Date 15/05/2012	

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Attachment 3

- Figure 3.1
  Yarra Valley Water Epping North Potable Water Infrastructure Plan
- Figure 3.2
  Utilities PSP Wollert, Potable Water Plan
- Figure 3.3
  Utilities PSP Quarry Hills, Potable Water Plan

(POT) Wollert Connecting Main
PWGW0827
Funding=Y, Design=Y, Build=Y

(POT) Wollert North Main
PWGW0352
Funding=Y, Design=Y, Build=Y

(POT) Wollert Pump Station
PWGW0353
Funding=Y, Design=Y, Build=Y

(POT) Wollert Main
PWGW0351
Funding=Y, Design=Y, Build=Y

(POT) Wollert East Main
PWGW0361
Funding=Y, Design=Y, Build=Y

(POT) ENE Main - Part 1
PWGW0141
Funding=Y, Design=Y, Build=Y

(POT) Wollert West Main
PWGW0349
Funding=Y, Design=Y, Build=Y

(POT) Craigieburn Road East Main
PWGW0354
Funding=Y, Design=Y, Build=Y

(POT) Bindts Road Main
PWGW0355
Funding=Y, Design=Y, Build=Y

(POT) Aurora North E-W Main (RB)
PWGW0097
Funding=Y, Design=D, Build=D

(POT) South Morang North M
PWGW0844
Funding=Y, Design=Y, Build

(POT) Aurora North N-S Main (RB)
PWGW0113
Funding=Y, Design=D, Build=D

(POT) ENE Main - Part 2 (RB)
PWGW0094
Funding=Y, Design=D, Build=D

(POT) Harvest Home Road Mains Realignment
PWGW0259
Funding=Y, Design=Y, Build=Y

(POT) South Morang West Main
PWGW0363
Funding=Y, Design=Y, Build=Y

(POT) Epping North Tank 2
PWGW0350
Funding=Y, Design=Y, Build=Y

(POT) Aurora South Main (RB)
PWGW0099
Funding=Y, Design=D, Build=D

(POT) South Morang West PRV
PWGW0364
Funding=Y, Design=Y, Build=Y

(POT) M668 O'Herns Road Main Ext
PWGW0136
Funding=Y, Design=Y, Build=Y

(POT) South Morang East PRV
PWGW0390
Funding=D, Design=D, Build=D

(POT) South Morang East Main
PWGW0362
Funding=Y, Design=Y, Build=Y

(POT) WPS066 Upgrade
PWGW0856
Funding=Y, Design=Y, Build=Y

(POT) Edgars Rd Main (RB)
PWGW0102
Funding=Y, Design=D, Build=D

(POT) M663 Cooper St Main
PWGW0138
Funding=Y, Design=Y, Build=Y

(POT) Deveny Rd Main (RB)
PWGW0103
Funding=Y, Design=D, Build=D

Yarra Valley Water

Legend

- Potable Main
- Potable Pump
- Potable Tank
- Potable PRV
- Proposed Potable Main
- Proposed Potable PRV
- Proposed Potable Pump
- Proposed Potable Tank
- UGB

N

0.00 0.25 0.50 0.75

Kilometers

EPPING NORTH

POTABLE WATER INFRASTRUCTURE PLAN

I:\SGP\1. Major Growth Strategies\Epping North\Water\Epping North Water External.gws

18 January 2012

SUMMERHILL ROAD
SUMMERHILL ROAD
EPPING ROAD
MASONS LANE
BODYCOATS ROAD
ANDREW ROAD
ROAD
BOUNDARY ROAD
BRIDGE INN ROAD
VEARINGS ROAD
EPPING ROAD
CRAIGIEBURN EAST ROAD
LEHMANNS LANE
EPPING ROAD
HUME FREEWAY
EPPING ROAD
BINDTS ROAD

N

Legend

Potable Water Infrastructure
Supplied by Yarra Valley Water

Proposed	Existing	Pipe Diameter
		600mm
		525mm
		450mm
		375mm
		300mm
		225mm

Proposed WPS
Proposed PRV

Note: Symbols not to scale

Easement
PSP Boundary

Contours are Australian Height Datum interval 1m.

Figure 3.2
Utilities PSP
Wollert
Potable Water Plan

Scale A3
1 : 20000

200 0 200 400 600
Lengths are in metres

Co-ordinate Datum	MGA55	Sheet 1 of 1	
Drawing No.	135859 - ATT2 - WATER	Version 1	
CAD Ref.	G:\13\135859\ACAD		
Drawn By JL	Checked By SN	Date 15/05/2012	

REV	AMENDMENT	APPROVED	DATE

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Albury NSW 2640
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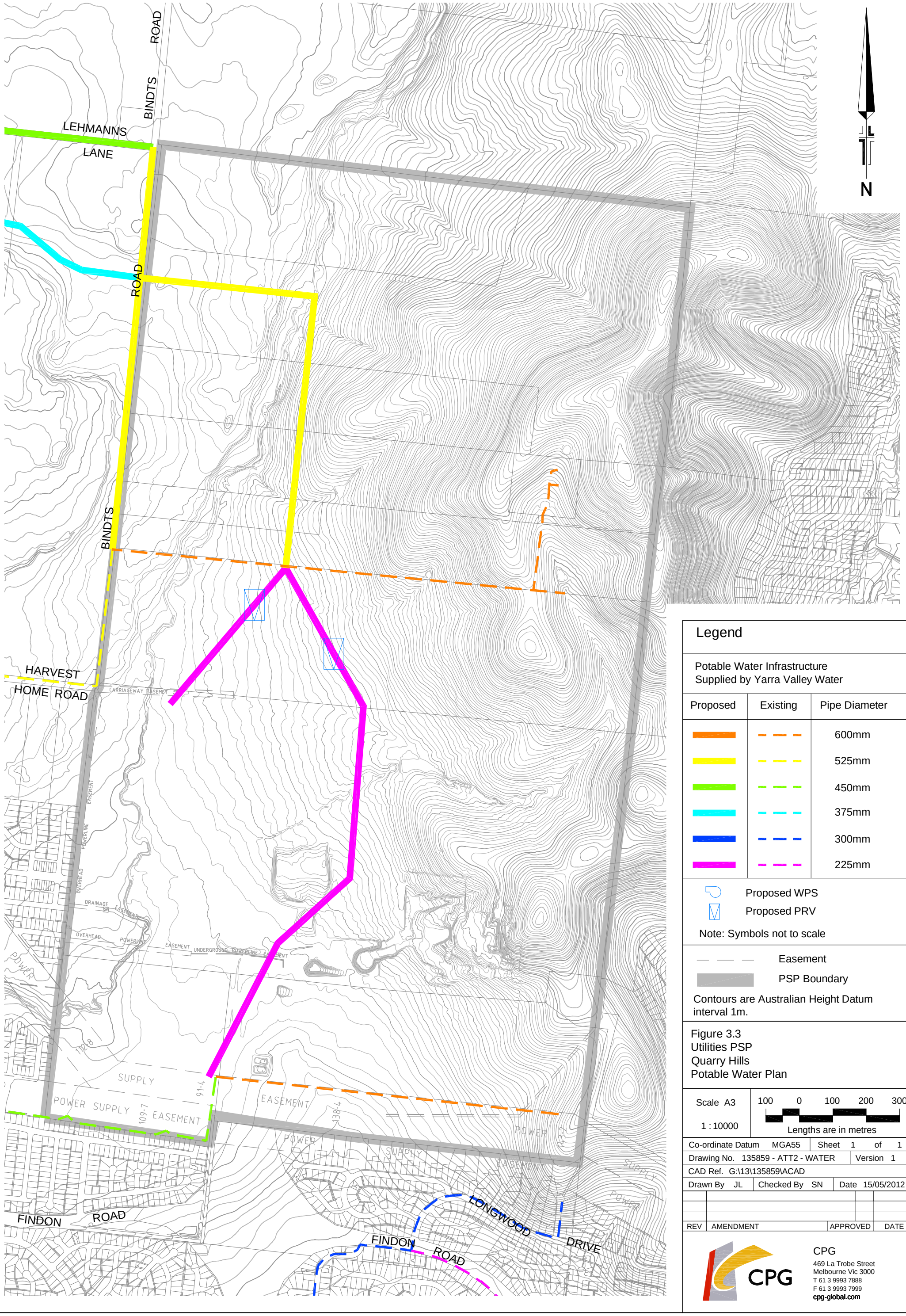

Legend

Potable Water Infrastructure
Supplied by Yarra Valley Water

Proposed	Existing	Pipe Diameter
		600mm
		525mm
		450mm
		375mm
		300mm
		225mm

Proposed WPS
Proposed PRV

Note: Symbols not to scale

Easement
PSP Boundary

Contours are Australian Height Datum interval 1m.

Figure 3.3
Utilities PSP
Quarry Hills
Potable Water Plan

Scale A3
1 : 10000

100 0 100 200 300
Lengths are in metres

Co-ordinate Datum	MGA55	Sheet 1 of 1	
Drawing No.	135859 - ATT2 - WATER	Version 1	
CAD Ref.	G:\13\135859\ACAD		
Drawn By JL	Checked By SN	Date 15/05/2012	

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Attachment 4

- Figure 4.1
  Yarra Valley Water Epping North Recycled Water Infrastructure Plan
- Figure 4.2
  Utilities PSP Wollert, Recycled Water Plan
- Figure 4.3
  Utilities PSP Quarry Hills, Recycled Water Plan

(RW) Wollert North Main
PWGW0368
Funding=Y, Design=Y, Build=Y

(RW) Wollert Connecting Main
PWGW0826
Funding=Y, Design=Y, Build=Y

(RW) Wollert PS
PWGW0374
Funding=Y, Design=Y, Build=Y

(RW) Wollert East Main
PWGW0369
Funding=Y, Design=Y, Build=Y

(RW) Wollert West Main
PWGW0365
Funding=Y, Design=Y, Build=Y

(RW) Craigieburn Road East Main
PWGW0370
Funding=Y, Design=Y, Build=Y

(RW) RWTP Aurora Class A Treatment Plant Upgrade 2
PWGW0155
Funding=Y, Design=Y, Build=Y

(RW) RWTP Aurora Class A Treatment Plant Upgrade 1
PWGW0124
Funding=Y, Design=Y, Build=Y

(RW) ENE Main - Part 1
PWGW0234
Funding=Y, Design=Y, Build=Y

(RW) Bindts Road Main
PWGW0371
Funding=Y, Design=Y, Build=Y

(RW) Aurora North E-W Main (RB)
PWGW0109
Funding=Y, Design=D, Build=D

(RW) South Morang North Main
PWGW0372
Funding=Y, Design=Y, Build=Y

(RW) Wollert South Main
PWGW0366
Funding=Y, Design=Y, Build=Y

(RW) ENE Main - Part 2 (RB)
PWGW0108
Funding=Y, Design=D, Build=D

(RW) RWPS001 Aurora Pump Station Augmentation
PWGW0216
Funding=Y, Design=Y, Build=Y

