



Services Investigation Report Engineering Servicing Advice

Craigieburn West Precinct Structure Plan

Victorian Planning Authority

March 2019



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1 EXECUTIVE SUMMARY

The Victorian Planning Authority (VPA) proposes to create the Craigieburn West Precinct Structure Plan (PSP) enabling development of land along the eastern side of Mickleham Road between Mt Ridley Road to the north, Frontier Avenue / Ambition Drive to the south

Taylors has been engaged by the VPA to undertake an investigation into the location of existing services and determine their ability to service proposed development of the PSP. The investigation included consultation with key service authorities, including Yarra Valley Water, APA Group, AusNet Gas Services, Jemena and NBN Co.

This report has identified that while the existing PSP study area is not fully serviced at present, the adjoining developments to the north, east and south of the PSP are already fully serviced and economical extensions of the key services can be undertaken to ensure the proposed Craigieburn West PSP is fully serviced in the future.

The following table provides a summary of the availability of each of the major services.

Sewerage	Available	Developers to extend from the existing developments to the east
Ocwerage	Available	
		into the PSP area.
Drinking Water	Available	Yarra Valley Water building trunk infrastructure in Mickleham Road,
		south of Craigieburn Road. Developers to extend from the existing
		developments to the east into the PSP area.
Recycled Water	Available	Yarra Valley Water building trunk infrastructure in Mickleham Road,
		south of Craigieburn Road. Developers to extend from the existing
		developments to the east into the PSP area.
Electricity	Available,	Limited supply available from existing developments to the east,
	Limited	however Zone Substation will be required for full development of
	Initial Supply	the PSP. Zone Substation will be funded by Jemena.
Telecommunications	Available	NBN Co will extend the network as required when development
		occurs. Existing Mobile Phone Towers are located within the
		Preinct.
Gas	Available	AusNet building trunk infrastructure in Mickleham Road, south of
		Craigieburn Road. AusNet will extend the network as required
		when development occurs.

It is likely that development of the Craigieburn West PSP will be staged from along the eastern and southern boundary initially, pending the ability to service the land with Electricity from the proposed Craigieburn West Zone Substation. This advice is based upon availability to existing services. It does not preclude Developers from pursuing properties in the north-west corner of the precinct and extending services with bring-forward costs.

Funding of shared water and sewer assets is typically achieved by levies collected by the Water Authority (YVW) and put towards financing trunk infrastructure and Shared Asset projects that are essential to service development areas. These assets are typically programmed by the Authority into staged delivery over a number of years based on anticipated development of the Precinct. Should sections of these shared assets be required by Developers ahead of anticipated program, then the financing costs associated with bringing forward the provision of shared assets would be borne by the Developer.

Construction of shared electricity, gas and telecommunications assets is funded by levies or forecast revenue from usage charges.



Yarra Valley Water has advised that the Craigieburn East PSP study area will be a mandated recycled water supply zone meaning developers will be required to supply a recycled water connection to each new allotment. Class A recycled water is wastewater collected from laundries, sinks, showers that has been treated to a standard that makes it suitable for uses in the home that include washing clothes, watering of gardens, washing of vehicles and flushing of toilets. Yarra Valley Water and Hume City Council also encourage the use of rainwater tanks by its customers.

There are several opportunities within the Craigieburn West PSP to incorporate innovative technologies and sustainable initiatives to assist with Climate Change Mitigation and Adaptation. These including strategies for Urban Cooling, Carbon Storage, Resource Management, Renewable Energy Sources and Power Consumption reduction.

Further consultation with Jemena is to be conducted during the preparation of the Craigieburn West PSP masterplan to determine the location and spatial requirements for the proposed Craigieburn West Zone Substation.



2 INTRODUCTION

It is understood that the Victorian Planning Authority (VPA) proposes to create the Craigieburn West Precinct Structure Plan (PSP) enabling development of land along the eastern side of Mickleham Road between Mt Ridley Road to the north, Frontier Avenue / Ambition Drive to the south. It is required that all of the developable land within the Craigieburn West PSP be provided with essential services such as water, electricity, sewerage, drainage, gas and telecommunications. A services investigation report detailing the availability of these services is required to assist the VPA in understanding any constraints in servicing the PSP and to assist future Developers understand timing and/or cost of service delivery.

3 COMMISSION

Taylors has been engaged by the VPA to undertake an investigation into the location of existing services and determine their ability to service proposed development of the PSP. Accordingly, the objective of this report is to identify existing and future infrastructure servicing requirements within the precinct area and to identify any associated implications that need to be considered during the preparation of the PSP.

This assessment will enable the VPA to plan the future urban structure with greater certainty and identify infrastructure which will be required and should be encouraged within the study area to serve the needs of the local community.

The assessment will include:

- Site description and existing conditions
- Provision of a services plan
- Identify all current service and utility infrastructure
- Identify current capacity of all service and utility infrastructure
- Identify key opportunities and constraints for the provision of all future service and utility infrastructure
- Consider opportunities for innovative approaches to servicing, based on projected land use
- Identify specifications and notional routes through the PSP area for future service and utility infrastructure
- Investigate access to services and recommend how provision of these services can be achieved in the short and long-term
- Consider expected funding arrangements (based on the views of relevant servicing agencies and any relevant principles established by the Essential Services Commission)
- Provide advice on probable staging (relative to service infrastructure location and capacity)
- Address water recycling and reuse practices and identify potential options suitable for the PSP area
- Anticipate location and approximate cost of trunk infrastructure
- Take into account both existing and expected conditions and consider the requirements generated by the future development of the area (i.e. How much land or size of easement is required for particular items of infrastructure?)
- Provide recommendations to assist in the preparation of the PSP
- List issues requiring further investigation at each stage of the development process following finalisation of the PSP
- Support all of the above investigations and advice using maps, plans and documentation, particularly in regard to location of all existing and future service and utility infrastructure and its staging.



4 SITE DESCRIPTION

The Craigieburn West PSP study area has a site area of approximately 600 hectares. An aerial photograph is provided in Figure 1 and a locality plan is provided in Figure 2. The study area is bounded by Mickleham Road to the west, Mt Ridley Road to the north, Frontier Avenue / Ambition Drive to the south, and by the Craigieburn PSP boundary along the eastern edge. The study area interfaces with several exiting developments, including the Trillium Estate on Mt Ridley Road, the Highlands Estate between Mt Ridley Road and Craigieburn Road, the Aston Estate on Craigieburn Road, and the Aspect Estate at Frontier Avenue / Ambition Drive. The Study Area also includes approximately 36.9 hectares of land, south of the Craigieburn West PSP and east of the Aspect East, which forms part of the Greenvale North PSP.



