The Precinct Structure Plan

Utility Servicing Assessment Report

Victorian Planning Authority

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→ The Power of Commitment

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Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.3 and the assumptions and qualifications contained throughout the Report.

GHD was engaged by the Victorian Planning Authority (VPA) to provide an assessment of existing infrastructure capacity and future servicing requirements of the Officer South Employment Precinct (OSEP).

Findings considered to be the most significant are summarised in Table 1 below.

Table 1 Key Findings

Sector	Findings
Stormwater Drainage and Flooding	– Melbourne Water Corporation (MWC) are still working on preliminary drainage strategy. – MWC are investigating the existing infrastructure services that might impact the stormwater services. – MWC are investigating regarding the capacity of the downstream outfall and how the urbanisation upstream outfall will impact the downstream capacity – The Council advised that no stormwater or flood management/ mitigation studies has been undertaken since the previous Situational Analysis Report – The Council advised appropriate outfall is needed for effective stormwater servicing for future development.
Potable Water	– SEW advised that an extension of trunk infrastructure into OSEP will be required to service the Precinct.
Recycled Water	– Recycled water is supplied by Pakenham Water Recycling Plant – OSEP is not mandated for recycled water supply and planning does not trigger the requirement for the supply recycled water to the Precinct – The proposed plan includes two recycled water storage tanks located outside of the southern boundary of OSEP and the size of the outlet pipeline of these tanks are DN750
Sewer	– SEW has an existing sewer pump station within the precinct (near the Officer Road/Princess Freeway interchange) and associated reticulation to Officer South. – A proposed 900mm pipeline gravity sewer will transfer flows from Officer North area to the pumping station in the southern area of the precinct. – The preferred design for the major rising main alignment is to be connected to the Ballarto pump station
Electrical	– AusNet may need to install a new Zone Substation, which is a critical piece of infrastructure that converts power from transmission voltage down to distribution voltage before distributing to the wider development.
Gas	– APA Transmission had advised that all the information provided regarding the existing services is still accurate – Gas assets are usually located within an easement 7-35m wide to allow for future pipeline opportunity and maintenance – APA Distribution are advised that all the information provided previously is still accurate, with the inclusion of a DN450 TP main within the Precinct area that was not cited in the previous report – There are no upgrade plans currently, but it will depend on the commercial and residential growth basis
Telecommunications	– NBN, Telstra, and Optus advised that all the information provided previously regarding the existing services are still accurate. – OSEP area is within the Wireless & Satellite footprint of the NBN network. Currently no NBN fixed line network exists in the identified area. The area currently does not support FTTP or any other form of fixed line technology – Telstra have infrastructure on the northern border of the development along the highway which is likely to be impacted. The location is a rural area with limited Telstra infrastructure and will currently not support the significant indicative forecast growth – The upgrade plans depend on case by case, and the developers will provide pit and pipe upon Telstra request – NBN advised that existing trunk within infrastructure within the proposed development OSEP may require more GSM (Global System for Mobile communication) sites which is a cell tower that provides the 4G and 3G services.

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1. Introduction

1.1 Project Context

1.1.1 Precinct Location

The Officer South Employment Precinct (the Precinct) is located within the Shire of Cardinia, on the south-eastern fringe of metropolitan Melbourne. The Precinct comprises of approximately 1069 hectares of land, bound by the Princes Freeway to the north, Lower Gum Scrub Creek to the east, Patterson Road to the south and Cardinia Creek to the west. A Locality Plan is provided in Appendix A illustrating the location and boundaries of the Precinct.

1.1.2 Existing Land Use

The majority of the precinct is predominantly underdeveloped, rural properties. There are several residential dwellings located throughout the Precinct and there is a service station located to the north of the Precinct along the Princes Freeway.

The Precinct is situated within an Urban Growth Zone (UGZ). The purpose of the UGZ is to allow for urban development[1]. The UGZ is typically associated with a Precinct Structure Plan (PSP) and permits the existing non-urban use of land prior to the implementation of a PSP.

1.1.3 Project Overview

GHD is undertaking a Utility Assessment for the Officer South Employment Precinct (OSEP) on behalf of the Victorian Planning Authority (VPA) that has commenced planning for the Officer South Employment Precinct Structure Plan in collaboration with Cardinia Shire Council (Council), authority agencies, landowners, and developers.

GHD liaised with Utility Service Providers (USP) in 2020 regarding the location, condition, and capacity of existing utility infrastructure, as well as the key issues and opportunities regarding utility infrastructure in the OSEP. This report will confirm the relevance of this 2020 advice and focus on the future servicing arrangements for future development of the OSEP.

The Precinct will complement existing surrounding development through the provision of mixed-use development, incorporating industrial, commercial, and residential land uses.

The aim of a PSP assessment is to provide a 'big picture' plan that sets out the vision for developing new communities and is an effective tool for guiding development in identified growth areas. The PSP provides the indicative growth forecast for shared infrastructure such as residential, commercial, and industrial net development areas.

As part of its planning works for the Precinct, various studies have been commissioned to inform the preparation of the OSEP. This Utilities Servicing Assessment will provide key information regarding the current infrastructure capacity and future servicing requirements of the Precinct.

1 **https://planning-schemes.delwp.vic.gov.au/schemes/vpps/37_07.pdf**

1.2 Purpose of this report

The focus of this assessment is to determine the condition and capacity of existing infrastructure servicing the precinct development area, as well as to advise whether upgrades, relocations, network augmentation or alteration works, or extensions of new infrastructure will be required to support development. This report includes an assessment of stormwater, sewerage, water, gas, telecommunications, and electricity infrastructure.

Utility infrastructure has the potential to contribute significant costs and delays if constraints are not identified and addressed early in the process. Therefore, this report is crucial to maintaining lines of communication with stakeholders and giving pre-planning development information to utility services that own or manage utility assets in the development area.

The USPs consulted in this assessment are outlined in Table 2 below. This report integrates their advice regarding existing and required infrastructure to service the precinct.

Table 2 Utility Service Providers in the precinct

Utility	Utility Service Authority	Contact Details
Electricity	AusNet Electricity AusNet Transmission	Andrew Webber Design Team Leader [redacted]
Gas	APA Group Networks	Rebecca May Planning Manager [redacted]
	APA Group Transmission	Michael Mielczarek Senior Urban Planner [redacted]
Sewer	South East Water	Matthew Snell Group Manager Growth [redacted]
Stormwater Drainage	Cardinia Shire Council	Marcelle Bell Growth Area Strategic Planner [redacted]
		Emma Cadd Development Coordinator [redacted]
	Melbourne Water Corporation	Laurence Newcome Precinct Structure Planning Coordinator, Catchment Strategies and Services, Development Services [redacted]
Water	South East Water	Matthew Snell Group Manager Growth [redacted]

Utility	Utility Service Authority	Contact Details
Telecommunication	NBN Co	Daryl Martinez Senior Planner I PDC Projected Delivery Build [redacted]
	Optus / Uecomm	Paul Lowe Senior Project Engineer DART [redacted]
	Telstra	Jonathan Parker Network - Senior Planner Pit, Pipe and Duct Planning [redacted]
		David Carricondo Project Specialist Network Integrity Project specialist: Vic/Tas/SA [redacted]

1.3 Limitations and Assumptions

The location of existing services has been approximately determined based on Before You Dig Australia information and information provided by Authorities. The location and depth of existing infrastructure is approximate and service proving is recommended to confirm the location and depth.

Assessment of the condition and capacity of existing infrastructure has been based on advice and data received from USP's. Information provided by stakeholders is preliminary information only, subject to change and should not be relied upon without verification.

This report has been prepared by GHD for Victorian planning Authority (VPA) and may only be used and relied on by VPA for the purpose agreed between GHD and VPA as set out in this section.

GHD otherwise disclaims responsibility to any person other than VPA arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this section of the report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by VPA and others who provided information to GHD (including Government and Utility Service Providers), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report, which were caused by errors or omissions in that information.

1.4 Methodology

GHD undertook an initial investigation into the utility infrastructure within the precinct area through a desktop study. This research involved using information obtained through a Before You Dig Australia (BYDA) enquiry.

Following the desktop investigation, GHD commenced obtaining spatial data from each USP to create Existing Infrastructure Plans. Where spatial data was not able to be obtained from USPs, it has been digitised from the USP's BYDA responses. A summary of the infrastructure data types utilised in the Existing Infrastructure Plans is provided below in Appendix A.

Table 3 Infrastructure Data Types by Utility Service Provider

Utility Service Authority	Infrastructure Data Type
APA Group	Digitised BYDA Data and VPA supplied data
AusNet	Digitised BYDA Data
Cardinia Shire Council	Spatial Data
Melbourne Water Corporation	Spatial Data
South East Water	Spatial Data
NBN Co	Digitised BYDA Data
Optus/Uecomm	Digitised BYDA Data

Using the estimated proposed development dwelling yields and residential land use predictions provided by the VPA, GHD commenced discussions with the relevant USPs to determine the potential impacts of proposed development on existing infrastructure. These discussions focussed on the expected constraints due to existing infrastructure on the proposed development, the expected impact of the proposed development on local infrastructure and the identification of services that were likely to require relocation, replacement, or upgrade.

GHD provided USPs with a questionnaire highlighting relevant supply side information necessary for an analysis of their infrastructure networks. In response, USPs outlined predicted infrastructure capacity constraints and upgrade requirements necessary to facilitate development, whilst maintaining the level of service provided to existing customers.