(RW) Epping North RW Tank 2
PWGW0807
Funding=Y, Design=Y, Build=Y

(RW) Harvest Home Road Main
PWGW0213
Funding=Y, Design=Y, Build=Y

(RW) RWRS001 Epping North Tank 1
PWGW0283
Funding=Y, Design=Y, Build=Y

(RW) Aurora North N-S Main (RB)
PWGW0110
Funding=Y, Design=D, Build=D

(RW) Epping North Main - Part 1 (RB)
PWGW0215
Funding=Y, Design=D, Build=D

(RW) RWBS003 Harvest Home Rd South PRV Station
PWGW0243
Funding=Y, Design=Y, Build=Y

(RW) South Morang East PRV Station
PWGW0822
Funding=Y, Design=Y, Build=Y

(RW) Epping North Main - Part 2
PWGW0214
Funding=Y, Design=Y, Build=Y

(RW) Aurora South Main (RB)
PWGW0111
Funding=Y, Design=D, Build=D

Yarra Valley Water

Legend

- YVW RW Main
- RWPS
- RW PRV
- RWRS
- RWTP
- Proposed RW Main
- Proposed RWPS
- Proposed RW PRV
- Proposed RW Tank
- Proposed RW TP
- UGB

N

0.0 0.5 1.0 1.5

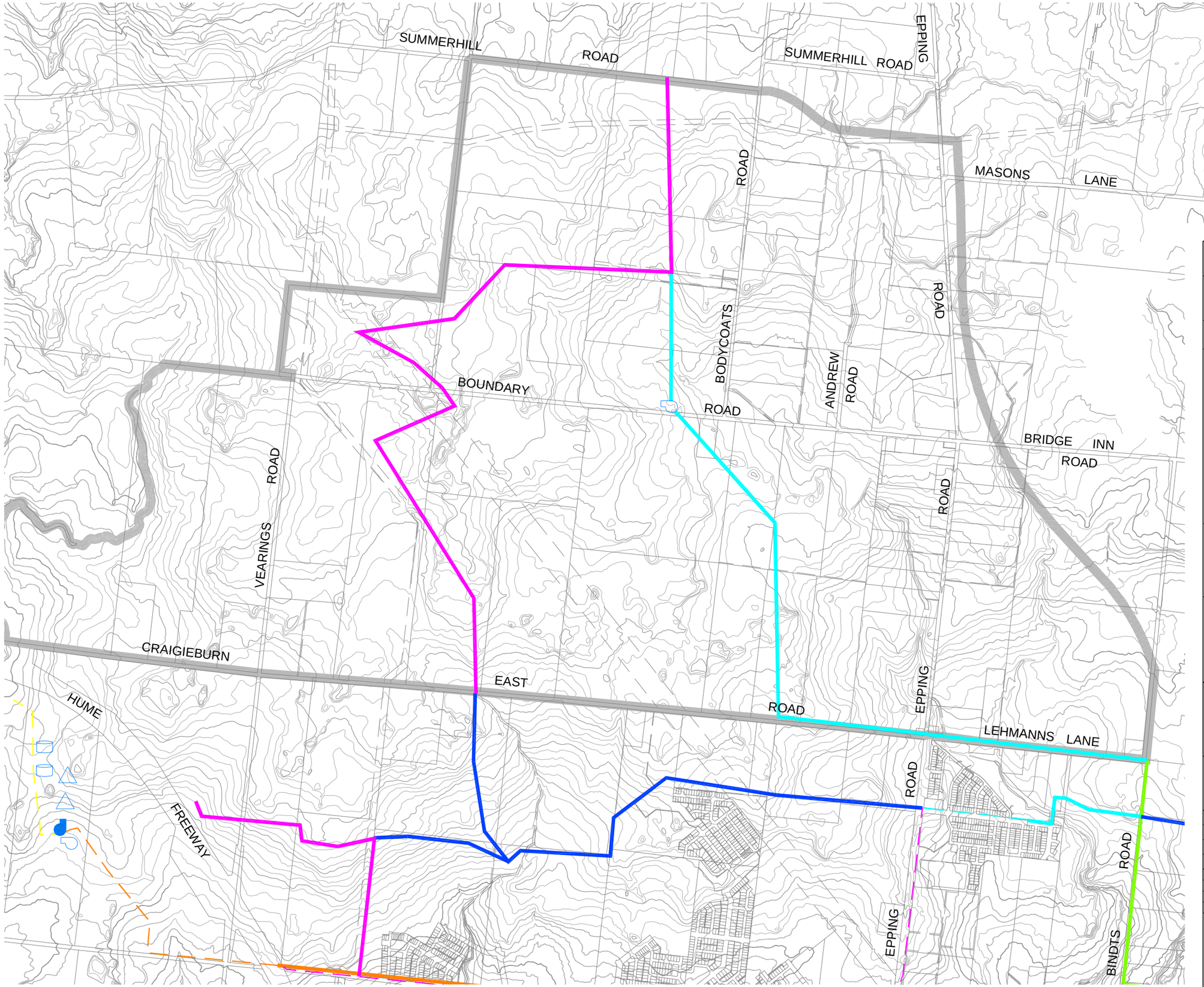
Kilometers

EPPING NORTH

RECYCLED WATER INFRASTRUCTURE PLAN

I:\SGP\1. Major Growth Strategies\Epping North\Sewer\Epping North Recycled Water Infrastructure External.gws

3 November 2011



Legend

Recycled Water Infrastructure
Supplied by Yarra Valley Water

Proposed	Existing	Pipe Diameter
		600mm
		525mm
		450mm
		375mm
		300mm
		225mm

Proposed WPS
Proposed PRV
Existing WRS

Note: Symbols not to scale

Easement
PSP Boundary

Contours are Australian Height Datum interval 1m.

Figure 4.2
Utilities PSP
Wollert
Recycled Water Plan

Scale A3	200 0 200 400 600
1 : 20000	Lengths are in metres
Co-ordinate Datum MGA55	Sheet 1 of 1
Drawing No. 135859 - ATT3 - RECW	Version 1
CAD Ref. G:\13\135859\ACAD	
Drawn By JL	Checked By SN / Date 15/05/2012

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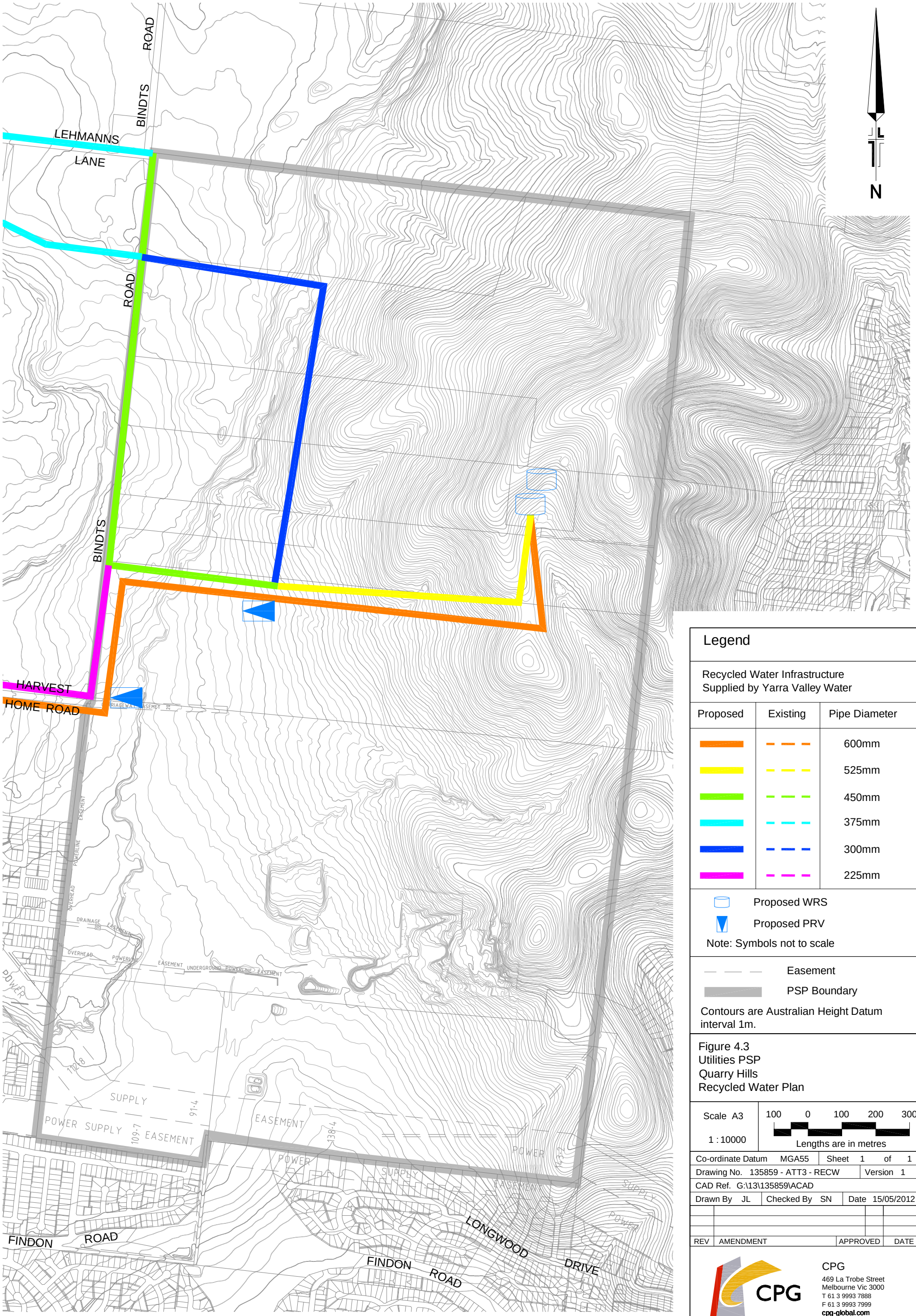

Legend

Recycled Water Infrastructure
Supplied by Yarra Valley Water

Proposed	Existing	Pipe Diameter
		600mm
		525mm
		450mm
		375mm
		300mm
		225mm

Proposed WRS

Proposed PRV

Note: Symbols not to scale

Easement

PSP Boundary

Contours are Australian Height Datum interval 1m.