Figure 1 – Aerial Photograph (Google)

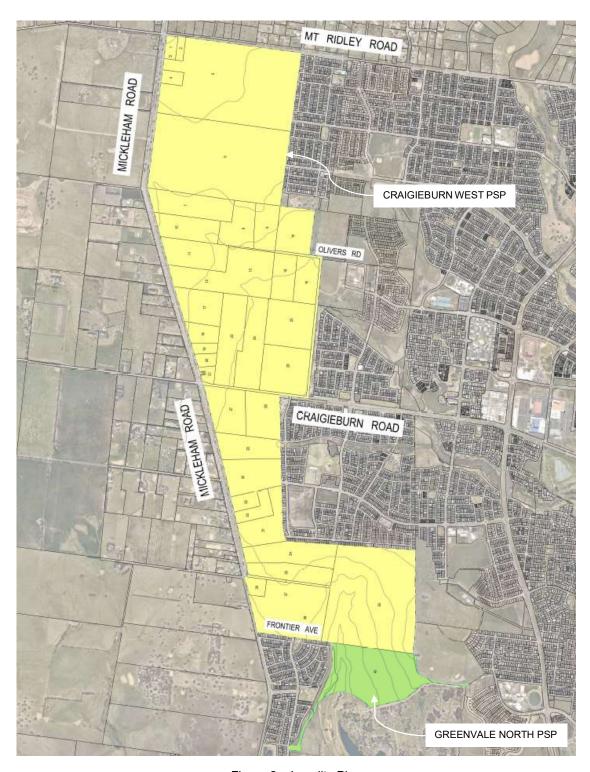


Figure 2 - Locality Plan



5 PROPOSAL

The Craigieburn West PSP study area is in its early stages of planning, however the VPA advises that it will be largely a residential precinct with at least 10% open space (active and passive) and provide appropriate retail, education and community facilities to support the projected population. It is expected that the precinct will generate up to 7,500 new residential allotments.

6 INVESTIGATION:

Our investigation into the availability of services to the above-mentioned development included a desktop and field survey. The desktop survey comprised obtaining existing service information from the following sources:

- Hume City Council
- Yarra Valley Water Authority
- Telstra
- National Broadband Network Co (NBN)
- Opticomm
- APA Group
- AusNet Gas Services
- Jemena
- Melbourne Water
- Land Channel Victoria
- NearMap.com
- Site Visit

7 LIMITATIONS AND ASSUMPTIONS

This investigation has been scoped and undertaken as a desktop study to provide preliminary advice on the anticipated servicing works at the proposed development site. There are limitations on the level of detail that is able to be given due to the nature of this review. Desktop studies such as this are reliant on information that is made available from service authorities, with an assumption that it provides an accurate representation of existing site conditions.



8 FINDINGS & DISCUSSION

8.1 WATER SUPPLY - Potable Water

8.1.1 Existing Services

The responsible authority for potable water supply is Yarra Valley Water.

Yarra Valley Water has provided information on the location of existing potable water main infrastructure which shows an existing 400 mm diameter Polyethylene transfer main in Craigieburn Road that currently terminates at Mickleham Road. There is no potable water main infrastructure, within the study area, on Mickleham Road and Mt Ridley Road, however there is existing potable water main infrastructure in Mickleham Road south of the Craigieburn West PSP study area and within Mt Ridley Road east of the study area. There is also a significant potable water supply network located within the Highlands, Aston, Trillium and Aspect Estates on the eastern and southern boundary of the study area.

8.1.2 Future Servicing Arrangements

Yarra Valley water is currently planning to construct a 300 mm diameter potable water supply main along Mickleham Road, including pressure reducing valve infrastructure, between Frontier Avenue and Craigieburn Road. Yarra Valley Water anticipates that they will complete the construction of this main by the end of 2019.

Future servicing of the Craigieburn West PSP with potable water will rely upon Developers constructing interconnecting mains between the proposed main in Mickleham Road, and the existing infrastructure in Craigieburn Road and Mt Ridley Road. Preliminary planning maps provided in Appendix A show potable water mains running through the Precinct north of Craigieburn Road. These alignments were Yarra Valley Water's supposition of future road alignments in lieu of the Craigieburn West Masterplan. Confirmation of these alignments, and timing of delivery will require confirmation with YVW upon completion of the Craigieburn West PSP Masterplan. All future water mains are to be constructed within road reserves. No dedicated water transfer easements will be required within the precinct.

Yarra Valley Water advises that the adjacent potable water network has been adequately sized to cater for development of the Craigieburn West PSP.

8.1.3 Expected Funding Arrangements

The Essential Services Commission (ESC) specifies how water businesses levy new customer contributions (NCC). Yarra Valley Water applies this levy on a per lot basis. The levies collected by Yarra Valley Water are utilised to fund trunk infrastructure and shared asset projects which are essential to service areas of new development. The Craigieburn West PSP is currently within the Yarra Valley Water "Standard" supply zone meaning that a charge of \$704 will be applied per allotment for potable water. The supply zone and NCC charge is subject to change.

Yarra Valley Water is responsible for funding trunk infrastructure and shared assets. Developers are responsible for providing reticulation assets and temporary reticulation works and the cost to connect the development to the Yarra Valley Water network. Developers are also responsible for the financing costs associated with bringing forward the provision of shared assets and temporary shared works that Yarra Valley Water had programmed to be constructed at a future date. The ESC guidelines determine that Yarra Valley Water may levy a charge that will cover the financing costs associated with bringing forward the provision of Shared Assets. This is referred to as an Incremental Financing Cost charge.

The potable water mains shown on the servicing plan in Appendix A have been identified by Yarra Valley Water as being Shared Assets.



8.1.4 Summary of Outcomes

- Yarra Valley Water will construct a 300 mm diameter potable water supply main along Mickleham Road, including pressure reducing valves, between Frontier Avenue and Craigieburn Road.
- Future servicing of the Craigieburn West PSP with potable water will rely upon Developers
 constructing interconnecting mains between the proposed main in Mickleham Road, and the existing
 infrastructure in Craigieburn Road and Mt Ridley Road.
- Yarra Valley Water will reimburse Developers for construction of shared assets using funds collected
 from new customer contributions. Where shared assets are proposed to be constructed by Developers
 prior to their scheduled delivery, then Developers may be liable for incremental finance costs.
- Yarra Valley Water confirms that existing infrastructure has capacity to supply the precinct.



8.2 WATER SUPPLY – Recycled Water

8.2.1 Existing Services

The responsible authority for recycled water supply is Yarra Valley Water.

Yarra Valley Water has provided information on the location of existing recycled water main infrastructure which shows an existing 400 mm diameter Polyethylene transfer main in Craigieburn Road that currently terminates at Mickleham Road. There is no recycled water main infrastructure within the study area in Mickleham Road and Mt Ridley Road; however, there is existing recycled water main infrastructure in Mickleham Road south of the Craigieburn West PSP study area and within Mt Ridley Road east of the study area. There is also a significant recycled water supply network within the Highlands, Aston, Trillium and Aspect Estates on the eastern and southern boundary of the study area.

8.2.2 Future Servicing Arrangements

Yarra Valley Water has advised that the Craigieburn East PSP study area will be a mandated recycled water supply zone meaning developers will be required to supply a recycled water connection to each new allotment. All future water mains are to be constructed within road reserves. No dedicated water transfer easements will be required within the precinct.

Class A recycled water is wastewater collected from laundries, sinks, showers that has been treated to a standard that makes it suitable for uses in the home that include washing clothes, watering of gardens, washing of vehicles and flushing of toilets.

Yarra Valley Water is currently planning to construct a 300mm diameter recycled water supply main in Mickleham Road, including pressure reducing valve infrastructure, between Frontier Avenue and Craigieburn Road. Yarra Valley Water plans to complete the construction of this main by the end of 2019. Future servicing of the Craigieburn West PSP with recycled water will rely upon Developers constructing interconnecting mains between the proposed main in Mickleham Road, and the existing infrastructure in Craigieburn Road and Mt Ridley Road. Preliminary planning maps provided in Appendix A show potable water mains running through the Precinct north of Craigieburn Road. These alignments were Yarra Valley Water's supposition of future road alignments in lieu of the Craigieburn West Masterplan. Confirmation of these alignments, and timing of delivery will require confirmation with YVW upon completion of the Craigieburn West PSP Masterplan.