GHD undertook a desktop research investigation to identify local and state policy that supports low carbon emissions with a focus on Environmentally Sustainable Design (ESD) for residential precincts. GHD facilitated a workshop with Council and the VPA to understand the key and objectives drivers regarding sustainability for the Precinct.

2. Stormwater Drainage Infrastructure

2.1 Overview of the Precinct Stormwater Drainage Network

The primary purpose of Victoria's stormwater drainage networks is to minimise the impact of flooding by directing stormwater caused by rain events away from developed areas.

Drainage authorities are responsible for the installation and maintenance of drainage infrastructure, including drainage system capacity and floodwater mitigation.

Stormwater drainage infrastructure varies significantly in size and type. Local councils are responsible for catchment areas and their infrastructure includes local drains such as underground pipelines and open drains, as well as street gutters and the pits that connect the gutters to the underground pipes.

MWC and the Cardinia Shire Council are the responsible authorities for the stormwater drainage infrastructure, and MWC is the floodplain management authority for the Precinct.

2.2 Existing Conditions

Existing stormwater drainage assets and associated overlays are shown in the Previous Situational Analysis Report, refer Appendix C – Appendix C - Stormwater Drainage Assets - Figure 2.

2.2.1 Melbourne Water Corporation

The MWC advised that they are still working on the preliminary drainage service strategy layouts and once completed the designs may differ from the previous Situational Analysis Report. Once the preferred drainage servicing strategy for this precinct is confirmed, it will provide clear guidance on the major drainage infrastructure required to facilitate urban development, including any augmentation to existing infrastructure. The preferred drainage servicing will consider a variety of factors including indicative growth forecasts, development densities, climate change, biodiversity value, and existing infrastructure.

To inform their study MWC has engaged a contractor to determine the condition and capacity of the existing level of the APA gas main by undertaking asset proving. The depth and location of the gas main may have a direct impact on the MWC drainage strategy.

MWC has advised it will confirm the preferred drainage service strategy to respond to staging and sequencing approach for the precinct once its internal investigation and works are completed. MWC were unable to provide a timeframe for completion of these works.

2.2.2 Cardinia Shire Council

Cardinia Shire Council advised that the previously provided information regarding unmapped tributaries / river systems has been update with additional mapping having been completed. Council notes that no additional stormwater or flood management / mitigation studies have been undertaken since the submission of GHD's Situational Analysis Report.

An appropriate drainage outfall is required to facilitate effective stormwater service for future development. Stormwater and its management are already a significant constraint on this site, due to drainage water flowing from the northern developed areas into the OSEP, putting additional strain on the network which is already nearing capacity. This will be a significant & ongoing constraint on this site.

2.3 Planned Upgrades & Redevelopment Scenarios

The MWC advised that there are barriers expected outside of stakeholder control to the delivery of the required upgrade work, including:

– Access to other developers/landowner's land parcels (within and external to the PSP) and existing downstream flooding issues
– The staging and sequencing of development respond to several competing factors.

MWC has advised this will be confirmed once the preferred drainage service strategy is confirmed.

2.4 Key issues and Opportunities

2.4.1 Melbourne Water Corporation

MWC advised the following regarding the PSP:

– The existing downstream outfalls (waterways) do not have adequate capacity and will be further impacted by the urbanisation of the upstream catchment. However, MWC is reviewing these as a component of their ongoing background investigations. The Developers will also fund and construct the major drainage infrastructure defined in the relevant Development Services Scheme (DSS) to appropriately service the relevant catchment, but this component of the work will be confirmed once the DSS is confirmed.
– The opportunity to deliver integrated water management strategies with the precinct will depend on further investigation and inclusion of precinct outcomes in the designs. To facilitate these opportunities further engagement with stakeholders to determine funding and implementation pathways would be required which MWC is happy to continue to be involved in these ongoing discussions.

2.4.2 Cardinia Shire Council

The Council advised that stormwater and its management is already a significant constraint on this site due to drainage water flowing from the northern developed areas and to achieve effective stormwater servicing for future development, an appropriate outfall is needed.

3. Water Infrastructure

3.1 Overview of Officer South Water Network

South East Water (SEW) is the water retailer responsible for the distribution and reticulation infrastructure within the Precinct. MWC advised it has no trunk water supply assets currently located within the Precinct, however there is a proposed DN750 recycled water pipeline. Refer to Appendix A-1 for Water and Sewer Asset plans.

3.2 Existing Conditions

SEW advised that all the existing water infrastructure is still reliable and accurate, as shown in the previously issued Situational Analysis Report, refer to Appendix CB - Appendix C - Water and Sewer Assets - Figure 3.

3.3 Key issues and Opportunities

3.3.1 Potable Water

To service the PSP, SEW advised that trunk infrastructure must be extended into OSEP. As the surrounding areas abutting the site are greenfield developments, the trunk system has been designed to accommodate long term growth. Additionally, residential properties in mandated PSP areas west of Clyde Creek will receive their recycled water supply from Pakenham Water Recycling Plant.

The capital expenditure associated with the required work for potable water is approximately $6M to deliver assets greater than DN225 within the precinct. Other assets would be funded by the developers.

3.3.2 Recycled Water

SEW advised OSEP is not mandated for recycled water (RW) supply, therefore SEW is not intending to deliver recycled water infrastructure to the OSEP. However, any potential large RW users in OSEP would be considered for a supply on a case-by-case basis and would require a separate supply direct from Pakenham Treatment Plant. Residential properties in mandated PSP areas West of Clyde Creek will receive their RW supply from Pakenham Treatment Plant. The plan includes two storage tanks located outside of the southern boundary of OSEP. The outlet of these tanks, a DN750, will need to pass through OSEP likely following the creek to the West of the precinct and cross the creek where the future extension of Thompson Road would cross to connect into the reticulation network. The inlet to the storage tanks from Pakenham treatment plant will not pass through the OSEP. Proposed tank location and indicative alignments of inlet/outlet to the proposed recycled water storage. The size of the outlet pipe is proposed to be a DN750 and it is anticipated to be constructed in 2028/29. Refer to Appendix A-1-3 for the proposed recycled water plan.

4. Sewer Infrastructure

4.1 Overview of Officer South Sewerage Network

SEW provides sewerage services in the Officer South area and controls the headworks and major sewerage treatment plants in Officer South. The Victorian sewer industry is regulated by the Essential Services Commission (ESC). Refer to Appendix A-1 for plans showing the existing and proposed assets.

4.2 Responsible Authorities

SEW is responsible for the trunk sewerage network in the Officer South Employment Precinct. SEW is the authority responsible for the distribution and reticulation of the sewerage network in the Officer South Employment Precinct.

4.3 Existing Conditions

Existing sewer assets and associated overlays are shown in the previous Situational Analysis Report in Appendix B – Appendix C Appendix C– Water and Sewer Assets – Figure 3

SEW advised that the existing sewer infrastructure plan that was given in the previous Situational Analysis Report is still reliable and accurate. OSEP have an existing pump station within the precinct area and associate pipelines to Officer south. A proposed gravity sewer 900mm pipeline to transfer flows from officer north area to the pumping station in the southern area, rising main and storage tank are required to service the OSEP. The location for the assets may change as they are dependent on the stage of development and whether SEW can acquire the land elsewhere.

SEW advised that the preferred alignment for the major sewer rising mains in the OSEP and staging plan is where the rising main connects directly to the Ballarto pump station rising main which is expected to be approximately 1km south of the OSEP pump station. The Ballarto pump station rising main runs from Ballarto Rd East pump station to the Pakenham region.

4.4 General Requirements

SEW has advised of the following requirements for Officer South Employment Precinct:

– SEW has confirmed that the servicing strategy was based on estimates of net developable area for residential, commercial, Industrial and is comparable to the information provided. Also, historical growth rates for PSP's were analysed and an average growth rate was forecast for OSEP. Several sensitivities were analysed to assess possible impacts of climate change, such as back-to-back extreme demand events. As a result, the capital expenditure associated with the required sewer work is in the order of $30M.
– SEW is assessing land requirements for the sewer pumping station and recycled water storages, which are currently located outside of the PSP. SEW is also in discussion with MW regarding the possible co-location of assets.

4.5 Key issues and Opportunities

SEW advised of the following key issues and opportunities for Officer South Employment Precinct:

– SEW's preference is for the Sewer Pump Station (SPS) not to be located too close to odour-sensitive users, e.g., residential or business areas, to avoid potential odour and noise amenity issues in the future. This means generally either siting the SPS away from such users if possible or excluding odour and noise-sensitive users from a buffer area surrounding the SPS. If the SPS is located outside the PSP, then the resulting buffer area within the PSP can be reduced.
– Assets will be timed as delivery of each parcel occurs. Many of the assets will be delivered by a developer and reimbursed through SEW standard development deed process.

– SEW advised that one of the effective methods for development that benefits the delivery of SEW infrastructure is its asset being delivered through an early works package. This method requires the developers to pay an early delivery cost; however, that will depend on the acceptance from land developers.

5. Electrical Infrastructure

5.1 Overview of Victoria's Electrical Network

The electricity "grid' is the term used to describe the interconnected network that transports electricity generated at power stations to individual properties.