Figure 4.3
Utilities PSP
Quarry Hills
Recycled Water Plan

Scale A3
1 : 10000

100 0 100 200 300
Lengths are in metres

Co-ordinate Datum	MGA55	Sheet 1 of 1	
Drawing No. 135859 - ATT3 - RECW		Version 1	
CAD Ref. G:\13\135859\ACAD			
Drawn By JL	Checked By SN	Date 15/05/2012	

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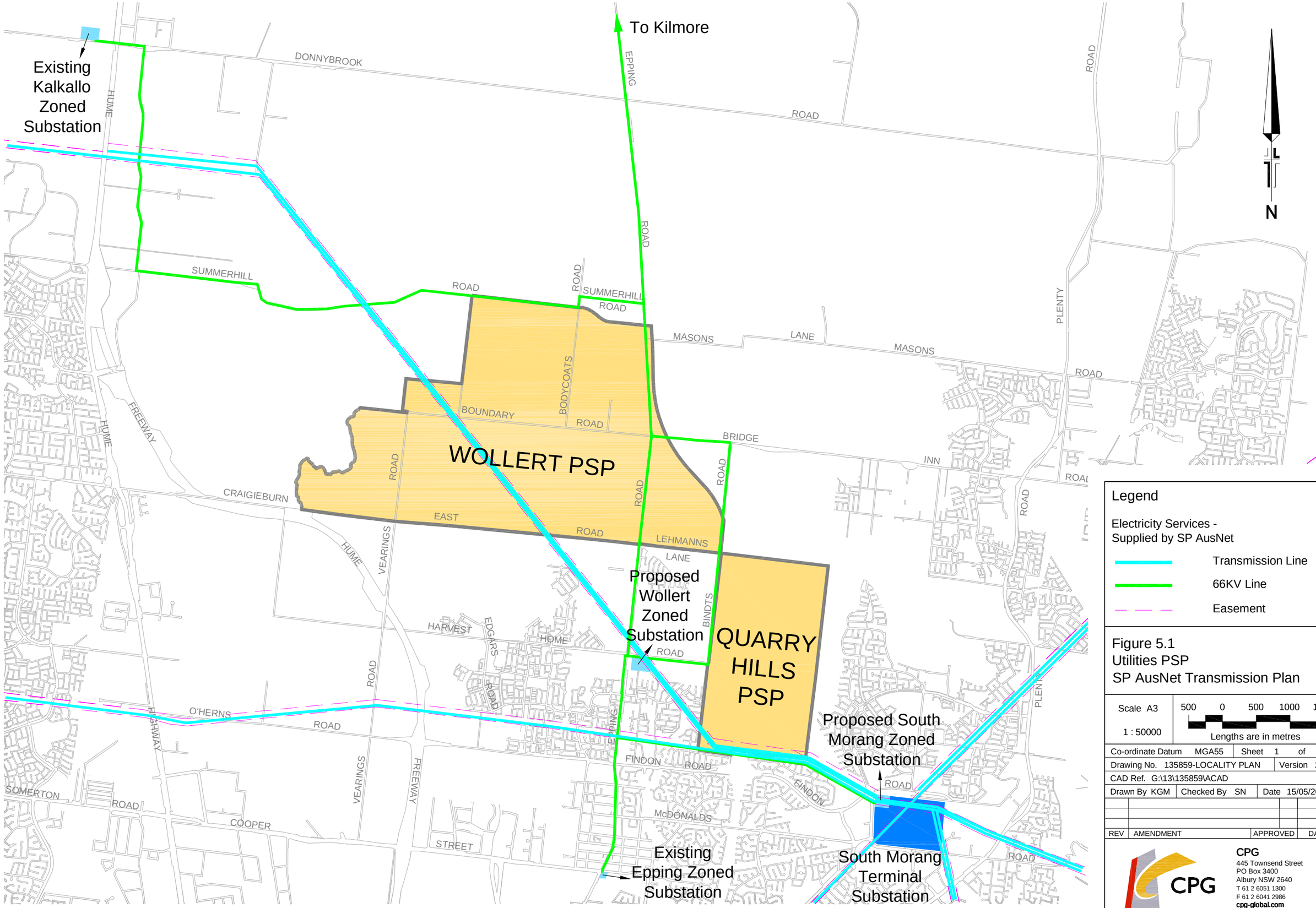
Attachment 5

- Figure 5.1

  Utilities PSP, SP AusNet Transmission Plan
- Figure 5.2

  Utilities PSP, SP AusNet Tower and Cable Locations Plan
- Figure 5.3

  Guidelines for subdivision and development of land affected by transmission line easements



Legend

Electricity Services - Supplied by SP AusNet

- Transmission Line
- 66KV Line
- Easement

Figure 5.1
Utilities PSP
SP AusNet Transmission Plan

Scale A3	500 0 500 1000 1500
1 : 50000	Lengths are in metres
Co-ordinate Datum MGA55	Sheet 1 of 1
Drawing No. 135859-LOCALITY PLAN	Version 2
CAD Ref. G:\13\135859\ACAD	
Drawn By KGM	Checked By SN / Date 15/05/2012

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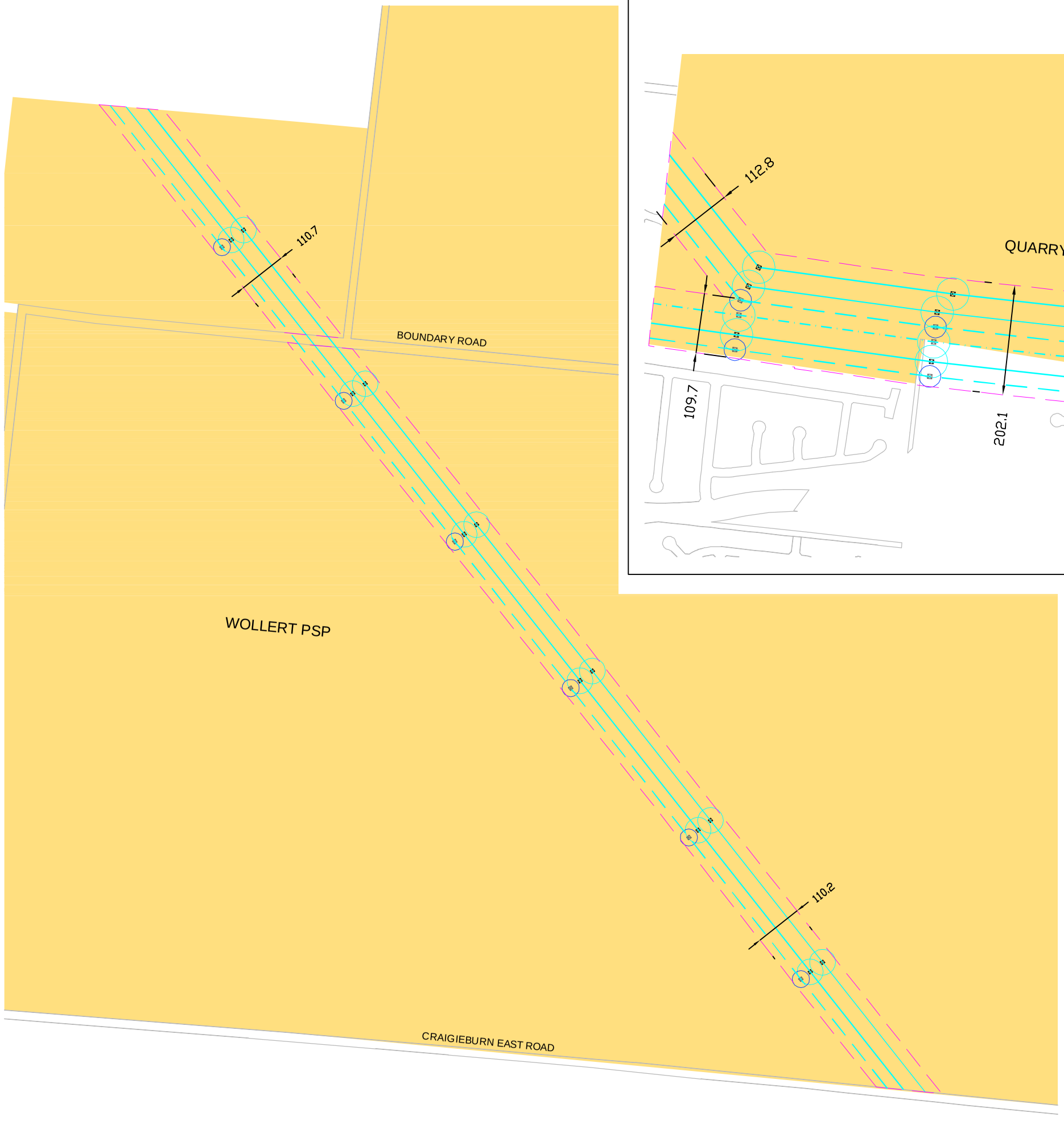

Legend

Electricity Services -
Supplied by SP AusNet

- 500KV Line
- Future 5000KV Line
- Future 220KV Line
- Exist / Future Tower
- Easement
- 20m / 30m Radii clear zones

Figure 5.2
Utilities PSP
SP AusNet Transmission Plan

Scale A3 1 : 10000	100 0 100 200 300 Lengths are in metres

Co-ordinate Datum	MGA55	Sheet 1 of 1	
Drawing No. 135859-FIGURE 5.2		Version 1	
CAD Ref. G:\13\135859\ACAD			
Drawn By KGM	Checked By SN	Date 15/05/2012	

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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

GUIDELINES FOR SUBDIVISION AND DEVELOPMENT OF LAND AFFECTED BY EASEMENTS

CONTENTS

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 it’s 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 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)

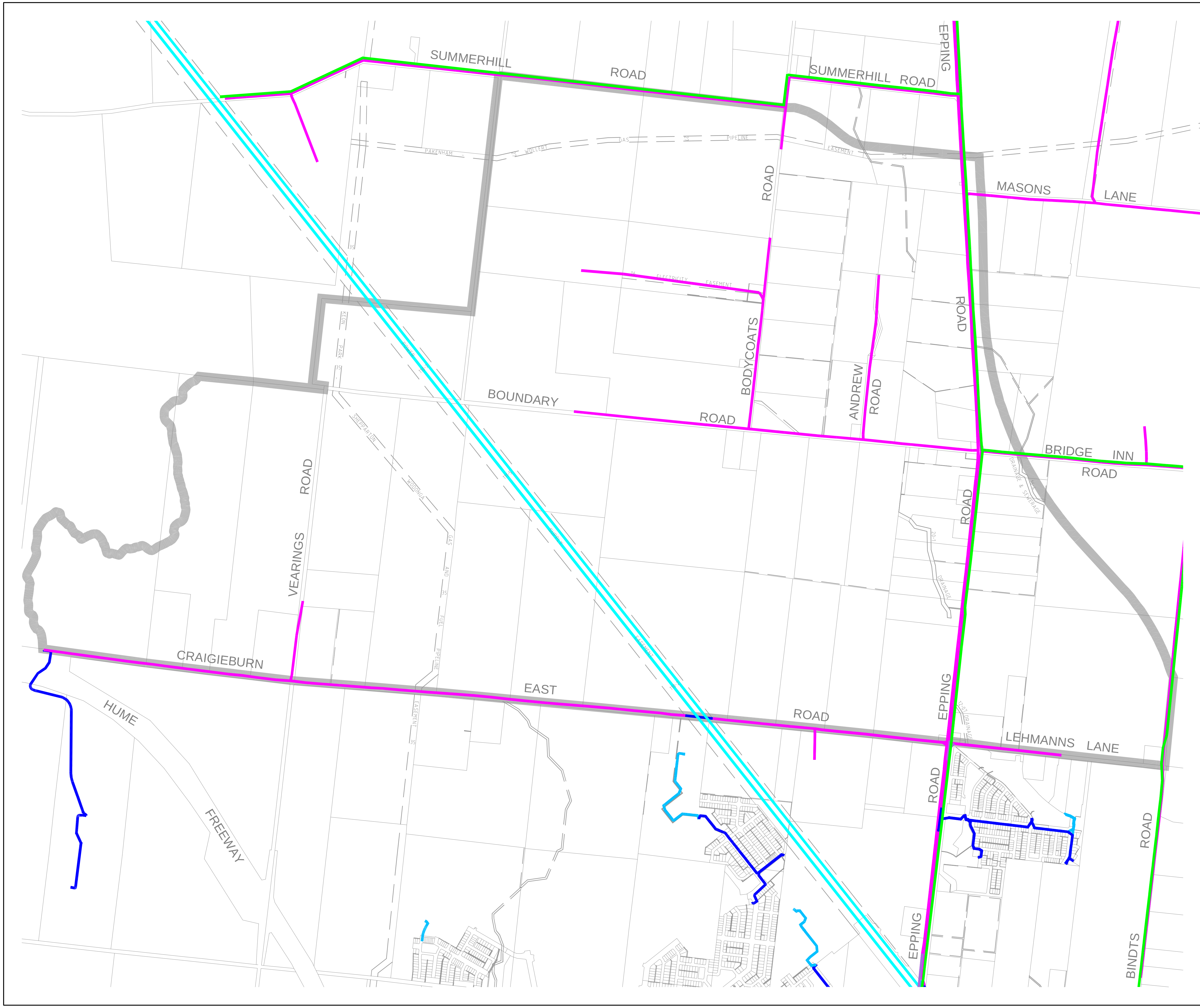
Location of Metal Object	Maximum Length (metres)
On the easement	100
Within 20 metres of the easement	250