Yarra Valley Water and Hume City Council also encourage the use of rainwater tanks by its customers. Similar to recycled water, rainwater can be used for irrigation purposes, flushing of toilets and washing of vehicles. Hume City Council has and Integrated Water Management document and clauses within its planning scheme that provides guidance on the use of rainwater tanks. Yarra Valley Water also provides information on its website which encourages the use of rainwater tanks, among other initiatives, for its customers to save water.

Yarra Valley Water advises that the adjacent recycled water network has been adequately sized to cater for development of the Craigieburn West PSP.

8.2.3 Expected Funding Arrangements

The Essential Services Commission (ESC) specifies how water businesses levy new customer contributions (NCC). Yarra Valley Water applies this levy on a per lot basis. The levies collected by Yarra Valley Water is then put towards financing trunk infrastructure and Shared Asset projects that are essential to service development areas. The Craigieburn West PSP is currently within the Yarra Valley Water "Standard" supply zone meaning that a charge of \$704 will be applied per allotment for recycled water. The supply zone and NCC charge is subject to change.

Yarra Valley Water is responsible for trunk infrastructure and Shared Assets. Developers are responsible for providing reticulation assets and temporary reticulation works and the cost to connect the development to the Yarra Valley Water network. Developers are also responsible for the financing costs associated with bringing



forward the provision of shared assets and temporary shared works that Yarra Valley Water had programmed to be constructed at a future date. The ESC guidelines determine that Yarra Valley Water may levy a charge that will cover the financing costs associated with bringing forward the provision of Shared Assets. This is referred to as an Incremental Financing Cost charge. The recycled water mains shown on the servicing plan in Appendix A have been identified by Yarra Valley Water as being Shared Assets.

8.2.4 Summary of Outcomes

- Yarra Valley Water has advised that the Craigieburn East PSP study area will be a mandated recycled water supply zone.
- Yarra Valley Water will construct a 300 mm diameter recycled water supply main along Mickleham Road, including pressure reducing valves, between Frontier Avenue and Craigieburn Road.
- Future servicing of the Craigieburn West PSP with recycled water will rely upon Developers
 constructing interconnecting mains between the proposed main in Mickleham Road, and the existing
 infrastructure in Craigieburn Road and Mt Ridley Road.
- Yarra Valley Water will reimburse Developers for construction of shared assets using funds collected from new customer contributions. Where shared assets are proposed to be constructed by Developers prior to their scheduled delivery, then Developers may be liable for incremental finance costs.
- Yarra Valley Water confirms that existing infrastructure has capacity to supply the precinct.



8.3 SEWERAGE

8.3.1 Existing Services

The responsible authority for sewer reticulation is Yarra Valley Water. Yarra Valley Water has confirmed that there are currently no reticulation sewer assets within the Craigieburn West PSP study area, however there is a substantial reticulation sewer network on the eastern and southern boundaries of the precinct that will service the future PSP.

There is a 300 mm diameter sewer and 225 mm diameter sewer that can be extended into the parcels at the corner of Mickleham Road and Mt Ridley Road from the Trillium Estate. There is 525 mm diameter sewer and 300 mm diameter sewer that can be extended into the parcels to the north of Craigieburn Road from the Highlands Estate. There is a 375 mm diameter sewer that can be extended into the parcels at the corner of Mickleham Road and Craigieburn Road from the Aston Estate, and there is a 375 mm diameter sewer and 300 mm diameter sewer in the Aspect Estate that can be extended into the parcels north of Frontier Avenue / Ambition Drive.

8.3.2 Future Servicing Arrangements

Future servicing of the Craigieburn West PSP with reticulated sewer will rely upon Developers extending the existing sewer mains from the adjacent developments described above into the precinct. All new sewers can be routed along road reserves or within easements along drainage reserves or through allotments. Reticulation sewer easements are typically 2.5 to 3.5 metres wide. All new sewers within the Craigieburn West PSP are to be gravity sewers and it is very unlikely that sewer pump stations will be required. Yarra Valley Water advises that the downstream sewer network has been adequately sized to cater for development of the Craigieburn West PSP.

8.3.3 Expected Funding Arrangements

The Essential Services Commission (ESC) specifies how water businesses levy new customer contributions (NCC). Yarra Valley Water applies this levy on a per lot basis. The levies collected by Yarra Valley Water is then put towards financing trunk infrastructure and Shared Asset projects that are essential to service development areas. The Craigieburn West PSP is currently within the Yarra Valley Water "Standard" supply zone meaning that a charge of \$704 will be applied per allotment for sewer supply. The supply zone and NCC charge is subject to change.

Yarra Valley Water is responsible for trunk infrastructure and Shared Assets. Developers are responsible for providing reticulation assets and temporary reticulation works and the cost to connect the development to the Yarra Valley Water network. Developers are also responsible for the financing costs associated with bringing forward the provision of shared assets and temporary shared works that Yarra Valley Water had programmed to be constructed at a future date. The ESC guidelines determine that Yarra Valley Water may levy a charge that will cover the financing costs associated with bringing forward the provision of Shared Assets. This is referred to as an Incremental Financing Cost charge. The sewer mains shown on the servicing plan in Appendix B have been identified by Yarra Valley Water as being Shared Assets.

8.3.4 Summary of Outcomes

- Yarra Valley Water has confirmed that there are currently no reticulation sewer assets within the Craigieburn West PSP study area, however there is a substantial reticulation sewer network on the eastern and southern boundaries of the precinct that will service the future PSP.
- Future servicing of the Craigieburn West PSP with sewerage will rely upon Developers extending existing sewer mains into the Craigieburn West PSP area.
- Yarra Valley Water will reimburse Developers for construction of shared assets using funds collected from new customer contributions. Where shared assets are proposed to be constructed by Developers prior to their scheduled delivery, then Developers may be liable for incremental finance costs.
- Yarra Valley Water confirms that existing infrastructure has capacity for expected sewerage volume generated from the precinct.



8.4 ELECTRICITY

8.4.1 Existing Services

Jemena is the responsible authority for the provision of electricity supply to the Craigieburn West PSP study area. The study area is currently serviced by a 22-kV feeder network predominately supplied from the Coolaroo and Somerton Zone Substations. The existing 22-kV overhead feeders in Mickleham Road will be unlikely support full development of the Craigieburn West PSP, however some development could be supported by existing infrastructure within developments along the eastern boundary of the study area.

Furthermore, AusNet Electricity Services has a 66 kV sub-transmission overhead line in Mickleham Road which provides electricity supply to Kalkallo and Beveridge.

Existing electrical infrastructure and potential Craigieburn West zone substation sites have been identified on the Electrical Supply plan in Appendix C.

8.4.2 Future Servicing Arrangements

Jemena have advised that the Craigieburn West PSP will require a Zone Substation, ideally located on Mickleham Road adjacent to Mt Ridley Road or Craigieburn Road. It is anticipated that the Zone Substation will require an area of 0.5 hectares with typical dimensions of 50 metres by 100 metres. It is likely that a new 66-kV line will be required to supply the proposed zone substation, and the existing 22-kV feeders within Mickleham Road would require augmentation to ensure supply demands within the study area can be met. It is expected that augmented powerlines will remain with existing road reserves and no transmission or subtransmission easements through the precinct will be required.

Jemena have advised that the lead time on the Craigieburn West Zone Substation would likely be 3 to 5 years to enable appropriate network studies to be conducted, acquisition of a suitable site, and for the design and delivery of the infrastructure.

8.4.3 Expected Funding Arrangements

Zone substations and sub-transmission network augmentation would likely be funded by Jemena as part of the shared upstream network augmentation. Out of sequence upgrades to the 22kV feeder network may incur cost to the Developer, however this cannot be confirmed until an application is made.