Electricity is generated at power stations across the country, generally located proximate to energy sources. The *transmission* network includes terminal stations and transmission lines, which connect the power stations to the terminal stations. The terminal stations lower the voltage level of the electricity that passes to the *distribution* network, which connect the terminal stations to individual properties. The transmission network is generally categorised as 220 kilovolts and above, and the distribution network is 66 kilovolts and below.

The distribution network comprises the following components:

– Sub-transmission lines connect terminal stations to zone substations.
– Zone substations
– Distribution feeders are either overhead or underground lines that connect zone substations to local substations.
– Local substations: indoor, kiosk, or pole-mounted
– Low voltage power lines: either overhead lines or underground cables connecting power from the local substations to the customers.

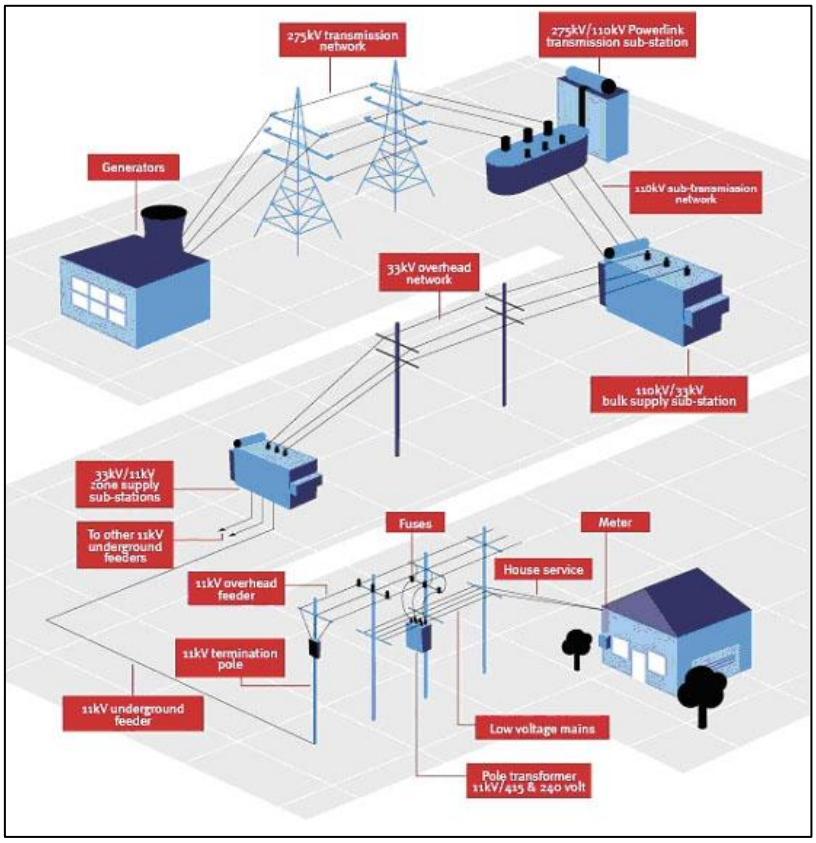


Figure 1 ***Typical Electricity Transmission and Distribution Network***

5.2 Existing Conditions

The responsible authority for the precinct is AusNet.

AusNet advises that all the information provided regarding existing electrical assets is still accurate and reliable. Existing electrical assets and associated overlays are shown in the Situational Analysis Report in Appendix B Appendix C Appendix C– Electricity Assets – Figure 5.

5.3 Planned Upgrades

AusNet advised that they have the following requirements regarding planned upgrades for the OSEP:

- When considering the future demands to service a growing commercial precinct, solar has not been considered as it is not clear if batteries will be installed with the solar systems. Without batteries to accompany solar, there is no overall demand reduction on the AusNet network.
- When AusNet planning team forecasts an overload within the next 2 years for the feeders supplying the precinct, the required works within the OSEP will be deemed critical and in need of upgrade. AusNet advised that this review could take up to 12 months.

5.4 General Requirements

AusNet has advised the following general requirements:

- The work within OSEP will be delivered by customer growth, and it is not impacted by the Electricity Distribution Price Review spend forecast. AusNet will finance the bulk of the investment which will require the development of a major business case for approval of a $20 million budget, which will be provided to senior management for approval.
- There are no barriers foreseeable outside of stakeholder interfaces, but the work upgrades require the land to be acquired and a business case approving construction.
- AusNet will permit vehicle charging stations adjacent to the boundary of the easement, but no encroachment will be permitted.
- AusNet does not permit solar arrays within the transmission easements.
- AusNet permits Urban Agriculture within its easements, but any associated buildings are not permitted
- AusNet's location preference for a new Zone Substation is on Officer South Road, north of the transmission easement. The closer to the transmission easement, the better.
- AusNet has no objection to assets within the road corridor, but a review of the detailed design will be required prior to final approval.
- Any proposed road crossings would be subject to clearance to the overhead lines (15m minimum from surface to lines)
- AusNet advised that minimal clearance of drainage assets is permitted within the easement, any design must be submitted in draft for review.
- AusNet require minimum horizontal 30m buffer to towers from drainage assets.
- Note that there are two proposed transmission lines within the easement to allow for future expansion. Refer to Figure 2.

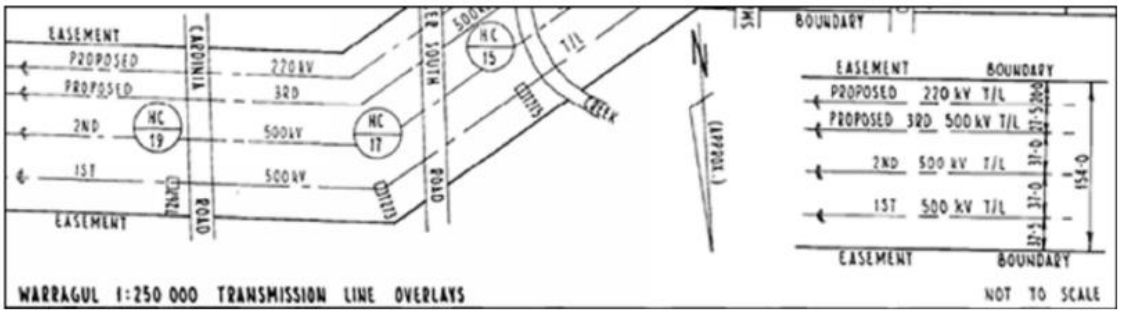


Figure 2 Two Proposed Transmission lines within the easement, AusNet 2022

5.5 Development Scenarios

AusNet advised that they have the following planned development scenario for OSEP:

– AusNet's electricity network in the area is almost at capacity. It will most likely be able to cope with the first few years of development within the precinct but will very soon need the establishment of a new Zone Substation. It must be noted that the lead time to establish a Zone Substation is in the order of 2 to 3 years considering all approvals required, detailed design and then the actual construction.

– The current status of land planning is that AusNet will require approximately 10,000 m^2 land to be set aside in the PSP for the new zone substation site.

– A zone substation is a major piece of electrical infrastructure. It converts AusNet sub transmission voltages down from 66kV to 22 KV. From the zone substation, it will be required to install 22kV distribution feeders connected to local transformers to step the voltage down from 22kV to 415/240V for normal consumption.

– The capital expenditure associated with the required work is in excess of $20M.

5.6 Key issues and Opportunities

AusNet advised the following key issues and opportunities for Officer South Employment Precinct:

- The OSEP area has been identified as needing a zone substation. A critical piece of AusNet infrastructure worth approximately $20 million that converts 66kV system to 22KV before distributing it in the street. This process needs a site measuring approximately 10,000 square metres. An agreed location has not been reached yet.
- The electricity transmission easement width is 150m wide. The location and size of water drainage assets within easement and roads crossing over easement are restricted and need to be planned with Ausnet.
- 30m buffer around towers is required within the precinct

6. Gas Infrastructure

6.1 Overview of Victoria's Gas Network

The gas network in Victoria includes transmission and distribution pipelines. The transmission of natural gas involves transporting gas through pipelines from extraction to reticulation processing facilities and direct supply to major customers.

Gas is depressurised at either city gates or field regulators to appropriate pressures for the distribution of gas to final users through the distribution network, which can include commercial and industrial users as well as residential users. Gas is transported in smaller volumes and at lower pressures through the distribution network.

6.2 Responsible Authorities

APA Group owns the gas distribution and transmission network and APT O&M Services (APA) operates along with managing the natural gas reticulation network within the Precinct on behalf of Australian Gas Networks (AGN).

The Australian Energy Regulator administers the National Gas Law and Rules that govern the gas networks in eastern Australia.

6.3 Existing Conditions

Existing transmission and distribution gas infrastructure is shown in Appendix A-2, Appendix A-3 and the Situational Analysis Report in Appendix B - Appendix C – Gas Asset – Figure 6.

6.3.1 Transmission Network

The APA Transmission Network advised that the information provided previously in the situational analysis report including location, condition, and capacity of existing utility service is reliable and remains the same. Also, the transmission servicing strategy is reliant on the forecast of AGN network provider managed by APA networks.

APA assets are generally located within easements ranging from 7 to 35 metres in width. Easements provide protection of APA's assets and ensure:

– APA has preserved the opportunity to loop pipelines in the future.
– APA can access the pipeline for working and maintenance purposes.

A 20m easement with one pipeline has the potential for another pipeline in the future. The larger vacant side of the easement which is likely to be used for future looping of the pipeline is called the "live side" of the easement. Easements are typically linear following the pipeline alignment, so if there is a change of direction in the pipeline (corner) then the easement will follow. All easements will have pipeline marker posts installed within line of sight of each other and as close as possible to the pipeline. Their primary purpose is identifying and warning of the existence of underground gas assets.