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

Attachment 6

- Figure 6.1
  Utilities PSP Wollert, SP AusNet Network Plan



Legend

Electricity Services - Supplied by SP AusNet

- Transmission Line
- 66KV Line
- 22KV Line
- Planned High Voltage Line
- 22KV Underground Cable
- Other Underground Cable

- Easement
- PSP Boundary

Figure 6.1
Utilities PSP
Wollert
SP AusNet Network Plan

Scale A3 1 : 20000	200 0 200 400 600 Lengths are in metres		
Co-ordinate Datum MGA55	Sheet 1 of 1		
Drawing No. 135859-ELECTRICITY EX..	Version 2		
CAD Ref. G:\13\135859\ACAD			
Drawn By KGM	Checked By SN	Date 15/05/2012	
REV	AMENDMENT	APPROVED	DATE

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PO Box 3400
Albury NSW 2640
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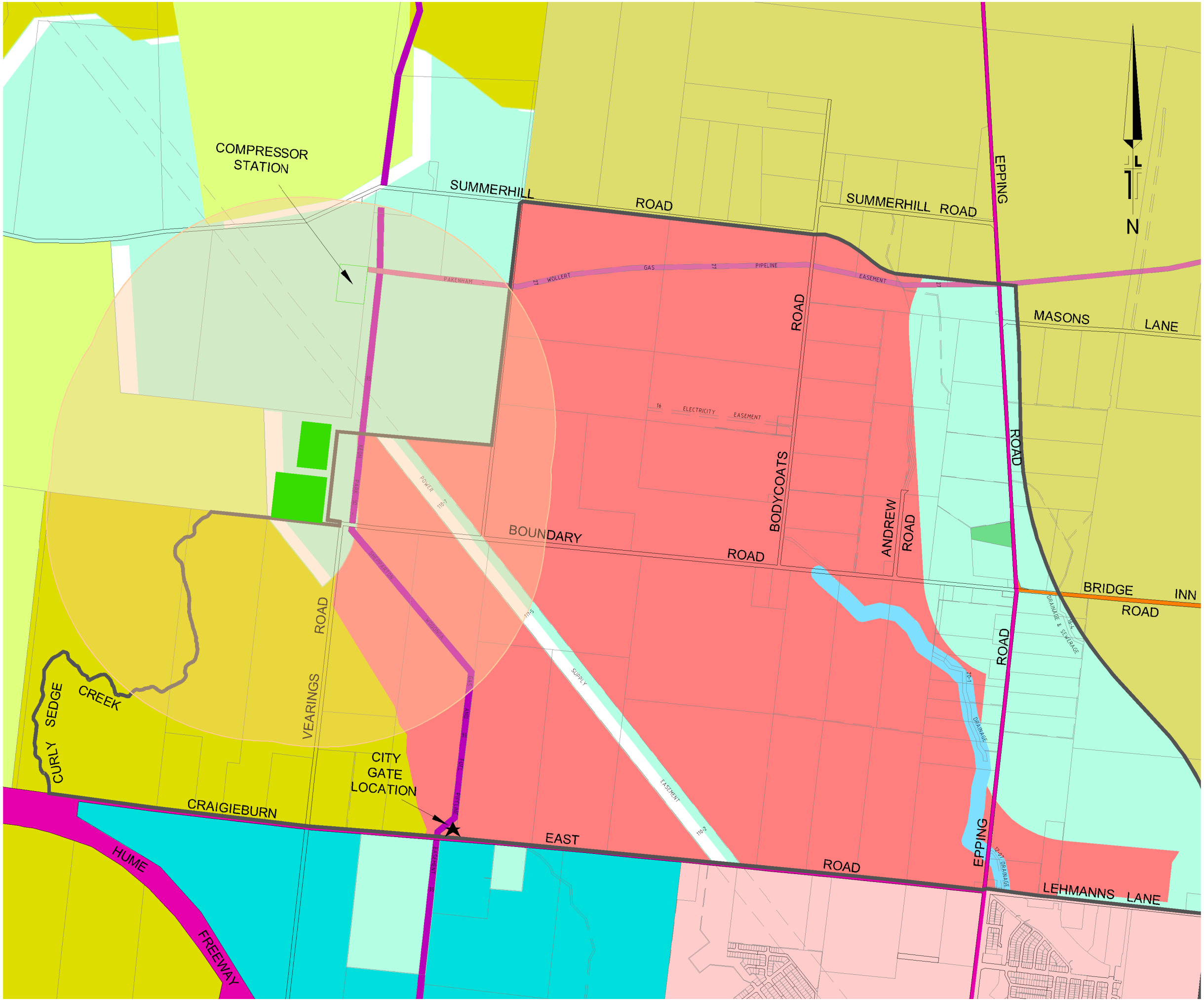
F 61 2 6041 2986
cpg-global.com

Attachment 7

- Figure 7.1
  Utilities PSP Wollert, APA recommended buffers
- Figure 7.2
  Utilities PSP Wollert, discussion plans with graduated buffers
- Figure 7.3
  APA submission to Growth Areas Authority 20th December 2011



Notations

Power Station Buffer Zone Impact

Total Wollert PSP Area	**1433 ha**
Total 1.2km Buffer Zone	**647 ha**
Buffer Zone within Wollert PSP	273 ha
	19% of PSP

Land Zone 1.2km Buffer Impact (within Wollert PSP)

Total Urban Growth Zone (UGZ)	928 ha
Buffer Zone within UGZ	139 ha
Total Rural Conservation Zone (RCZ)	208 ha
Buffer Zone within RCZ	105 ha
Total Farming Zone (FZ)	47 ha
Buffer Zone within FZ	29 ha

Note: Areas are approximate

Legend

- Proposed Power Station Structure - Supplied by APA Gas Net

Whittlesea City Council Planning Zones

- Public Park & Recreation Zone
- Road Zone Catagory 1
- Road Zone Catagory 2
- Residential 1 Zone
- Green Wedge Zone
- Rural Conservation Zone
- Farming Zone
- Special Use Zone
- Comprehensive Development Zone
- Urban Floodway Zone
- Urban Growth Zone

- Buffer Zone - 1.2km from Power Station Structure
- Keon Park - Shepparton - Wodonga Gas & Fuel Pipeline Easement
- Pakenham - Wollert Gas Pipeline Easement
- Easement
- PSP Boundary

Figure 7.1
Utilities PSP
Wollert ,
APA Recommended Buffers

Scale A3	200 0 200 400 600
1 : 20000	Lengths are in metres
Co-ordinate Datum MGA55	Sheet 1 of 3
Drawing No. 135859-FIGURE 7.1	Version 1
CAD Ref. G:\13\135859\ACAD	
Drawn By JL	Checked By SN Date 15/05/2012

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- Green Wedge Zone
- Rural Conservation Zone
- Farming Zone
- Special Use Zone
- Comprehensive Development Zone
- Urban Floodway Zone
- Urban Growth Zone

- Buffer Zone - 0.6km, 0.8km, 1.0km, 1.2km from Power Station Structure
- Keon Park - Shepparton - Wodonga Gas & Fuel Pipeline Easement
- Pakenham - Wollert Gas Pipeline Easement
- Easement
- PSP Boundary

Figure 7.2
Utilities PSP
Wollert Discussion Plan with Graduated Buffers
APA Gas Fired Power Station Location
Option 1

Scale A3
1 : 20000

200 0 200 400 600
Lengths are in metres

Co-ordinate Datum	MGA55	Sheet 1 of 3	
Drawing No.	135859-POWER STATIONV2	Version 2	
CAD Ref.	G:\13\135859\ACAD		
Drawn By JL	Checked By SN	Date 15/05/2012	

REV	AMENDMENT	APPROVED	DATE

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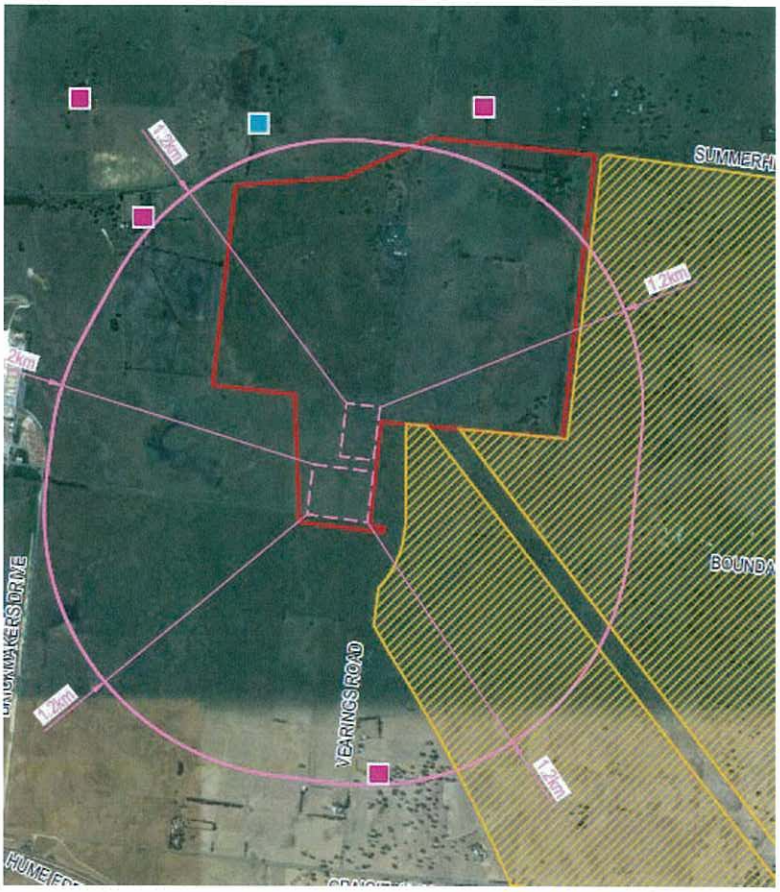
20th December 2011

THE GROWTH AREA AUTHORITY'S DRAFT MELBOURNE GROWTH CORRIDOR PLANS

APA Group's Response



REPORT

Submitted to:
Growth Areas Authority
Level 29
35 Collins Street
Melbourne
VIC 3000

Report Number. 117613152

Distribution:

GAA - 2 copies
APA Group - 2 copies
Golder Associates - 2 copies

Golder Associates

Table of Contents

APPENDICES

1.0 INTRODUCTION

This submission to the Growth Areas Authority (GAA) has been prepared on behalf of the APA Group by Golder Associates Pty Ltd (Golder Associates). The APA Group owns a strategic site in the draft Melbourne Growth Corridor (MGC) Plan at 365 Summerhill Road, Wollert of approximately 193 hectares. The site is currently occupied by a gas compressor facility, which serves both Metropolitan Melbourne and northern Victoria.