8.4.4 Summary of Outcomes

- The study area is currently serviced by a 22-kV feeder network predominately supplied from the Coolaroo and Somerton Zone Substations.
- The existing 22-kV overhead feeders in Mickleham Road will be unlikely support full development of the Craigieburn West PSP, however some development could be supported by existing infrastructure within developments along the eastern boundary of the study area.
- Jemena have advised that the Craigieburn West PSP will require a Zone Substation, ideally located
 on Mickleham Road adjacent to Mt Ridley Road or Craigieburn Road. It is likely that a new 66-kV
 line will be required to supply the proposed zone substation, and the existing 22-kV feeders within
 Mickleham Road would require augmentation to ensure supply demands within the study area can
 be met.
- Jemena have advised that the lead time on the Craigieburn West Zone Substation would likely be 3
 to 5 years to enable appropriate network studies to be conducted, acquisition of a suitable site, and
 for the design and delivery of the infrastructure.



8.5 TELECOMMUNICATION SERVICES

8.5.1 Existing Services

The Craigieburn West PSP study area is currently serviced by the Telstra copper network in Mickleham Road, Craigieburn Road and Mt Ridley Road. This network provides telecommunications connectivity to the existing rural residential lots along Mickleham Road, and to the small Mickleham township at the corner of Mt Ridley Road. There is also an Optus network conduit in coming from the south along Mickleham Road and into Craigieburn Road and Whites Lane, servicing a mobile phone tower property 25.

The NBN network has a fibre optic cable in Mickleham Road, feeding from the south, servicing the Aitkin Hill Conference Centre. Furthermore, there is already a significant NBN network in the developments that abut the Craigieburn West PSP boundary including the Aspect Estate, Aston Estate and Highlands Estate.

The Botanical Estate and the Trillium Estate on Mt Ridley Road are to be connected to the Opticomm optic fibre network.

Additionally, there are several Mobile Phone towers located within the Craigieburn West PSP study area. These locations have been identified on the Telecommunications Plan provided in Appendix D. Electrical and telecommunications cables will service each of the existing towers however these are not shown on the Plan provided in Appendix D. Discussion with Telstra has indicated that cost to relocate the phone towers and associated infrastructure is expected to cost between \$1-2 Million and where there are multiple service providers using the tower these costs can be higher. Further, relocation of the towers would not be acceptable if it resulted in a loss of network coverage or quality. It is Taylors recommendation that the phone towers be retained in their current location unless there is a strong case for relocation.

8.5.2 Future Servicing Arrangements

NBN Co has confirmed that due to proximity of the existing NBN network in Aspect, Aston and Highland Estates, there is no foreseeable impediment to expansion of the network to include the Craigieburn West PSP. It is likely that fixed line service, such as Fibre to the Premises (FTTP) technology would be made available to new developments within the future PSP. As the NBN network will be likely to service the Craigieburn West PSP, the existing Telstra copper network will not require augmentation.

All NBN conduits and cabling is to be routed along existing and proposed precinct road reserves. No dedicated easements through the precinct will be required.

8.5.3 Expected Funding Arrangements

The developer's responsibilities will include:

- Design of pit and pipe infrastructure to NBN's specifications and standards and submit to NBN for review prior to installation
- Installation of pit and pipe infrastructure to NBN's specifications and standards
- Payment of NBN deployment contributions in accordance with the Telecommunications Infrastructure
 in New Developments (TIND) policy. Developer contribution charges only apply to developers and
 builders. It is a flat rate charged for:
 - Single Dwelling Units (SDUs): \$600 inc. GST per premises
 - Multi Dwelling Units (MDUs): \$400 inc. GST per premises
- Payment of Backhaul contributions if applicable

8.5.4 Summary of Outcomes

- NBN Co has confirmed that due to proximity of the existing NBN network in Aspect, Aston and Highland Estates, there is no foreseeable impediment to expansion of the network to include the Craigieburn West PSP.
- The precinct contains 3 mobile phone towers. It is recommended that the phone towers be retained in their current location.



8.6 GAS

8.6.1 Existing Servicing

APA GasNet is the responsible authority for gas transmission pipelines with Victoria and AusNet Gas Services is responsible for the gas distribution network. Natural Gas is conveyed through transmission pressure pipelines at pressures greater than 2,500 kPa. The high gas pressures are reduced at specific locations along the transmission network, known as City Gates. The City Gate includes a custody transfer meter and gas regulator heater. The custody transfer meter allows APA to monitor gas volumes extracted from the transmission pipeline. The gas regulator heater is used to regulate temperature fluctuations that occur due to pressures changes. Once the gas pressures have been reduced, they are transferred to the gas distribution network which supplies customers.

There are no transmission pipelines within the Craigieburn West PSP study area. Furthermore, there is currently no distribution pipelines within the study area, however there is distribution infrastructure in Mickleham Road south of the PSP study area, and in Craigieburn Road and Mt Ridley Road east of the PSP study area. Existing distribution gas infrastructure is shown in Appendix E.

8.6.2 Future Servicing Arrangements

AusNet Gas Services is currently preparing to construct a 180 mm diameter Polyethylene main in Mickleham Road, between Destination Drive and Craigieburn Road, to ensure pressure demands can be met within the Craigieburn growth area. AusNet estimates construction of this main to commence in the first quarter of 2019. This main will also provide initial supply to the southern portion of the Craigieburn West PSP and is expected to be completed before the end of 2019.

To ensure full coverage of the Craigieburn West PSP, a 180 mm diameter main will be required in Mickleham Road between Craigieburn Road and Mt Ridley Road. The timing of this main will be dependent on development in the north of the study area and a development application to AusNet Gas Services. All distribution pressure gas mains are to be routed along with existing and future roads within the precinct. No dedicated easements for gas transmission or distribution is anticipated. At the time of writing this report, AusNet Gas Services does not anticipate the need for City Gate infrastructure to be located within the PSP study area. AusNet Gas Services confirms that with these works the gas supply to the proposed Craigieburn West PSP will be sufficient.

8.6.3 Expected Funding Arrangements

The principles for determining the charge to be paid by a Developer for obtaining connection to the distribution system is dependent on the type of tariff (V or D) to which the development would be assigned once connected.

An economic feasibility test is applied which calculates the revenue anticipated from the provision of the natural gas to the development and the anticipated cost associated with serving that development. The period of analysis for Tariff V Customers is 20 years for domestic customers and 15 years for commercial and industrial customers. Any deficit from the application of the economic feasibility test between cost and revenue would result in financial contribution from the Developer. The economic feasibility test is not used for Tariff D customers as all capital costs of installing the infrastructure and ongoing maintenance costs are borne by AusNet.

The above principals will also be utilised for any new subdivisions with an economic feasibility test over a 10-year period. Any project shortfall is required to be paid up front prior to works commencing.



8.6.4 Summary of Outcomes

- There are no transmission pipelines within the Craigieburn West PSP study area.
- There are no distribution pipelines within the study area, however there is distribution infrastructure in Mickleham Road south of the PSP study area, and in Craigieburn Road and Mt Ridley Road east of the PSP study area.
- AusNet Gas Services is currently preparing to construct a 180 mm diameter Polyethylene main in Mickleham Road, between Destination Drive and Craigieburn Road, to ensure pressure demands can be met within the Craigieburn growth area. This main will also provide initial supply to the southern portion of the Craigieburn West PSP.
- To ensure full coverage of the Craigieburn West PSP, a 180 mm diameter main will be required in Mickleham Road between Craigieburn Road and Mt Ridley Road.