Additionally, APA Group advised that currently, the Crown Land Agreement between the gas authorities and the State Government gives the same rights to Authorities as they would have had if they had a registered easement for assets located within Crown Land, including road reserves. If the land use changes, then easement, licence or lease arrangements may need to be formalised.

6.3.2 Distribution Network

The APA Distribution Network advised that all the information that was provided previously is still accurate with the addition of the supply main and gate asset north along officer South Rd to Lecky Rd. Refer to Appendix B – A-2, A-3, A-4

6.4 Planned Upgrades

The APA Group (Transmission) advised that there are no planned upgrades expected or required, but the APA Distribution Network advised that there are no formal integrated approaches for servicing this precinct planned development. It will depend on the customer demand and request and timing would be dependent upon when the individual customer was to connect or require this additional demand.

Additionally, augmentation takes the form of duplication or connection of existing pipe assets. Most pipe assets are located within the road reserve and if main needs to be duplicated, a suitable alignment would need to be sought within the reserve, considering other existing assets.

If gas services are required for commercial businesses or industrial connections assessments would be made upon the gas service connection enquiry submitted to a retailer and forwarded to AGN/APA. This would trigger an assessment to ascertain what infrastructure would be needed to satisfy the supply of that demand. It is generally unknown what gas servicing needs are for industrial and commercial estates as the demands are dependent on the type of business established.

Viability of the connection would be assessed, and if a contribution were required, this would be communicated to the consumer, via their retailer.

6.5 General Requirements

6.5.1 Urban Design Requirement

APA easements can be integrated into urban development projects in many different ways. The identification of an existing APA easement and pipeline corridor in the early stages of planning and urban design will result in better outcomes. The following key criteria should be considered when planning and designing around and within APA easements:

- The primary purpose of the easement is for the transmission of gas through existing and future gas transmission infrastructure.
- The easement and warning signage are statutory safety features pursuant to Australian Standard 2885. They are a fundamental tool in ensuring the safe operation of the transmission network, compliance with the relevant safety standards, and providing for the safety of the public and assets from the implications of a pipeline failure.
- Creation of a linear landscape reserve that runs the full length of the gas pipeline easement.
- Optimise passive recreation uses of the gas pipeline easement through the provision of a connective shared pathway network.
- Visual integration of gas pipeline easement into adjacent passive open spaces, drainage reserves, wetlands, retarding basin areas and road reservations.
- Minimise the number of crossings and extent of road pavement over the pipeline easement.
- Roads and road reserves are to be located outside of the easement, except where there is a 90-degree road crossing.
- Other utilites (e.g. drains, other utilities, etc.) are not permitted to be located within the easement except at crossings.
- ‘Easements on easements’ is an unacceptable outcome except for infrastructure crossings.
- APA may require that a Construction Management Plan (CMP) be prepared to address any road crossings and work over the pipeline (including landscaping works), but this can be incorporated within any CMP required by Council.
- After work in the vicinity of APA’s pipeline is completed, APA will issue a statement of compliance (where applicable) on request from the developer.

6.5.2 Landscape design Criteria

The following general criteria apply to all landscape design and work within easements, regardless of location and context:

– Shared paths are acceptable within the easement to optimise connectivity within the development.
– There is potential for artworks and other hard infrastructure (e.g. benches) to be installed in selected locations and integrated into the landscape.
– Provide landscaping species which ensure unobstructed views between pipeline indicator markers and avoid any impact on existing subterranean pipe infrastructure and likely future pipeline routes.
– The list of selected plant species will be agreed upon with the APA.
– The landscape and hardscape should be based on Council regulations, APA maintenance requirements, and cost for a good outcome.

Adequate clearances to gas assets need to be maintained for both asset integrity reasons and in the interest of public safety.

APA requires that the following clearances be maintained by its assets:

– Gas main typically located 2.1m from the property boundary.
– The minimum cover of depth required from top of pipe to surface level is typically between 0.90 – 1.2 metres, as per Australian Standard AS 2885, and this cover needs to be always maintained unless an alternative protective measure is put in place to the satisfaction of APA. Prior to works this depth needs to be physically confirmed and proved on site, as in many instances surface levels change over time.
– If larger diameter mains are to be installed, ie 125 and/or 180mm PE mains, APA assets require a minimum offset of 3m away from the adjacent boundary. This would be only problematic where a large diameter main is installed in front of a development where the main building facade is built along the property boundary
– Excavation works within an easement or 3m of a transmission pipeline where no easement exists will require APA third party approval and site supervision by an APA officer.
– If an additional main is required for augmentation purposes, it will require a suitable alignment in the existing road reserve
– Gas mains are generally laid in conjunction with water in common trench where available
– Furniture and significant large landscape structures, and light poles can be proposed on the easements, outside the 3m buffer area for transmission pipelines
– Small trees and medium-large shrub planting will be considered within an easement, but they should be outside the 3m buffer area. Small shrubs and groundcovers with limited size root balls and lawn can be installed any location on the easement upon agreement from APA.

6.6 Development Scenarios

APA Group Network, has advised that prior to the development they will undertake the following:

– Assess sensitive land uses near the high-pressure gas pipeline sensitive land uses are those where people may struggle to evacuate in case of an emergency such as places of assembly, aged care, childcare, education facilities, hospitals, and prisons.
– Sufficient capacity in transmission network will be provided for normal development, this will exclude gas power generation which may require additional capacity if required.
– Any transmission pipeline upgrades will be delivered under the Pipeline Act 2005 regulatory framework
– Based upon the projected domestic demand, the existing trunk infrastructure will have the capacity to service the predicted development. As most of the precinct has been identified to supply businesses and industry it is unknown what the projected connected demand that would be required.
– It would be best if staging considered the proximity of existing assets to extend the network more readily in a cost-effective manner if the tenant/owner requires gas. Out of sequence development can lead to a greater length of pipe needing to be laid, which at the end may require the end consumer to contribute to its cost.
– With the discouragement of gas servicing in this precinct, it may also discourage certain manufacturing sectors from establishing their businesses in this precinct.

6.7 Key Issues and Opportunities

The APA Network has advised on the following key issues and opportunities:

– It has been identified as an opportunity to have Council discourage the use of gas in favour of full electricity service. This is not an opportunity for APA Networks.
– There is a renewable, green option being developed as an alternative to natural gas (methane), which has not been considered for this precinct and with the Council potentially influencing future developers not to be serviced with gas.
– There will be no significant changes for gas suppliers due to renewable gas because it will be blended initially with natural gas using the existing gas network to deliver the same facilities. By discouraging gas connections, infrastructure will not be extended through OSEP for the uptake of renewable gas when it becomes available.
– Gas is a fuel of choice and is not an essential service, but there are industrial processes that are more efficient if serviced by gas than electricity, and gas is also deemed a more reliable fuel source.

7. Telecommunications Infrastructure

7.1 Overview of Victoria's Telecommunications Network

Australia has had an open market in telecommunications since 1997, where providers can enter the market and compete to provide infrastructure to new developments. In March 2015, the Australian Minister for Communications released the *Telecommunications Infrastructure In New Developments Policy* (TIND) to increase the efficiency in the provision of telecommunication services.

The key policy change was the introduction of infrastructure contributions to promote fairer and more effective competition, thereby creating greater efficiency, innovation and choice.

The key elements of this policy, regarding telecommunications providers, are as follows:

– Developers will be able to choose among competing infrastructure providers to service a new development.
– Developers will be required to provide 'fibre-ready facilities' in all new buildings, units or lots in a new real estate development.

NBN is the Infrastructure Provider of Last Resort (IPOLR) in developments of 100 lots or more. Telstra is the IPOLR in developments of less than 100 lots until the NBN network rolls out in the area.

Where an area is already serviced by NBN fixed line infrastructure, NBN has the right of first refusal for the telecommunications servicing of new developments regardless of which authority is the IPOLR.

The NBN will be able to purchase networks built to its specifications at pre-agreed prices from infrastructure providers, contractors, or developers.Consistent with the NBN multi-technology mix model, NBN will be able to select the technology it will deliver to a development.

The creation of the IPOLR ensures that one provider in an area of its responsibility will be obliged to service a new development, a crucial protection where developments are less commercially attractive to providers.

A key component of the NBN is that it is an open access network. This allows any retail service provider to enter into an access agreement with the NBN and ultimately sell services to consumers. The network is a combination of fibre to the premises, fixed wireless, and satellite services. The fixed wireless and satellite services are intended for areas where the rollout of fibre optic cable is uneconomical, representing approximately 7% of premises in Victoria.

7.2 Responsible Authorities

The Precinct is serviced by multiple telecommunication authorities, Including NBN, Telstra, and Optus (Uecomm).

7.3 Existing Conditions

Existing telecommunication assets are shown in the previous Situational Analysis Report refer to Appendix B – Appendix C Appendix C-Telecommunication Assets – Figure 4.

7.3.1 NBN

The OSEP area is within the Wireless and Satellite footprint of the NBN network. Currently, no NBN fixed line network exists in the identified area. The area currently does not support FTTP or any other form of fixed line technology.