The APA Group has long-term plans to develop a 1,000MW (nominal) closed-cycle gas power station at its Wollert site and has previously objected to the rezoning of immediately abutting land to uses that might prejudice the development of such a power station[1].

The APA Group's Wollert site is one of few locations in Metropolitan Melbourne that is located at the intersection of the major gas pipeline network and a high capacity electricity transmission network. A major attribute is that the development would benefit from lower infrastructure requirements associated with direct connection to these networks and therefore more cost-effective supply of electricity to consumers.

The principal issue that this report will address is an inconsistency in the draft MGC Plan. While the draft MGC plan states that; *'the plan recognises and protects a range of existing and prospective infrastructure facilities including a potential gas fired power station at Wollert'* (p70) the land use map presented on page 55 of the draft MGC plan proposes to locate new residential development on land immediately abutting the Wollert site.

Planning for residential development next to the site of a potential power station does not seem to '*recognise and protect'* the prospective infrastructure.

- In **Section 2** of this report we assess the demand for an energy generation in Victoria and the suitability of the Wollert site to accommodate a gas-fired power station;
- In **Section 3** we investigate the distances (or buffers) between recent gas power stations in Victoria and evaluate their applicability to the Wollert site; and
- In **Section 4** we propose modifications to the draft MGC Plan based on this research.

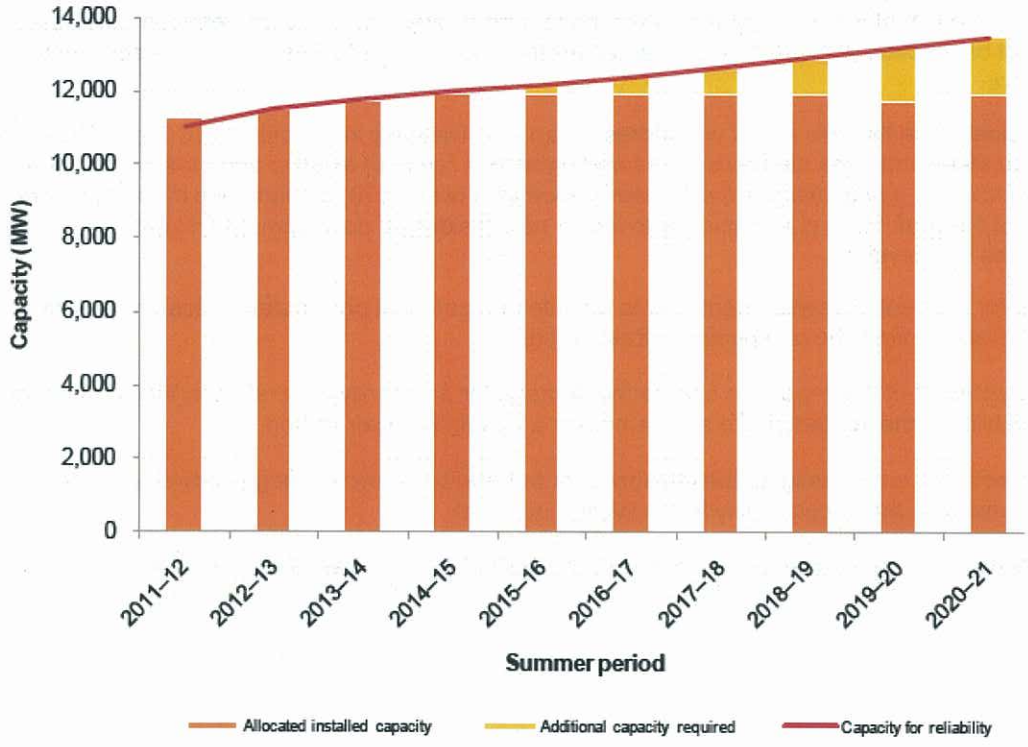
[1] Letter dated 17th Feb 2009 to the GAA in relation to the review of investigation areas for future expansion if the urban growth boundary (Urbis on behalf of the APA Group)

2.0 POWER REQUIREMENTS FOR VICTORIA

Demand

The 2011 Electricity Statement of Opportunities (AEMO; 2011) indicates that with medium economic growth conditions, Victoria will reach its low reserve condition point in 2014-15, requiring at least 100 MW of new generation or demand-side investment to delay this shortfall by one year. The current low reserve condition point is one year earlier than the 2010 Electricity Statement of Opportunities' timing, which is primarily due to increased maximum demand forecasts for Victoria, despite moderate increases in Victoria's projected available capacity. Figure 1 below is reproduced from the 2011 Electricity Statement of Opportunities report:

Figure 1: Victorian Summer Supply-Demand Outlook



Source: 2011 Electricity Statement of Opportunities (AEMO; 2011)

It should also be noted that with high economic growth conditions the 2011 Statement of Opportunities projects that new generation or demand-side investment is required in Victoria as early as 2013-14.

The proposed Wollert power station responds to the forecast shortfall in generating capacity in the National Electricity Market by using natural gas reserves to generate electricity at a lower intensity of greenhouse gas emissions than coal fired power.

Supply

Combined cycle[2] gas-fired power stations will produce significantly lower carbon emissions (up to 70% less) and use less than 1% of the water per megawatt hour compared with traditional wet cooled brown

[2] In a combined cycle gas-fired power station, a steam turbine is driven by steam generated from waste heat recovered from the gas turbine exhaust gases. In an open cycle gas turbine, the residual heat and the expanded combustion gases are emitted directly to the atmosphere through an exhaust stack. The energy efficiency of a combined cycle gas power station is approximately 50 per cent more than a comparable open-cycle gas power station.

coal-fired power stations[3]. The development of gas-fired generation to facilitate the transition to low-emissions technologies is emphasised in the Victorian Minister for Energy and Resources' statement, Energy for Victoria (Department of Natural Resources and Environment; 2002):

> *'Natural gas is widely seen as playing a significant role in providing a secure energy supply source. This is because natural gas: produces substantially lower greenhouse emissions than brown coal technologies; is more competitive than current renewable sources; and has sufficient flexibility to fuel large base load and peaking plants as well as small-scale distributed and high-efficiency generation.'*

The location of gas power stations is generally governed by three principal factors – access to a natural gas supply (and major pipeline network), proximity to a consumer market and proximity to the high capacity transmission network to deliver the electricity. The APA Group's Wollert site meets all of these criteria.

Figure 2 in Appendix A shows that the Wollert site is one of few locations in Metropolitan Melbourne that is located at the intersection of the major gas pipeline network and high capacity electricity transmission network. A major attribute is that the development would benefit from lower infrastructure requirements associated with direct connection to these networks. The site's close proximity to the Melbourne market is also a benefit as transmission losses occur when electricity is transmitted long distances. The losses are reduced when the generating plant is located close to the load centre (where the electricity is used by customers).

These factors are important from a consumer-cost perspective because lower fuel supply costs and reduced transmission losses would increase the competitiveness of the power station in the National Electricity Market, improving its ability to generate cost-effective electricity.

Figure 3 in Appendix B shows the intersection of the major energy networks at the Wollert site.

[3] Shaw River Power Station Environmental Effects Statement: Greenhouse Gas Assessment (Appendix 7); 2010

3.0 GAS POWER STATIONS AND BUFFERS

In Section 2 we demonstrated that the Wollert site has a number of strategic advantages for a new gas-fired power station to serve Melbourne and wider Victoria. This section investigates other recent gas-fired power station developments in Victoria to understand the impact that the Wollert proposal may have on neighbouring land uses.

In 2009 the APA Group commissioned Parsons Brinckerhoff to investigate the suitability of three of its sites in Victoria for new gas fired power stations and to assess the preferred plant sizing and configuration considering fuel, environmental, permitting, transmission and connection constraints related to each site. The study concluded that the area around the Wollert site has been identified as having high potential to meet growth in demand. Therefore, introducing generation close to relatively high load growth areas will be beneficial by reducing the network losses and providing network relief, in particular for the transmission network between Latrobe Valley generation centre and the South Morang Terminal Station. The study also concluded that, given the size of the proposed plant at Wollert, for either 500MW or 1,000MW capacity, the combined-cycle gas turbine configuration will be the preferred choice as this would offer better plant efficiency due to the waste heat recovery process.

Buffer Zones

In order to determine the required buffer distances between a new power station at Wollert and sensitive land uses such as residential, it is useful to consider precedents. The Shaw River Power Station is a recent example of a combined cycle, gas-fired power station that has been approved by the Minister in November 2010 following the EES process and a Planning Inquiry. As part of that process a wealth of environmental effects information was made publically available. The Shaw River Power Station is a good model to use to assess the likely effects of a new 1,000MW combined-cycle gas-fired power station at Wollert.

In terms of land use planning, a Special Use Zone (SUZ) was introduced specific to the power station to facilitate its approval. The SUZ follows the footprint of the power station site. An Environmental Significance overlay was also introduced to achieve the following objectives:

- *'To ensure that the development and use of the Shaw River Power Station is not constrained by the establishment of potentially conflicting accommodation uses and developments nearby.*
- *To ensure that potential noise impacts are considered in any decision regarding accommodation land use and development.*
- *To apply acoustic measures in the design of any accommodation developments in proximity to the Shaw River Power Station.'*

It could be anticipated that similar land use planning mechanisms could be applied to the Wollert power station. The Environmental Significance overlay would extend further from the site than the SUZ and affect the nature of development within that area, in particular 'accommodation development' or residential land uses. Its purpose would be to limit residential encroachment and regulate dwelling construction which might be affected by noise emissions generated by the power station.

The Shaw River Power Station Environmental Significance overlay follows the 34dB(A) noise contour during adverse weather conditions and extends from between 400m and 1.2km from the power station. Figure 4 in Appendix C reproduces the noise contour (and the boundary of the Environmental Significance overlay) from the Shaw River Power Station EES.

There are a number of factors that contribute to the determination of the noise contour, including:

- Size of the power station. The Shaw River Power Station has been assessed at a capacity of 1,500MW whereas Wollert's capacity is more likely to be 1,000MW. However, in the absence of more detailed studies it is considered prudent to plan based on the impact of a larger power station.

- Noise attenuation measures. We consider that the noise attenuation measures will be similar for both the Shaw River and proposed Wollert power stations.
- Background noise. The minimum levels at the Shaw River Power Station at night were below 25 dB(A) indicating the Interim Guidelines for Control of Noise from Industry in Country Victoria (Interim Guidelines) published by the Victorian Environment Protection Authority (EPA) should apply. The Wollert site is in Metropolitan Melbourne and close to a gas compressor facility (on-site) and brick manufacturing kilns on a neighbouring site. However, we anticipate that background noise levels would be at a similarly low level at night.
- Terrain. Figure 4 shows that the noise contour for the Environmental Significance overlay at Shaw River is affected by the surrounding terrain (the noise contour follows the creek to the north-west of the power station). The Wollert site is situated on a relatively undulating terrain and we do not anticipate that the noise contour would be significantly affected by local terrain conditions.
- Weather conditions. Figure 5 in Appendix D shows the wind direction and speed distributions for the Bureau of Meteorology Tullamarine Automatic Weather Station on and annual and seasonal basis. This has been assessed as representative of on-site conditions at Wollert. Northerly and southerly sector winds are the most dominant providing 42% (northerly) and 49% (southerly) of the frequency distribution respectively. In addition winds speeds higher than 5 m/s are experienced 36% of the time, it would be expected that background noise generated from wind in trees etc would mask the noise from the operational plant under such conditions. Average wind speed for the site is quite high with an annual average wind speed of 4.22 m/s. Figure 6 in Appendix E further illustrates the breakdown of wind speeds and stability class distribution. Stable winds (E & F stability class) blowing towards the receivers represent the worst case conditions, the most predominant stability class (D) represents neutral conditions and as expected these conditions make up a majority of the conditions experienced at the site (49.9%).