9 STAGING

It is anticipated that initial development of the Craigieburn West PSP will occur along the eastern boundary of the PSP area where there is access to existing services through the adjoining developments including Trillium Estate on Mt Ridley Road, Highlands Estate between Mt Ridley Road and Craigieburn Road, Aston Estate on Craigieburn Road, and Aspect Estate at Frontier Avenue / Ambition Drive. Development along Mickleham Road, south of Craigieburn Road is also feasible in the initial development of the precinct. It is expected that development in the north-west corner of the precinct will be the last area within the PSP to be developed.

This staging advice is based on availability of existing services and the view to extend services in accordance with authority timing. This does not preclude Developers from pursuing properties in the north-west corner of the precinct and extending services with bring-forward costs.

10 OPPORTUNITIES AND CONSTRAINTS

There are several opportunities within the Precinct for developers to work together to enable construction of trunk infrastructure through multiple property titles. This will expediate the delivery of allotments that are further from existing sewer and drainage discharge locations.

The main constraint to development within the Craigieburn West Precinct Structure Plan will be the availability of electricity supply. The surrounding network will be able to support initial development, however full development of the precinct will require the construction of the Craigieburn West zone substation on Mickleham Road. The exact number of allotments that can be supported by the existing electricity network is not known at the time of writing this report.

Another constraint that will need to be considered when master-planning occurs for the precinct, is the location of the three mobile phone towers that are within the Craigieburn West PSP study area. It should also be noted that it is unlikely that it will be financially feasible to relocate the existing towers.

The PSP can address these constraints by engaging with Jemena and Telstra to ensure that spatial requirements of the Zone Substation and Mobile Phone Towers, including any buffer distances, are fully understood and can appropriately incorporated into the Precinct Masterplan.

Based on consultation with other service authorities, there are no constraints to servicing the Craigieburn West PSP with Potable and Recycled Water, Sewerage, Gas or Telecommunication services.

11 SERVICING INNOVATION & SUSTAINABILITY OPPORTUNITIES

There are several opportunities for innovative servicing strategies and sustainability outcomes within the Craigieburn West PSP. These range from established strategies such as reticulation of recycled water and integrated water management, to innovative technologies such as solar power generation and urban cooling strategies.

A number of Integrated Water Management (IWM) strategies and project have been completed or are underway which should inform the preparation of the Craigieburn West PSP. The PSP is within the Merri Creek Upper Sub-Catchment of Melbourne Water's Healthy Waterways Strategy (2018). This strategy sets out a long-term vision for its nine key values while also specifying stormwater harvesting, infiltration and directly connected imperviousness targets as part of a suite of objectives designed to drive the industry beyond the normally accepted standards.

Yarra Valley Water has recently commenced the Upper Merri Creek IWM Plan project which should be considered throughout the formation of the Craigieburn West PSP to inform servicing innovation and sustainability opportunities.



11.1 Non-Drinking Water & Urban Cooling

Yarra Valley Water has confirmed that the Craigieburn West PSP will be a mandated recycled water supply zone. This will require all developments to install reticulated recycled water and provide connections to each allotment. The installation of Recycled Water however can be further utilised to enhance Urban Cooling. Urban Heat Island effect (UHI) occurs when an urban area is significantly warmer than rural environment due to human activities and development. Over-night temperatures are also higher as an effect of UHI as heat is trapped buildings, roads and carparks for example. Urban Cooling is one strategy that is being implemented globally to combat Urban Heat Island effects. Release of water vapour via transpiration combined with increased tree canopy coverage plays an important role in reducing Urban Heat Island effect.

The use of non-drinking water for irrigation and increased tree planting can aid Urban Cooling by providing shade and moist environments that improve thermal comfort. Increased tree canopy coverage in open spaces and along roadways, supported by Water Sensitive Urban Design, along with passive irrigation of landscaped areas and open spaces can reduce the Urban Thermal Climate Index, a measure of human thermal comfort, by as much as 10 degrees Celsius. The PSP can support Urban Cooling initiatives by increasing density of tree planting and canopy coverage in open spaces and irrigation through use of non-drinking water or stormwater harvesting. If this is to occur the PSP will need to set specific and measurable standards for the provision of trees in streetscapes including the prioritisation of tree planting over infrastructure services, particularly within in nature strips on narrow roads.

11.2 Carbon Storage

Increased tree planting to improve canopy coverage has an important secondary feature - Carbon Sequestration. Carbon sequestration is the capture and long-term storage of carbon dioxide. Release of Carbon Dioxide into the atmosphere through burning of fossil fuels is the leading cause of Climate Change. Carbon Sequestration seeks to remove Carbon Dioxide from the atmosphere by enhancing storage capabilities of soils, trees and vegetation. Carbon Sequestration from revegetation and mass plantings can provide a significant short-term contribution to Climate Change Mitigation. Longer-term, however, additional strategies are required to reduce reliance on fossil fuels and over-use of natural resources. The PSP can support Carbon Sequestration by increasing density of planting in landscaped areas and in public and active open spaces.

11.3 Resource Management

One strategy to reduce over-use of natural resources, that has been adopted by many Victorian Council's, including Hume City Council, is Climate Change Adaptation. Climate Change Adaption seeks to increase resilience to Climate Change impacts. Hume City Council has already taken steps in this area by using drought resistant turfs for sports grounds, irrigation management and use of non-potable sources of water. Additionally developers should seek to balance earthworks throughout their estates to ensure that fill resources are kept within urban areas and balanced within the PSP, and not dumped into green wedge zones or carted away to landfill.

Other strategies that could be implemented within the Craigieburn West PSP is the use of recycled products in road pavement construction. Studies supported by Sustainability Victoria have shown the use of recycled road pavement materials reduce impact on the environment through efficient use of extractive industries, reduced waste to landfill (and increased life of local landfill facilities) and reduce energy required to produce pavement construction materials as recycled products are less energy intensive to produce than quarry materials. Hume City Council can support these initiatives by encouraging developers to use recycled road construction products.

11.4 Renewable Energy Sources

Long-term Climate Change Mitigation relies on reduced reliance on the burning of fossil fuels. Victoria has a heavy reliance on coal fired power generation which is a large producer of carbon emissions. To reduce carbon emissions there must be a concerted effort to move away from fossil fuel power generation and embrace 'green' power generation options, such as wind, hydro or solar. The Victorian Climate Change Act



2017 responds to this challenge by establishing a legislative framework to drive action to achieve a zero-net-emissions, climate-resilient, Victoria by 2050. The aim of the Zero Net Emissions is to balance carbon emissions with carbon removal, either through offsetting or elimination of carbon emissions altogether. Several initiatives that can eliminate carbon emissions are discussed below.

An industry 'rule of thumb' is to allow 3 to 5 kVA per dwelling when estimating potential peak loads for a new development site. Following this rule, the peak load require by the Precinct would be approximately 20 to 30 Megawatts based on 7,500 new dwellings, excluding town centres and other community buildings. To put this into perspective, the Wonthaggi Wind Farm produces 12 Megawatts of electrical power from 6 turbines at peak generation. Similarly, the Gannawarra Solar Farm near Kerang, Victoria, produces 50 Megawatts of electrical power however covers an area of more than 130 hectares.

To supply the anticipated peak loads for the Craigieburn West Precinct would require 15 or more equivalent wind turbines as at the Wonthaggi Farm, or a Solar Facility covering a minimum of 50 hectares which in an Urban environment may be difficult to acquire. A more efficient use of space for a precinct of this size would be to encourage the use of a 'Virtual Power Plant'.