7.3.2 Optus and Uecomm

Optus and Uecomm have advised that all the information provided previously regarding telecommunication infrastructure, including condition and capacity, is still accurate. Based upon BYDA the Optus and Uecomm critical fibre assets are co-located within Telstra assets on the north of Officer South Road and west of Lecky Road.

7.3.3 Telstra

Telstra advised that all the information that they provided in the previous Situational Analysis Report, including condition and capacity, is still accurate and any BYDA plans obtained are reasonably accurate, but are only schematic and service proving would need to be completed to confirm asset locations.

7.4 Planned Upgrades

7.4.1 NBN

NBN advised that currently there are no plans to install or upgrade any infrastructure within this precinct. The NBN does not foresee any constraints or issues with future standard infrastructure installation. There are no plans to extend the network to the precinct area unless a customer initiated it. Overall, NBN Co believes that the need for new key infrastructure is extremely unlikely.

7.4.2 Optus and Uecomm

Optus advised that currently there are no plans to install or upgrade any infrastructure, but to account for customer growth, they might need additional GSM sites. However, any new assets would be located within existing conduit or new conduits within the future road reserve. Typical conduit locations can be reviewed in Appendix B.

7.4.3 Telstra

Telstra advised that upgrading telecommunication infrastructure might be needed, but Telstra has no current specific plans to increase capacity at this location but may do so in the future as the development progresses. Telstra has advised the following planned upgrades:

- Telstra Network planning responses have advised that the servicing strategy considers the information provided in indicative growth forecasts, but the network integrity servicing strategy does not consider the indictive growth forecast information.
- Telstra advised that the assumptions that they made to develop the servicing strategy are purely maintenance.
- Some network relocations might be needed to cater for the development, but Telstra will complete these plans according to the developer's requests.
- It is currently unknown when the work upgrades will be critical until business services are requested, but it's most likely the new build for consumer services will fall under NBN Statutory Infrastructure Provider (SIP) obligations.
- Telstra have indicated that locations of Telstra conduits within a main road reserve are not known at this time and would be assessed following master planning of the precinct. A typical road section has been provided in Appendix B which provides typical asset locations.
- Land within the central and southern areas of OSEP may be required for future mobile phone towers to service the precinct, locations would be assessed following master planning of the precinct.

7.5 Development Scenarios

7.5.1 NBN

Any extension of the fixed line footprint to Officer South Employment Precinct will connect to the NBN co-located Fibre Access Node (FAN) site in Station Street, Officer. The FAN site currently has capacity to service the Precinct.

Servicing of the Precinct would be planned on a case-by-case application basis and driven primarily by customer-initiated demand. New infrastructure would be deployed utilising a mixture of existing Telstra, new NBN build along with developer supplied & shared trenching arrangements. Any new build (multiple conduit) to this precinct is planned to connect via Station Street & Officer South Road at the northern end of the Precinct. It is envisioned that new pit & pipe infrastructure is required within the entire precinct.

NBN Co is open to working with the other USPs, governments and other entities to cater for growth in the Precinct. NBN would also consider significant one-off investments if deemed necessary to accommodate future growth. Opportunities may arise to facilitate possible trench sharing opportunities either with Council/Road Authorities or other Utilities.

NBN Co considers its best planning approach to cater for growth is a consistent staged rollout in a direction, e.g., out from the FAN site, and are interested in any future planning that takes place so that NBN Co can plan work on the network accordingly.

Some of the opportunities that would benefit NBN are:

– Working with other USPs when working on additional crossings of freeways, waterways, and railways.
– NBN encourage additional space in any road restructuring and widening to enable future telecommunications work.
– Installing additional conduits and ducts for future cables are required.

7.5.2 Optus and Uecomm

The existing trunk infrastructure within the proposed development OSEP may require more GSM sites.

7.5.3 Telstra

Telstra had advised the following development scenarios:

– The developer will provide pit & pipe infrastructure to service their development to industry standards upon Telstra's request.
– The consumer services will be managed by the NBN. Telstra will be providing wideband services for businesses. The earlier a business requests a feasibility study and places an order, the faster it will help to speed up the process (e.g., the developer could order a service for their site office).

7.6 Key issues and Opportunities

7.6.1 NBN

NBN advised that some difficulties do exist with the NBN network being located on the northern side of the freeway reserve, so NBN Co would be interested in being involved in any additional service crossings that occur. The NBN is constrained by boundaries such as railways, freeways and watercourses, so any additional crossings enable the NBN to increase the robustness of the network.

7.6.2 Optus and Uecomm

The service providers indicated that additional GSM sites might be needed to cater to the indicative forecast growth. Any new assets would be located within existing conduits, or new conduits within the future road reserve.

7.6.3 Telstra

Telstra have identified the following key issues and opportunities:

– Telstra has infrastructure on the development's northern border along the highway that is likely to be impacted. The location is in a rural area with limited Telstra infrastructure and the significant indicative forecast growth will not be supported by the existing infrastructure at this time.
– Telstra require protection of its existing fibre assets if the construction works are occurring within 3m.

8. Ecologically Sustainable Development for OSEP

8.1 Low Carbon Emissions Development Policies

8.1.1 Distributed and Renewable Energy Generation

Natural gas and solar energy are both effective methods to have precinct wide environmentally friendly energy generation, the USP's have identified the following:

- AusNet will consider requests for alternative energy supplies on the basis that solar and batteries are the current common alternatives however, provision for solar is uncertain at this time but it needs batteries to reduce demand on the power network. Batteries for commercial precincts may not be efficient as there is little after hours load when the sun has gone down as distinct from residential load that can utilise batteries charged by solar systems during the day to reduce their overall total demand.
- Generate renewable gas including Hydrogen and Biomethane, using electrolysis process to split hydrogen from water using renewable electricity to maintain the net zero target. Similarly, Biomethane is extracted from organic material such as agricultural water and sewage that can prevent releasing these material and waste into the environment.

8.1.2 Net Zero by 2050 Emissions Reduction Target

For future development within the OSEP, a best practice approach would be to discourage gas use within the residential applications.

APA Network provided the following comments regarding Net Zero:

- The only means investigated to reduce carbon emissions directly within this Precinct is the move towards full electrical service due to the more immediate renewable energy options available.
- This reliance on full electrical service may be seen as short-sighted with plans for the introduction of hydrogen to replace methane being explored by industry, which too will reduce emissions. By moving away from gas servicing, the potential for a future of net zero emission may be limited.
- Businesses and consumers access to hydrogen as an alternate fuel source is also reduced by limiting the expansion of the reticulation network.

Australian Gas Network (AGN) following strategy to have 100% renewable gas by 2040:

- 100% renewable gas available to new housing no later than 2025
- 10% by volume renewable gas by 2030
- 100% renewable gas by 2040 no later than 2050

8.1.3 Waste Management, Smart Separation

Waste collection in Australia is highly dependent on regional and local requirements, often involving the collection of waste using garbage trucks. An emerging technology in the waste industry is the use of an underground pneumatic waste conveyance system. The system transports waste from residential and commercial buildings through a system of underground pipes that appear above ground at collection points. The system is suitable for high-density urban environments and represents a significant reduction in resources in terms of labor, hours and fuel when compared to the traditional waste collection practices[2].

The system is being used or trialed around the world, including locations such as the Pearl-Qatar (Doha), Wembley (UK), Singapore and in the Maroochydore City Centre (Queensland)[3].

Effective waste management systems also support ESD and some of these practices can include:

2 https://www.hdb.gov.sg/cs/infoweb/about-us/our-role/smart-and-sustainable-living/hdb-greenprint/waste-management

3 https://www.sunshinecoast.qld.gov.au/Council/Planning-and-Projects/Infrastructure-Projects/Automated-Waste-Collection-System

– On-site management of food, gardens, and organic waste. At a commercial scale this can involve composting or organic processing technologies[4]
– Allowing for the provision of additional glass recycling at residential and commercial sites.
– Co-locating recycling and general waste bins to encourage recycling
– Considering the use of smart bins to reduce the frequency with which the bins are emptied.

4 https://www.sustainability.vic.gov.au/Government/Waste-and-resource-recovery/Waste-management-in-multi-unit-developments

9. Typical Road Cross Sections

To gain an understanding of how the future services will be located within the road reserve the following drawings provide a typical section through different road types. The sections show typical alignments for services with offsets from boundaries. Refer to Appendix B for drawings of the typical sections.