The development of a power station at Wollert is in its early stages and the APA Group has not been able to undertake a noise impact assessment of the proposed development. However, the APA Group has invested in research that evaluated three of its sites across Melbourne for a new power station[4], and has decided to focus on its Wollert site. Based on the Shaw River Power Station, we consider it prudent to apply the maximum distance of the noise contour from that site to the Wollert, of 1.2km. The most appropriate buffer distance could be higher or lower than 1.2km, subject to the results of a detailed noise assessment of the Wollert site.

Wollert Site

Figure 7 in Appendix F applies 1.2 km noise contours to the likely footprint of a 1,000MW combined cycle gas-fired power station at the APA Group's Wollert site. The illustration shows that the site is relatively unencumbered by adjoining sensitive land uses. The optimal location for the new power station is on the most southerly part of the site shown in the image. This location would have the benefit of allowing connection straight to the high capacity electricity transmission network and major gas pipeline network. It would also minimise the adverse impacts that noise generation might have on sensitive receptors – there is one residence approximately 1.15km from the power station in a southerly direction. However, Figure 7 also shows that the potential noise generation (within the 1.2km buffer) will impact on the residential area proposed in the draft MGC Plan.

Figure 6 showed that the most adverse winds (E & F stability class) winds blow from the north in a southerly direction 15% of the time. It is therefore possible that the most appropriate noise contour at 34dB(A) could extend in a more southerly direction than is shown in Figure 7. A noise impact assessment could show that the site requires a larger buffer zone from sensitive land uses in a southerly direction to account for adverse weather.

[4] Pre-Feasibility Study for Gas Fired Generation: Network Connection Study, Generation Assessment and Carbon Policies (Parsons Brinckerhoff for the APA Group; 2009)

A location further north on the APA Group's site could be considered preferable to the GAA as it would have a lower impact on the land proposed for residential development, However, Figure 7 shows that moving the site further north will bring up to 4 existing residences within the buffer zone of adverse environmental effects. It is worth noting that there are no powers of compulsory acquisition that developers of power stations can employ. Moving the location further north presents a greater risk to the proposed development as the owners of the affected residences might not agree to sell their land.

4.0 RECOMMENDATIONS

In approving the EES for the Shaw River Power Station the Minister for Energy and Resources Peter Batchelor said[5];

> *"Increasing our gas supply options is great for the economy and great for the environment with gas producing far fewer emissions than coal fired energy generation. Our Government has made a commitment to cut greenhouse gas emissions by 20 per cent by 2020 and new gas projects, which can replace baseload coal-fired electricity, coupled with renewable energy projects will ensure we can meet that target."*

In Section 2 of this report we have shown that the APA Group's Wollert site benefits from significant strategic advantages as it is one of few sites situated on the intersection of high capacity gas and electricity networks in close proximity to the load centre of Metropolitan Melbourne. Clearly, the site's potential to accommodate a low-carbon combined-cycle gas-fired power station to help alleviate the projected shortfall in Victoria's energy supply (see Figure 1) should be recognised by strategic planning. The site is a resource of Metropolitan significance for power generation and it would be premature to prejudice this potential.

While the draft MGC plan states that; *'the plan recognises and protects a range of existing and prospective infrastructure facilities including a potential gas fired power station at Wollert'* (p70) the land use map presented on page 55 of the draft MGC plan proposes to locate new residential development on land immediately abutting the Wollert site. Figure 7 of this report has shown that a proportion of that new residential development could be adversely affected by noise generated from a new power station at Wollert and be considered an unacceptable level of environmental amenity by new residents.

Until a more detailed noise assessment is conducted to accurately determine the size of the buffer zone required we request that the GAA change the land use designation within the buffer zone in Figure 7. We request that the GAA change the proposed land use in the buffer zone to either 'Urban – land use to be determined' or 'potential urban' as other sites have been categorised. The viability of residential development can then be determined upon the completion of further studies at or before Precinct Structure Plan stage.

We would welcome the opportunity to engage with the GAA in constructive dialogue during the finalisation of the MGC Plan.

[5] http://gastoday.com.au/news/shaw_river_gets_vic_gov_go-ahead/052182/

Report Signature Page

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APPENDIX A

Figure 2 Major Energy Transmission Infrastructure in Victoria

LEGEND

- MAJOR GAS PIPELINE NETWORK
- HIGH VOLTAGE (500kV) ELECTRICITY TRANSMISSION NETWORK
- INTERSECTION BETWEEN THE NETWORKS IN METROPOLITAN MELBOURNE

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CLIENT: APA GROUP							PROJECT: RESPONSE TO GAA
DRAWN BY: MLL	DATE: 12.12.11						DRAWING TITLE: GAS PIPELINES AND HIGH CAPACITY ELECTRICITY TRANSMISSION NETWORK IN VICTORIA
CHECKED BY: GE	DATE: 12.12.11						
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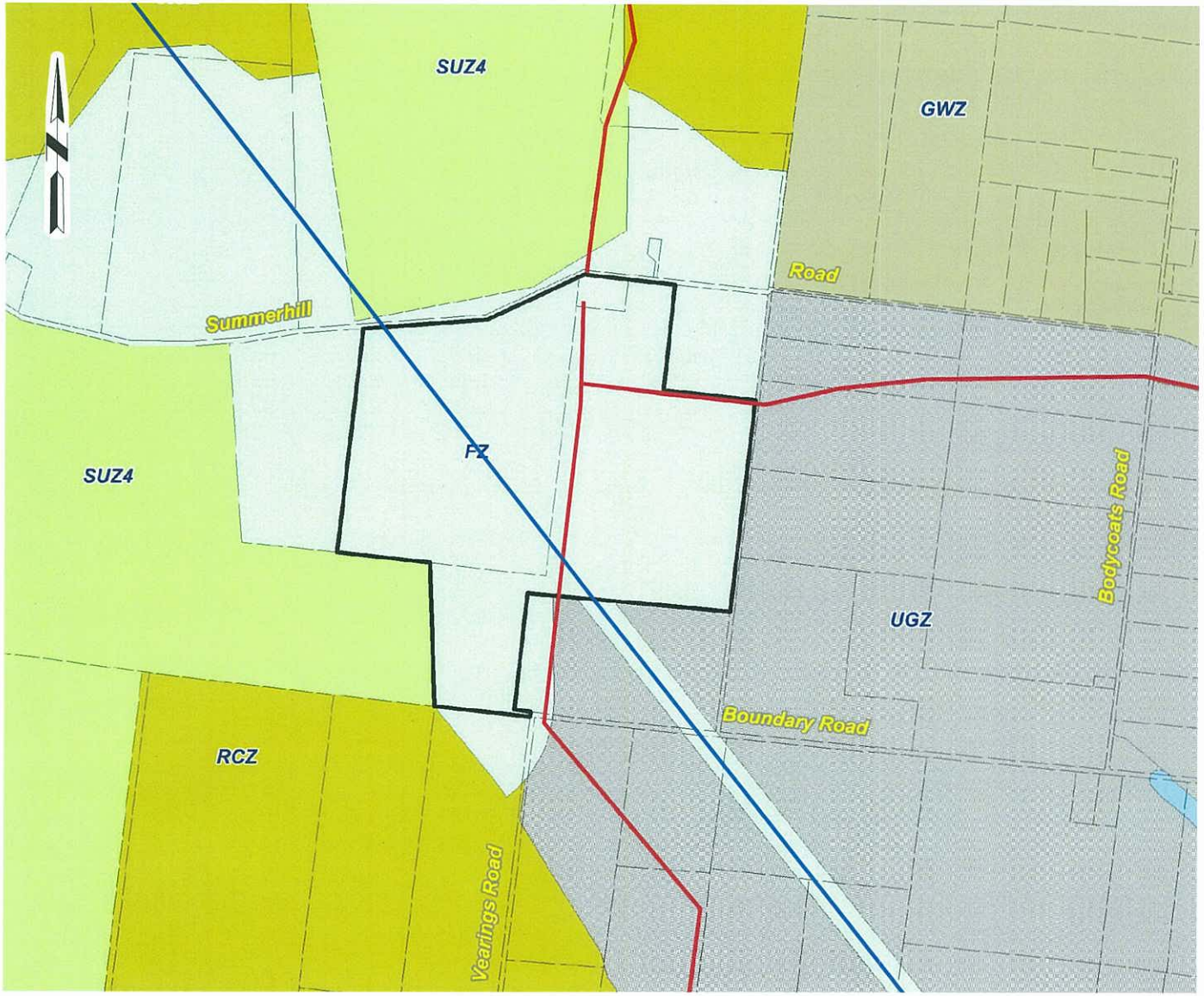
Xref: GAP_LOGO-A3.dwg; 117613152-XIMG-GOOGLEEARTH2010-VIC-23MAY2000-1.jpg;

APPENDIX B

Figure 3 – The Intersection of Major Energy Networks at Wollert



LEGEND

- SITE BOUNDARY
- HIGH VOLTAGE (500kV) ELECTRICITY NETWORK
- MAJOR GAS PIPELINE NETWORK
- CADASTRAL BOUNDARY

PLANNING SCHEME ZONES

- FZ - FARMING ZONE
- GWZ - GREEN WEDGE ZONE
- RCZ - RURAL CONSERVATION ZONE
- SUZ4- SPECIAL USE ZONE - SCHEDULE 4
- UGZ - URBAN GROWTH ZONE

BASE PLAN PROVIDED BY APA GROUP ON 02 DEC.2011
*SOURCE : VICMAP PLANNING SCHEMES JUNE 2011 AND VICMAP PROPERTY JUNE 2011

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CLIENT: APA GROUP		PROJECT: RESPONSE TO GAA	
DRAWN BY: MLL	DATE: 20.12.11	DRAWING TITLE: INTERSECTION OF MAJOR ENERGY NETWORKS	
CHECKED BY: GE	DATE: 20.12.11		
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			FIGURE 3