A Virtual Power Plant (VPP) delivers energy supply by installing rooftop solar panels and battery storage systems across the precinct, and then using technology to link them so they can be controlled remotely by the electricity distributor (Jemena). This approach is currently being trialled in South Australia with 1,110 SA Housing Trust properties being installed with 5kW solar panel and battery storage systems. Electricity from the installed solar and battery system provides electricity for the house on which it is installed. Any energy generated by the system that is not used by the household will be dispatched to the grid. The dispatched energy will be centrally controlled to support the needs of the grid, providing additional energy to the rest of the network when it is needed.

A well designed solar electric system on a residential dwelling can generate more electricity than they use and when combined with battery storage can become self-sufficient. Extending this further, dwellings can go gas free, eliminating gas bills and significantly reducing energy use and greenhouse gas emissions.

11.5 Power Consumption

While green power generation is one way to reduce carbon emissions, an alternative approach is to reduce power consumption. Urban Design Guidelines for development within the Precinct should encourage the use of energy efficient building materials, insulation and LED lighting as an example. Although Jemena is an Electricity Distributor – they provide the infrastructure necessary to transmit electricity from power stations to end users such as homes and businesses - they do not generate electricity and as such cannot control production of green electricity. Jemena is however investigating ways or reducing energy consumption within its distribution area.

Jemena, in conjunction with the Australian Renewable Energy Agency (ARENA), have commissioned a trail program that allows for remote-control of air conditioner units. The premise of this program is that Jemena can control the temperature of a participant's air conditioner through a central control system. On days of high electricity usage, typically on days with high over-night temperatures, air conditioning units connected to the system can be adjusted remotely by Jemena, increasing the temperature setting by 2 or 3 degrees. This small increase in temperature can have a large impact on overall power consumption throughout the network. It is envisaged that this system can be applied to other home appliances such as electric hot water systems for example. These programs can be incentivised by reductions to participants power bills and rebates on purchase of appliances.



Building material selection is another major factor in reduction of residential energy consumption. Double glazed windows can reduce heat losses through a window by up to 50% when compared to traditional single glazed windows. Insulating ceilings, walls and floors can save as much as 45% to heating and cooling costs. Draught proofing and controlled ventilation can also reduce winter heat loss by up to 25%. Solar absorption through roofing material and colour can also play a large role on temperature of the roof cavity during summer days. The selection of lighter colours and smoother textures on the roofing material can reduce solar absorption. Developers should be encouraged to adopt energy efficient construction through the implementation of these practices in their design guidelines for their developments.

12 FURTHER INVESTIGATION

Further consultation with Jemena will be required as the Craigieburn West PSP masterplan is prepared. Jemena will need to advise the VPA of the location for the proposed Craigieburn West Zone Substation, and the spatial requirements. Further, it would be beneficial to developers and staging of the precinct if Jemena were able to advise of the existing electrical capacity in their network, and the estimated number of allotments that can be serviced by the existing network, and the trigger for the construction of the Craigieburn West Zone Substation.

It is also recommended that the VPA consult further with Telstra regarding the relocation opportunities for the three mobile phone towers that are within the Craigieburn West PSP. While it may be financially feasible to for the PSP to relocate one or all of these towers, Telstra can ultimately decline to relocate these towers if there would be an impact to network coverage or quality.



13 CONCLUSION

The Victorian Planning Authority (VPA) proposes to create the Craigieburn West Precinct Structure Plan (PSP) enabling development of land along the eastern side of Mickleham Road between Mt Ridley Road to the north, Frontier Avenue / Ambition Drive to the south.

The Craigieburn West PSP study area is currently not fully serviced, however the adjoining developments in Mt Ridley Road, Craigieburn Road and south of the precinct in Mickleham Road have access to all essential services and can be readily extended into the PSP.

The Service Authorities for Potable Water, Recycled Water, Sewerage, Gas and Telecommunications have advised that the existing service networks adjacent to the study area have sufficient capacity to service the proposed development of the PSP. These services are to be extend into the Craigieburn West PSP as required by development.

Jemena, who are the Authority for distribution of electricity to the Precinct have advised that supply is currently limited, and full development of the PSP will require the construction of the Craigieburn West Zone Substation.

The location and size of the proposed substation and the location of existing mobile phone towers within the precinct are constraints that need to be considered by the Precinct Masterplan.

The Essential Services Commission (ESC) specifies how Yarra Valley Water levies new customer contributions (NCC) to developers. The levies collected by Yarra Valley Water are utilised to fund trunk infrastructure and Shared Asset projects that are essential to service development areas. Developers are also responsible for the financing costs associated with bringing forward the provision of shared assets that Yarra Valley Water had programmed to be constructed at a future date.

AusNet Gas Services determine the charge to be paid by a customer for obtaining connection to the distribution system by the type of tariff to which that customer would be assigned once connected. The economic feasibility test refers to revenue anticipated from the provision of the gas service to the customer and the cost anticipated associated with serving that customer.

NBN Co levies deployment contributions, in accordance with the Telecommunications Infrastructure in New Developments (TIND) policy, which is payable by the developer.

It is anticipated that initial development of precinct will occur along the eastern boundary of the PSP area where there is access to existing services through the adjoining developments. It is expected that development in the north-west corner of the precinct will be the last area within the PSP to be developed. This advice is based upon availability to existing services. It does not preclude Developers from pursuing properties in the north-west corner of the precinct and extending services with bring-forward costs.

Yarra Valley Water has advised that the Craigieburn East PSP study area will be a mandated recycled water supply zone meaning developers will be required to supply a recycled water connection to each new allotment. Class A recycled water is wastewater collected from laundries, sinks, showers that has been treated to a standard that makes it suitable for uses in the home that include washing clothes, watering of gardens, washing of vehicles and flushing of toilets. Yarra Valley Water and Hume City Council also encourage the use of rainwater tanks by its customers.

There are several opportunities within the Craigieburn West PSP to incorporate innovative technologies and sustainable initiatives to assist with Climate Change Mitigation and Adaptation. These including strategies for Urban Cooling, Carbon Storage, Resource Management, Renewable Energy Sources and Power Consumption reduction.



It is recommended that further consultation with Jemena and Telstra be conducted during the preparation of the Craigieburn West PSP masterplan. Jemena will need to advise the VPA of the location for the proposed Craigieburn West Zone Substation, and the spatial requirements. Further, it would be beneficial to developers and staging of the precinct if Jemena were able to advise of the existing electrical capacity in their network, and the estimated number of allotments that can be serviced by the existing network, and the trigger for the construction of the Craigieburn West Zone Substation. Telstra will need to advise the VPA of the potential for relocation of existing phone towers which will ultimately be based upon maintaining current network coverage and quality.

This report comprises 33 pages and should not be reproduced except in full.