Depth of services will be in accordance with typical USP requirements, the specified minimum depths are provided below:

Service	Minimum Depth Road	Minimum Depth Verge
Telecommunications	600mm	450mm
Gas (distribution)	600mm	450mm
Electical	1000mm	600mm
Sewer	1200mm	900mm
Water	1000mm	600mm

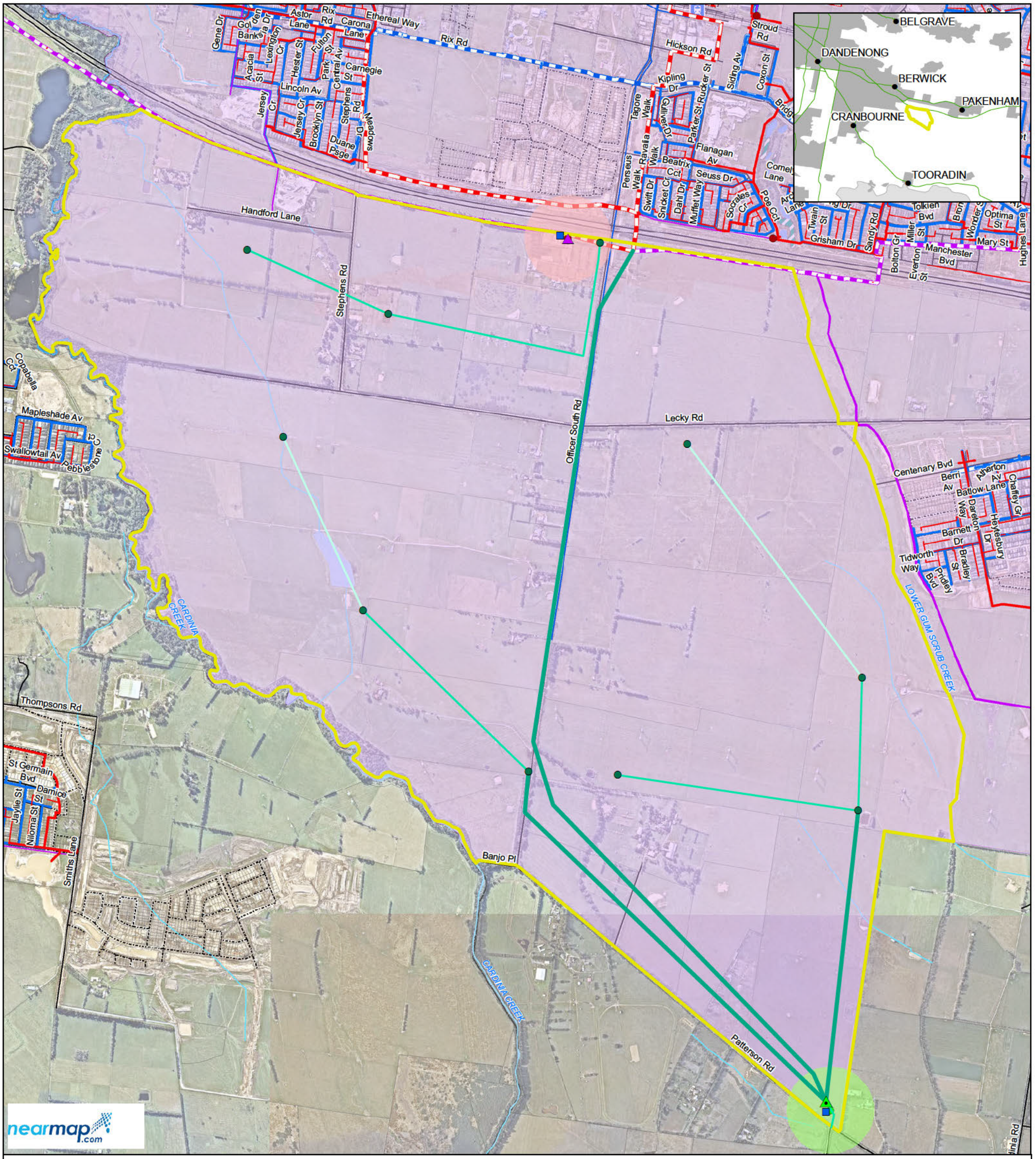
Appendices

Appendix A

Plans and Existing services

A-1 Sewer and Water Network Infrastructure plan

A-1-1 Water and Sewer Assets



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LEGEND

- Project Study Area
- Rail station
- Roads
- Proposed Roads
- River
- Stream
- Railway
- Watercourse
- Lake
- Swamp
- Parcel
- Proposed Sewer Pump Station 200m buffer
- Proposed Sewer Pump Station
- Proposed Join node

Proposed Node point

- Pump Station
- SPS Upgrade
- Storage tank

Proposed Pipe Lines

- 300; 375
- 450; 525
- 600; 900
- Officer Catchment polygon

South East Water Assets

- Sewer Pump Station
- Sewer Pipe,<150mm dia
- Sewer Pipe, >150mm - 300mm dia
- Sewer Pipe, >300mm - 1280mm dia
- Rising Main,<150mm dia
- Rising Main, >150mm - 300mm dia
- Rising Main, > 300 - 800mm dia
- Water Pipe, 50mm - 90mm dia
- Water Pipe, >90mm -230mm dia
- Water Pipe, >230mm - 600mm dia
- Sewer Pump Station 200m buffer

Paper Size A3

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Victorian Planning Authority

Victorian Planning Authority
Officer South Employment Precinct

Job Number	12526394
Revision	C
Date	19/09/2022

Water and Sewer Assets

Figure 3

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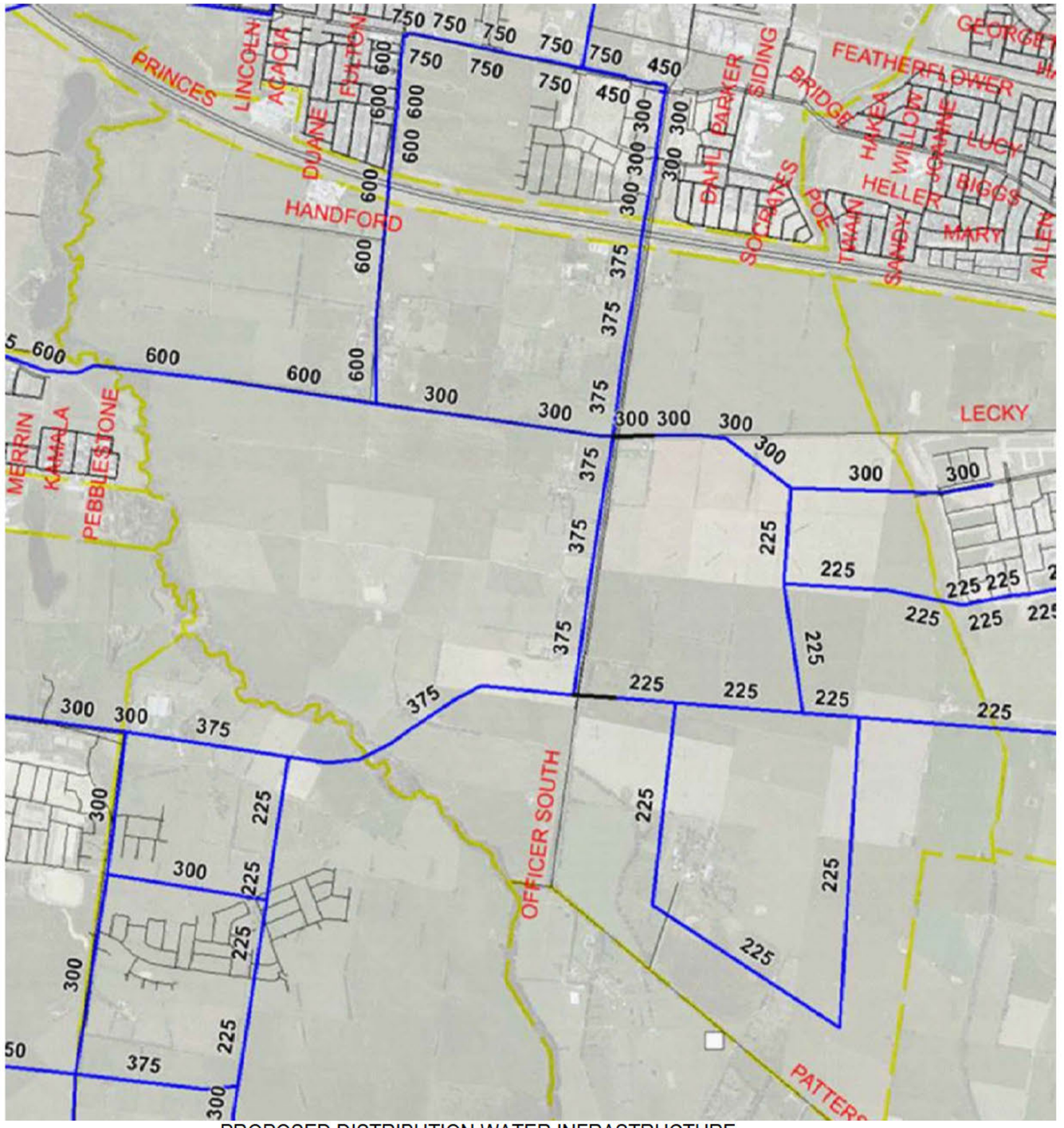
Hazelwood Drive (cnr Lignite Court) Morwell VIC 3840 Australia T 61 3 5136 5800 F 61 3 5136 5888 E mwlmail@ghd.com W www.ghd.com

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020; South East Water sewer and water main, South East Water, 2020; Created by: cjauniau

A-1-2 Proposed Distribution Water Infrastructure

LEGEND:

PROPOSED DISTRIBUTION WATER MAINS



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PROPOSED DISTRIBUTION WATER INFRASTRUCTURE

SCALE: NTS

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Utility Servicing Assessment