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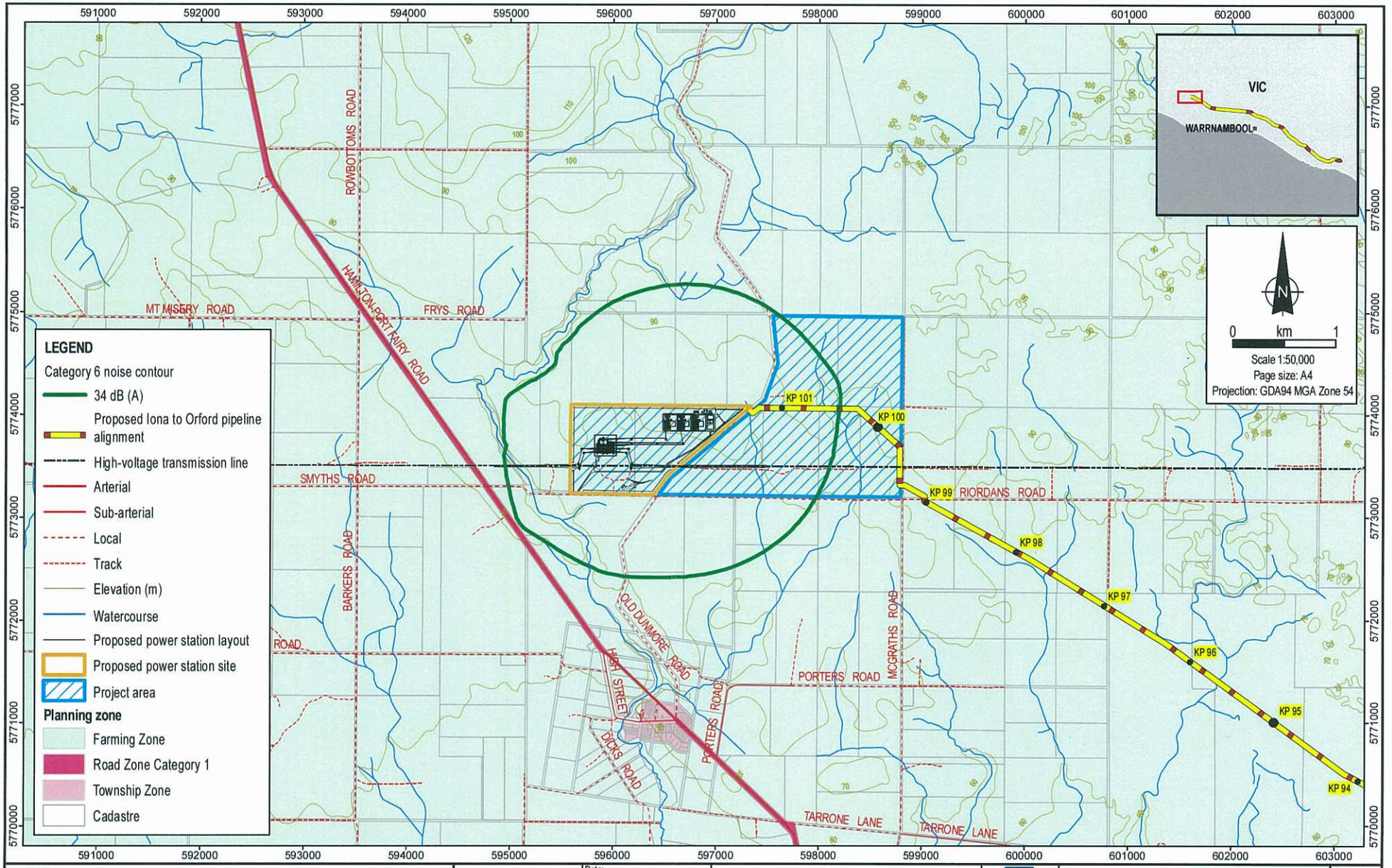
APPENDIX C

Figure 4 – Shaw River Power Station Noise Contour 34dB (A)



Source:
Place names, roads, watercourses, transmission lines, cadastre and planning zones from VICMAP Digital (optimum scale 1:25,000).
Proposed gas pipeline alignment and proposed power station site from Coffey Natural Systems.
Proposed power station layout from Santos.
Noise contour data from SONUS.

coffey natural systems

Date: 15.10.2009
MXD: SantosProjectMercuryGIS
File Name: 1351AA_MATRIX_F002_GIS

Shaw River Power Station Pty Ltd

Environment Effects Statement

SHAW RIVER POWER STATION

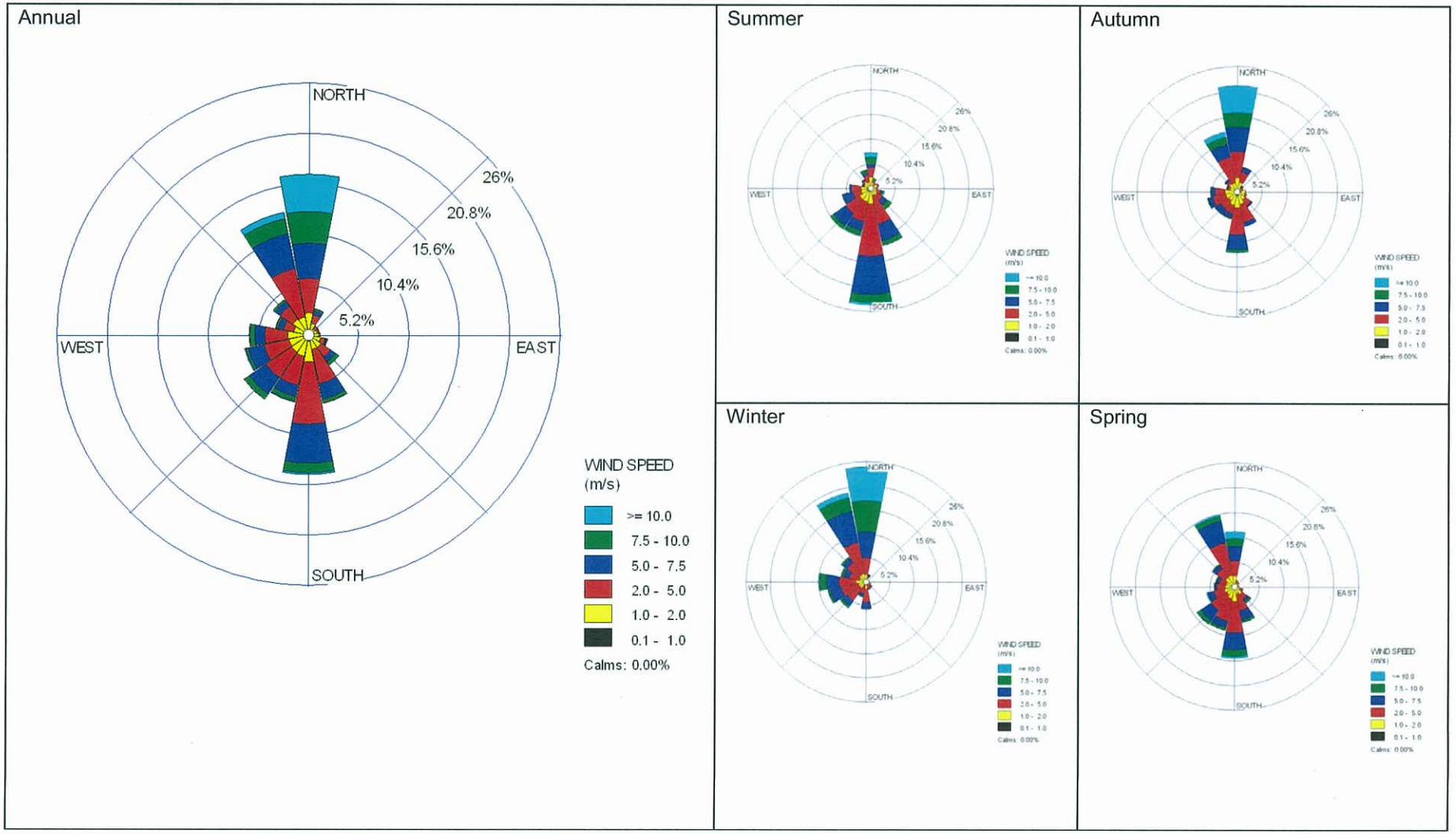
Environmental significance overlay

Figure No: 3

APPENDIX D

Figure 5 - Wind Roses for the Wollert Site

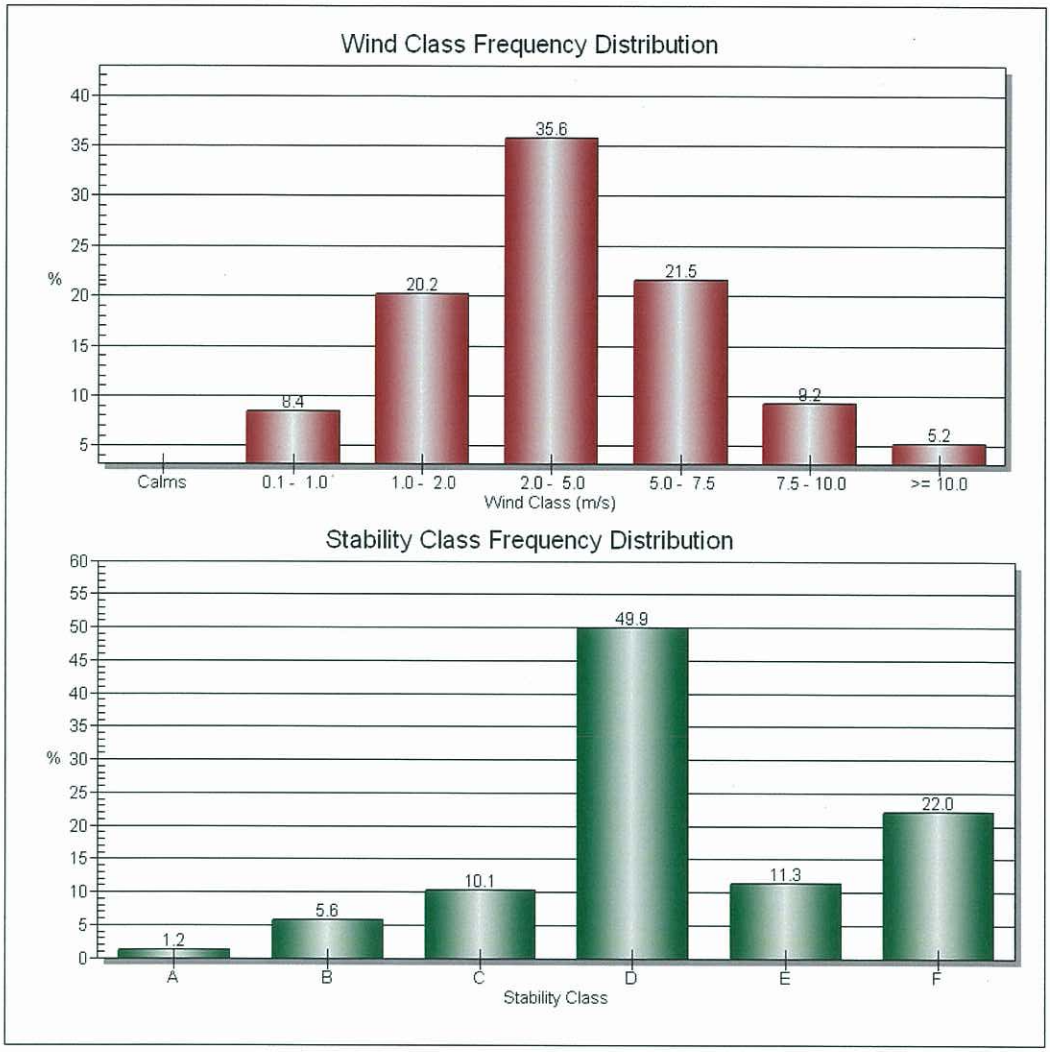
Figure 5 - Annual and Seasonal Wind Roses for Observed Meteorological Data – BoM Tullamarine AWS