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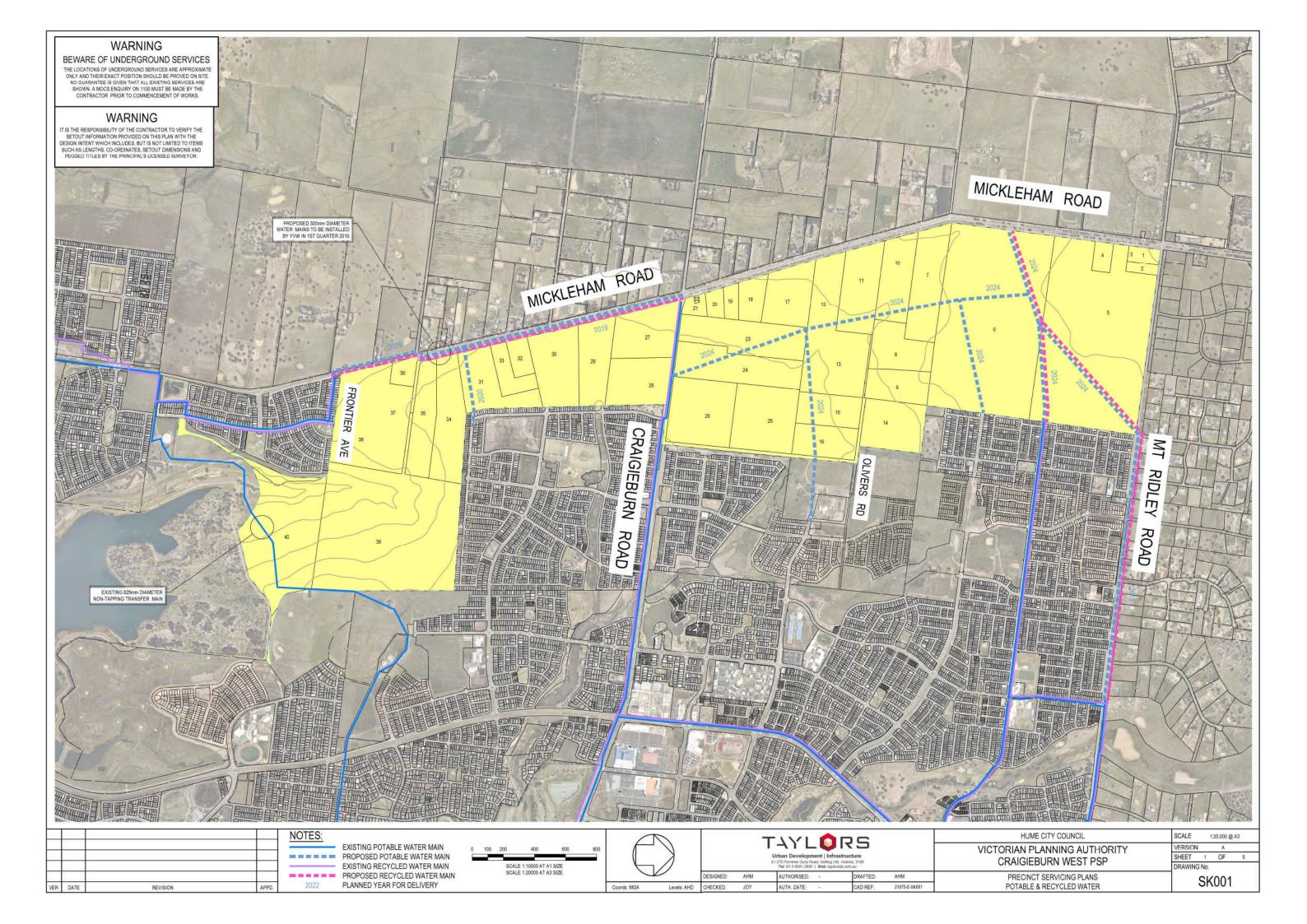
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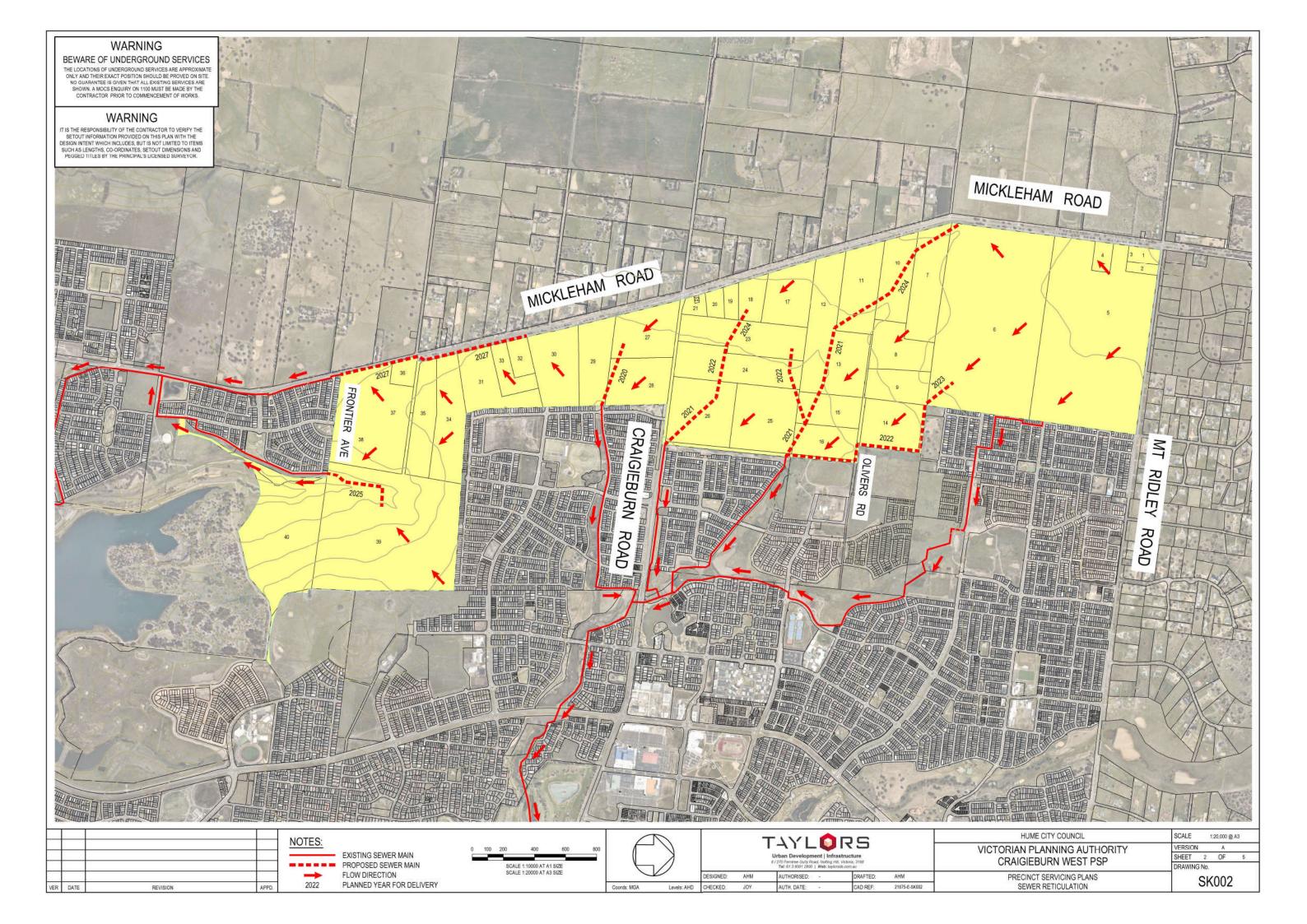