PROPOSED DISTRIBUTION WATER INFRASTRUCTURE

Job Number 12526394
Revision A
Date SEP 2022

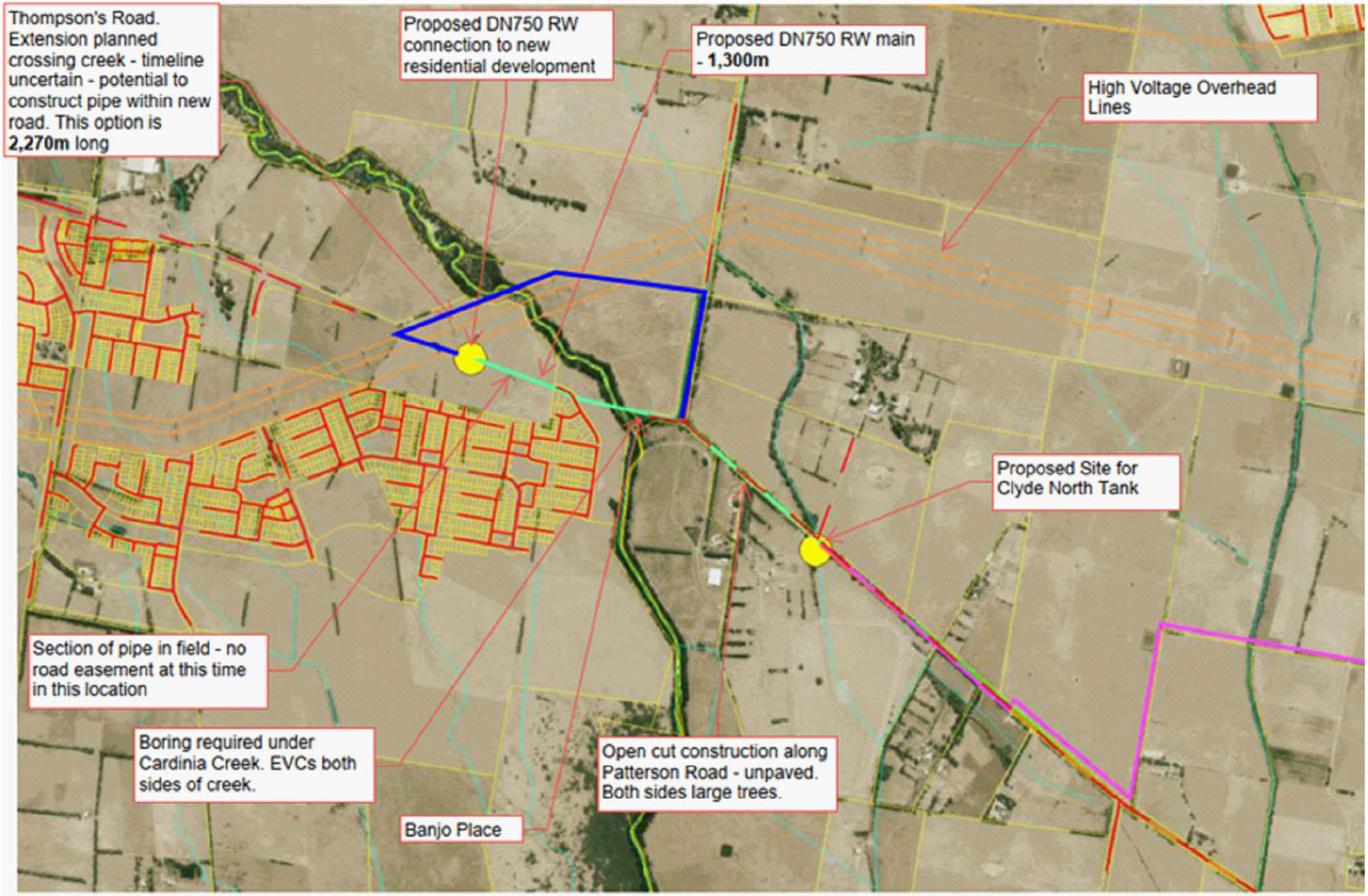
Figure 1

Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com.au **W** www.ghd.com

Plot Date 21 September 2022 - 2:43 PM Plotted by Maryam Qasim Cad File No G:\31\12526394\CADD\Drawings\12526394-Figure 1 - Figure 2.dwg

A-1-3 Proposed Recycled Water Infrastructure and R.W Zone

N



RECYCLE WATER

SCALE: NTS

LEGEND:

PROPOSED RW MAIN

PROPOSED RETICULATION NETWORK

WARNING

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RECYCLE WATER PLAN

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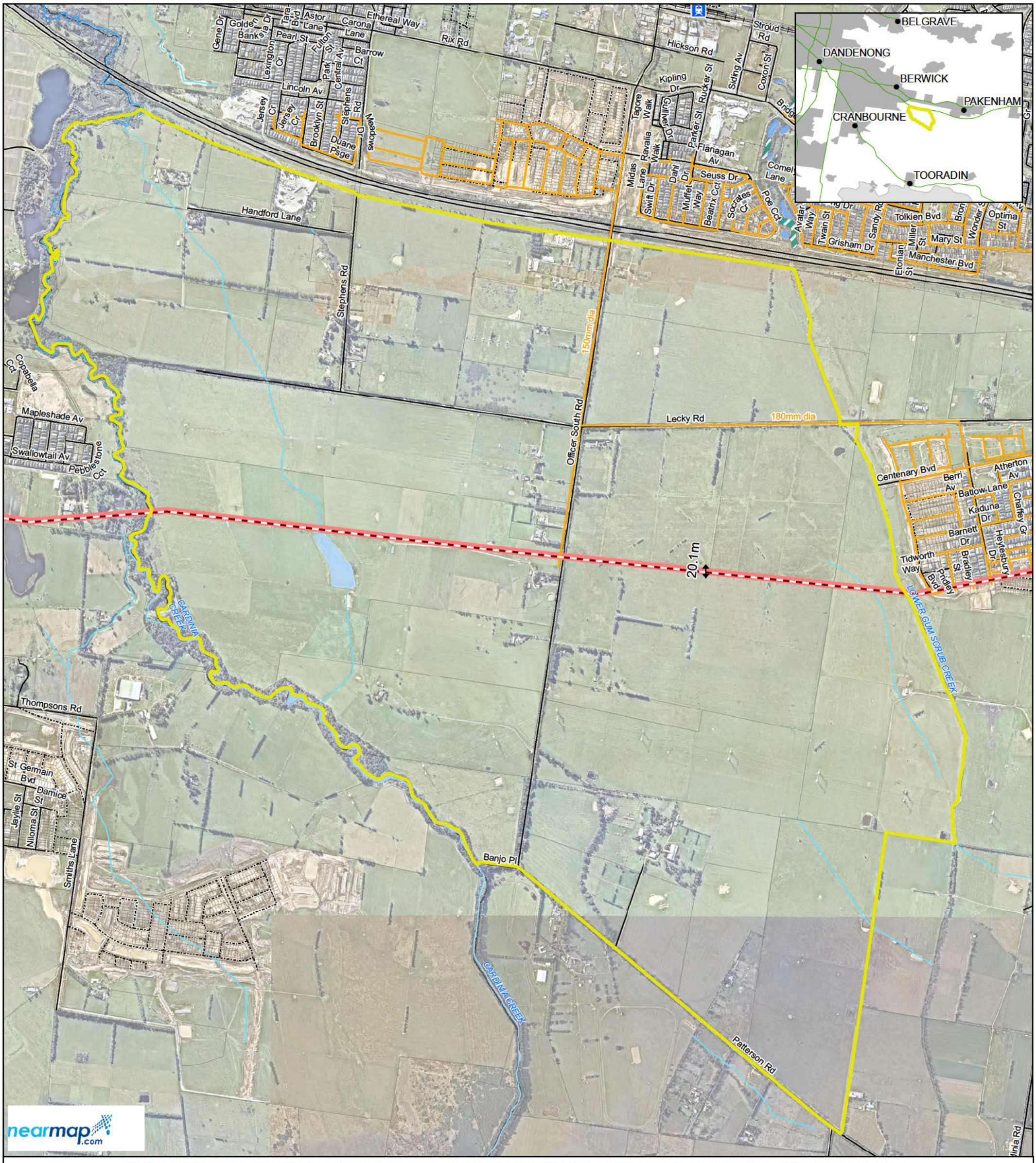
Date SEP 2022

Figure 2

Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com.au **W** www.ghd.com

Plot Date 7 October 2022 - 2:48 PM Plotted by Maryam Qasim Cad File No \\ghdnet\ghd\AU\Melbourne\Projects\31\12526394\CADD\Drawings\12526394-Figure 1 - Figure 2.dwg

A-2 Existing APA Network Infrastructure



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LEGEND

- Project Study Area
- Rail station
- Roads
- Proposed Roads
- River
- Stream
- Railway
- Watercourse
- Lake
- Swamp
- Parcel

APA Assets

- Transmission Pressure Gas Pipeline, 450mm dia
- Distribution High Pressure Gas Pipeline, 63 -180mm dia
- APA Easement

DRAFT

Paper Size A3

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Victorian Planning Authority
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Date 19/09/2022