APPENDIX E

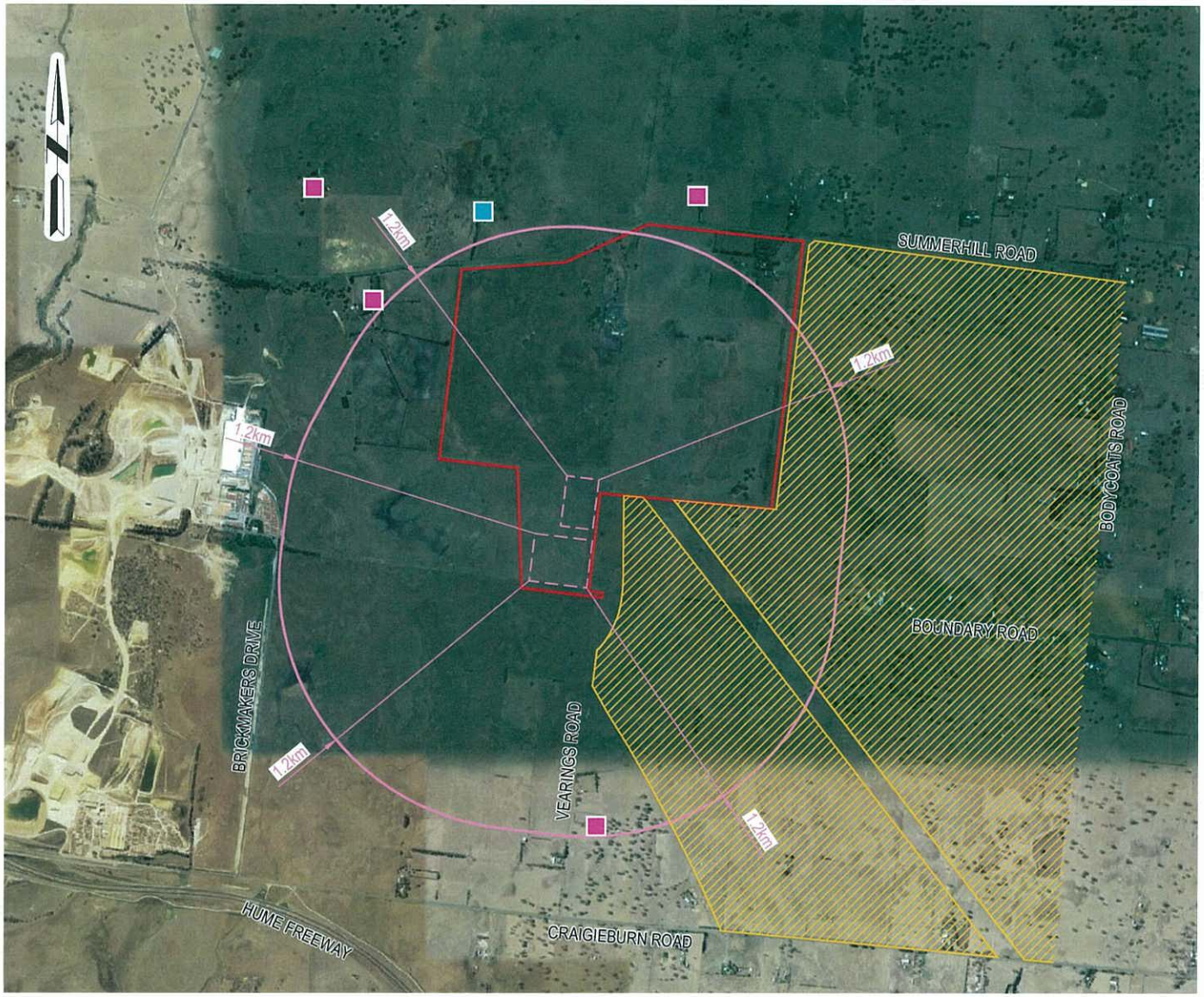
Figure 6 - Wind Speed and Stability Class Frequency Distribution

Figure 6 - Wind Speed and Stability Class Frequency Distribution



APPENDIX F

Figure 7 - Potential Buffer Zones at Wollert



LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PROPOSED POWER STATION LOCATION
- POWER STATION BUFFER ZONE
- EXISTING RESIDENCES IN FARMING ZONE
- EXISTING RESIDENCE IN SPECIAL USE ZONE 4 EARTH AND ENERGY RESOURCES
- RESIDENTIAL AREA PROPOSED IN THE DRAFT GAA NORTH MELBOURNE GROWTH CORRIDOR PLAN

1:30,000

0 600 1,200 1,800m

SITE BOUNDARY SHOWN FROM URBIS PTY LTD FILE: Wollert Power Station Site Boundary.pdf, DATED FEBRUARY 2009 (APPROXIMATE ONLY)
POWER STATION LOCATION OPTIONS SHOWN FROM FILE: Wollert Power Station Options & Buffers.pdf, RECEIVED FROM APA GROUP 02 DECEMBER 2011 (APPROXIMATE ONLY)
RESIDENTIAL ZONING AREAS SHOWN FROM APA GROUP FILE: WollertCS Planning Schemes Detailed.jpg, DATED DECEMBER 2011 AND Wollert Power Station Options & Buffers.pdf, RECEIVED FROM APA GROUP 02 DECEMBER 2011 (APPROXIMATE ONLY)

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CLIENT: APA GROUP				PROJECT: RESPONSE TO GAA				
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CHECKED BY: GE	DATE: 12.12.11							
SCALE: NOT TO SCALE	SHEET SIZE: A4	PROJECT No: 117613152	DOC No: 004	DOC TYPE: R	FIGURE No: F002	REVISION: 0	FIGURE 7	

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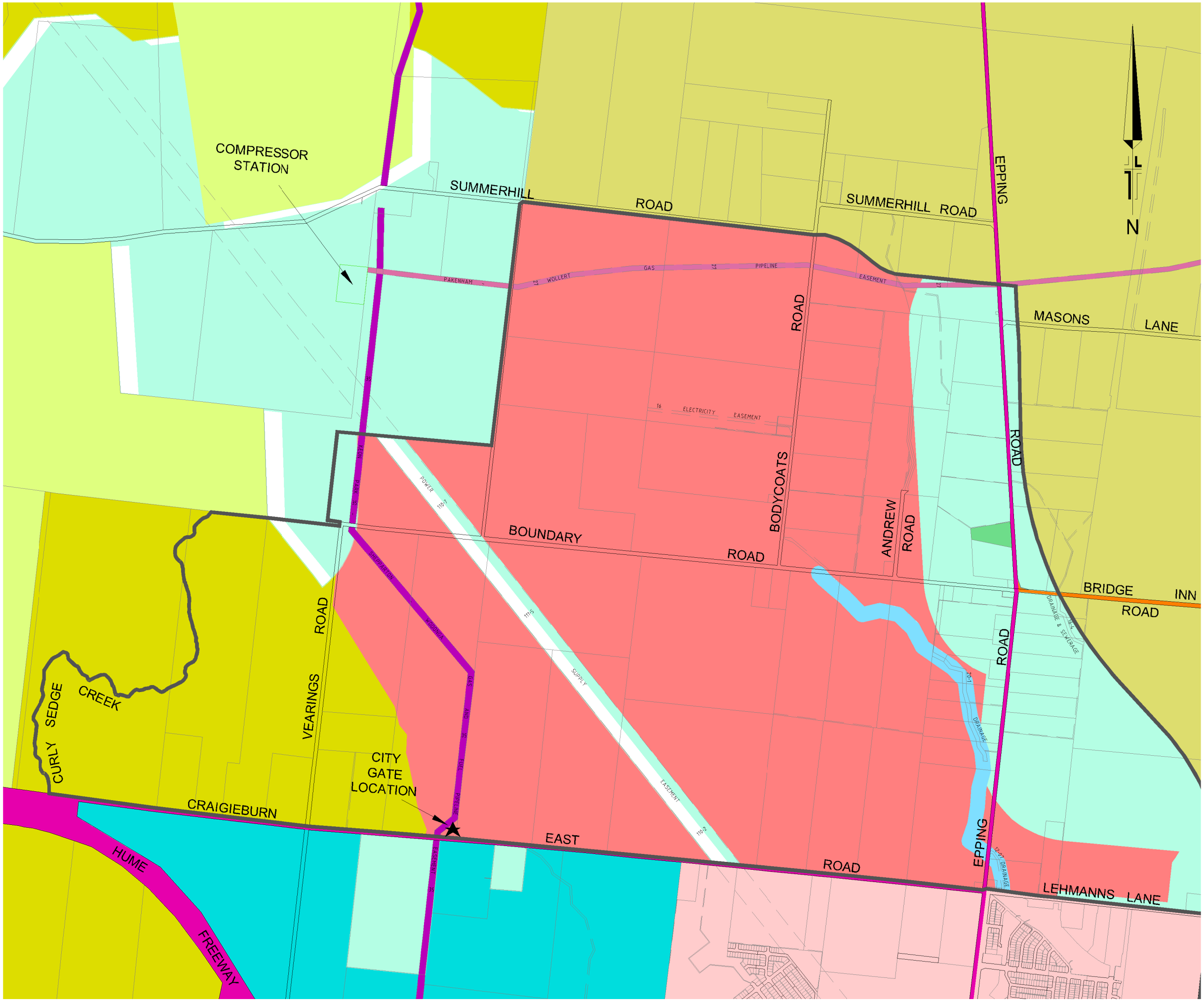
Attachment 8

- Figure 8.1
  Utilities PSP Wollert, APA City Gate location plan



Notations

Power Station Buffer Zone Impact

Total Wollert PSP Area	**1433 ha**
Total 1.2km Buffer Zone	**647 ha**
Buffer Zone within Wollert PSP	273 ha
	19% of PSP

Land Zone 1.2km Buffer Impact (within Wollert PSP)

Total Urban Growth Zone (UGZ)	928 ha
Buffer Zone within UGZ	139 ha
Total Rural Conservation Zone (RCZ)	208 ha
Buffer Zone within RCZ	105 ha
Total Farming Zone (FZ)	47 ha
Buffer Zone within FZ	29 ha

Note: Areas are approximate

Legend

- Proposed Power Station Structure - Supplied by APA Gas Net

Whittlesea City Council Planning Zones

- Public Park & Recreation Zone
- Road Zone Catagory 1
- Road Zone Catagory 2
- Residential 1 Zone
- Green Wedge Zone
- Rural Conservation Zone
- Farming Zone
- Special Use Zone
- Comprehensive Development Zone
- Urban Floodway Zone
- Urban Growth Zone

- Buffer Zone - 1.2km from Power Station Structure
- Keon Park - Shepparton - Wodonga Gas & Fuel Pipeline Easement
- Pakenham - Wollert Gas Pipeline Easement
- Easement
- PSP Boundary

Figure 8.1
Utilities PSP
Wollert ,
APA City Gate Location Plan

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Co-ordinate Datum MGA55	Sheet 1 of 3
Drawing No. 135859-FIGURE 8.1	Version 1
CAD Ref. G:\13\135859\ACAD	
Drawn By JL	Checked By SN Date 15/05/2012

REV	AMENDMENT	APPROVED	DATE

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