14 APPENDIX A - WATER SUPPLY



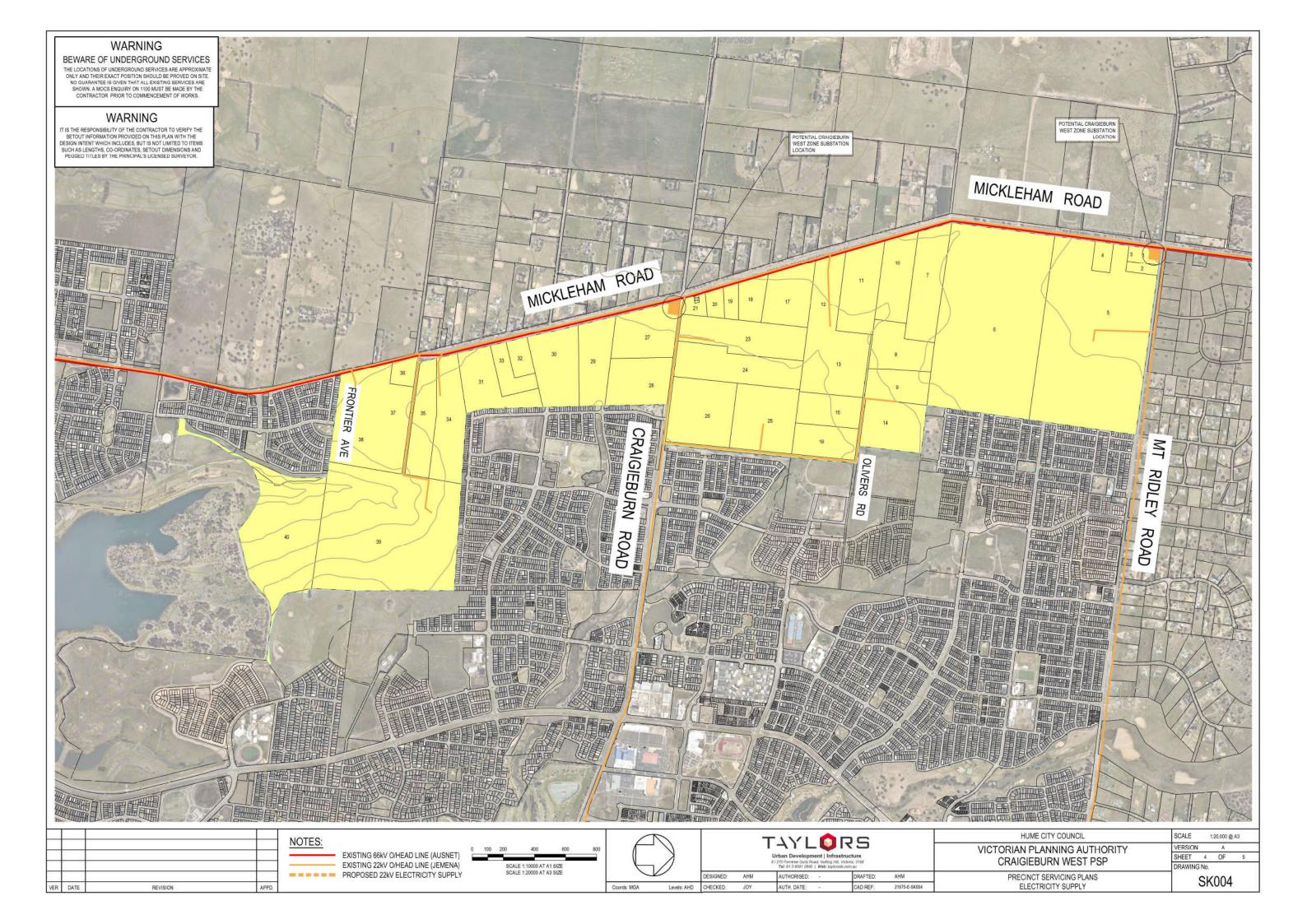


15 APPENDIX B - SEWER RETICULATION



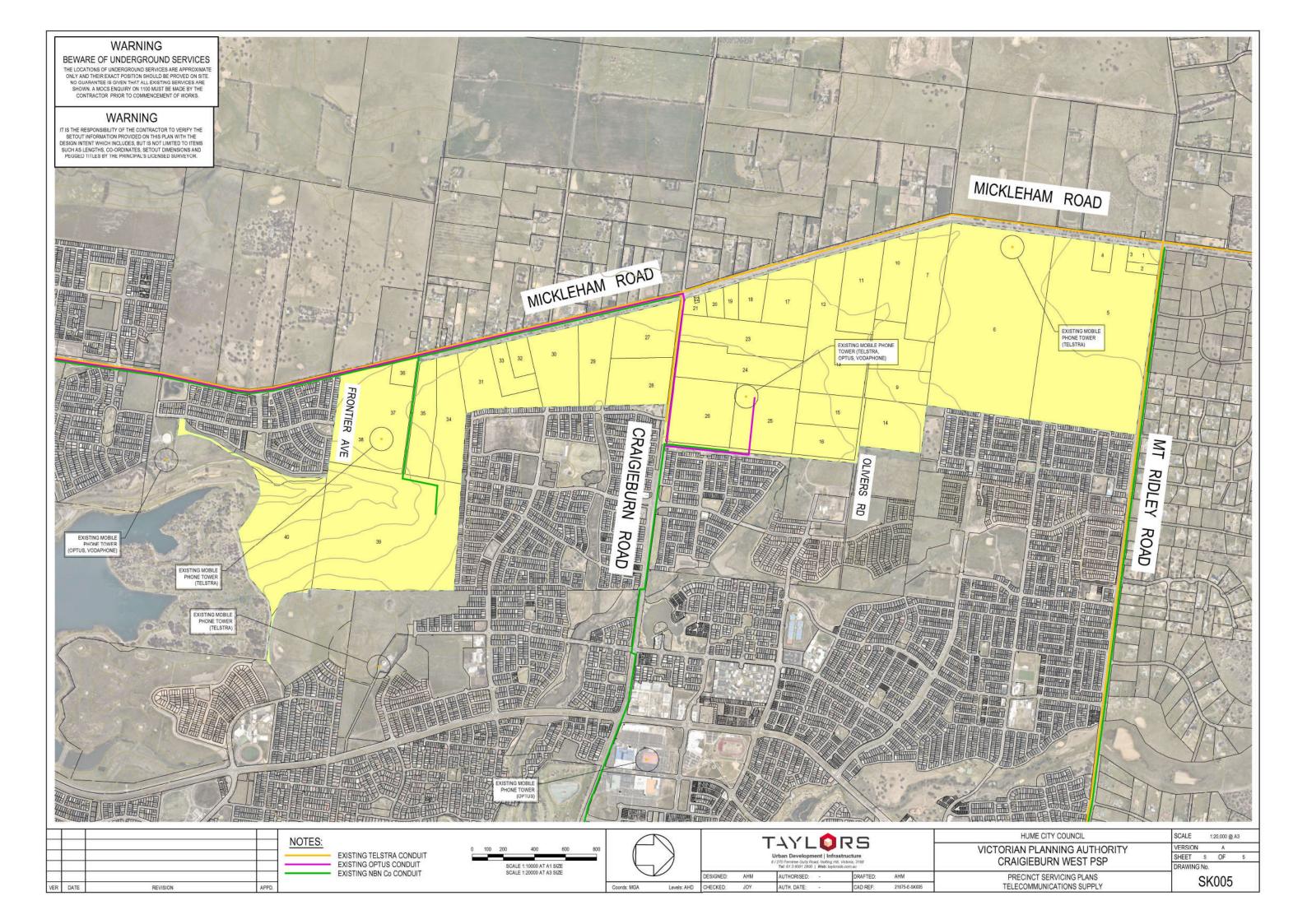


16 APPENDIX C - ELECTRICITY SUPPLY





17 APPENDIX D - TELECOMMUNICATIONS SUPPLY





18 APPENDIX E - GAS SUPPLY