Gas Assets

Figure 6

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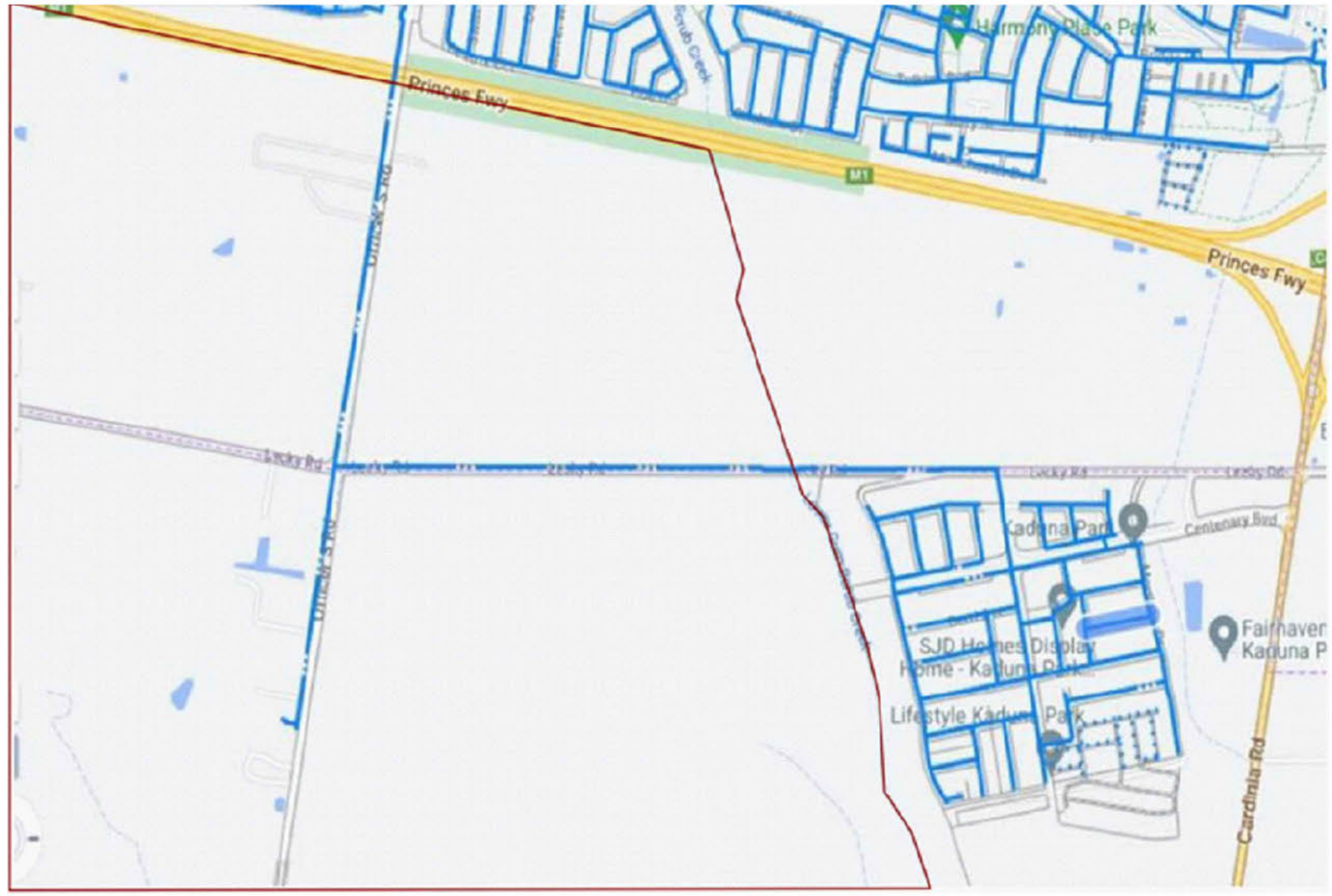
Hazelwood Drive (cnr Lignite Court) Morwell VIC 3840 Australia **T** 61 3 5136 5800 **F** 61 3 5136 5888 **E** mwlmail@ghd.com **W** www.ghd.com

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020;APA asset digitised from DBYD,2020 Created by: cjauniau

A-3 APA Network GIS Plan

LEGEND:

PSP BOUNDARY LINE



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APA NETWORK GIS PLAN

SCALE: NTS

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Victoria Planning Authority
Officer South Employment Precinct
Utility Servicing Assessment
APA GIS GAS PLAN

Job Number	12526394
Revision	A
Date	SEP 2022

Figure 1

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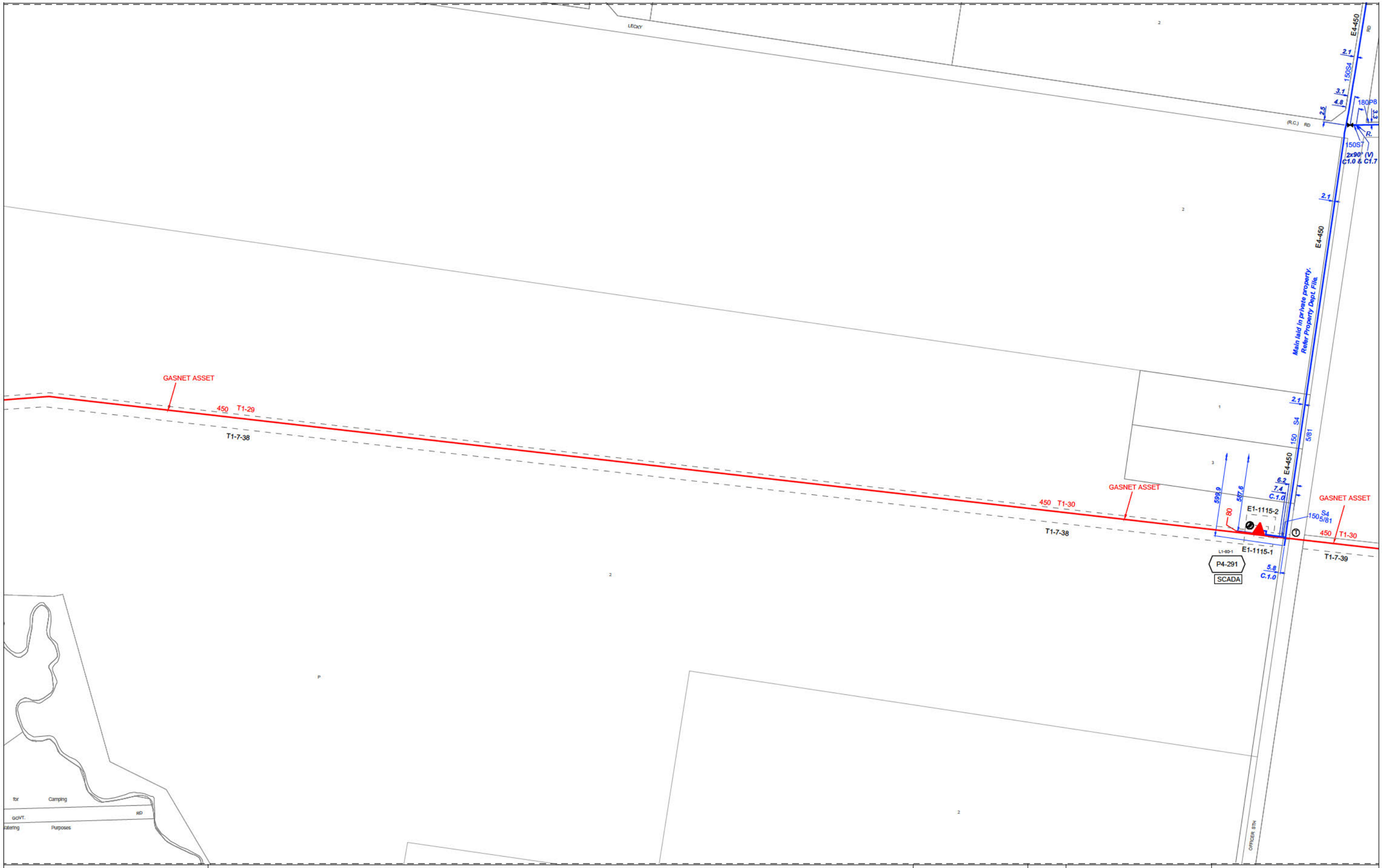
A-4 APA Network BYDA Plan



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0m 100m 200m 300m 400m 500m 600m 700m 800m

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DIMENSIONS ARE IN METRES PIPE SIZES ARE IN MILLIMETRES

FOR LEGEND : REFER *APA_VIC_DISTRICT PLAN_LEGEND.PDF*

PRESSURE RANGES	
LOW PRESSURE	UP TO 7kPa
MEDIUM PRESSURE	7kPa - 200kPa
HIGH PRESSURE	100kPa - 515kPa
TRANSMISSION PRESSURE	IN EXCESS OF 515kPa

LOCATION/TOWNSHIP

CLYDE NORTH, OFFICER, OFFICER SOUTH

REVISED BY	M.R.H.
REVISION DATE	22/07/2021
PRINT DATE	22/07/2021

25-20	26-20	27-20
25-19	26-19	27-19
25-18	26-18	27-18

Australian Gas Networks

MUNICIPALITY

CASEY, CARDINIA

CARRUM 2500

26-19

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0m 100m 200m 300m 400m 500m 600m 700m 800m

DIAL BEFORE YOU DIG 1100

DIMENSIONS ARE IN METRES PIPE SIZES ARE IN MILLIMETRES

FOR LEGEND : REFER "APA_VIC_DISTRICT PLAN_LEGEND.PDF"

PRESSURE RANGES	
LOW PRESSURE	UP TO 7kPa
MEDIUM PRESSURE	7kPa - 200kPa
HIGH PRESSURE	100kPa - 515kPa
TRANSMISSION PRESSURE	IN EXCESS OF 515kPa

LOCATION/TOWNSHIP

OFFICER, OFFICER SOUTH

REVISED BY	M.R.H.
REVISION DATE	28/09/2021
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25-21	26-21	27-21
25-20	26-20	27-20
25-19	26-19	27-19

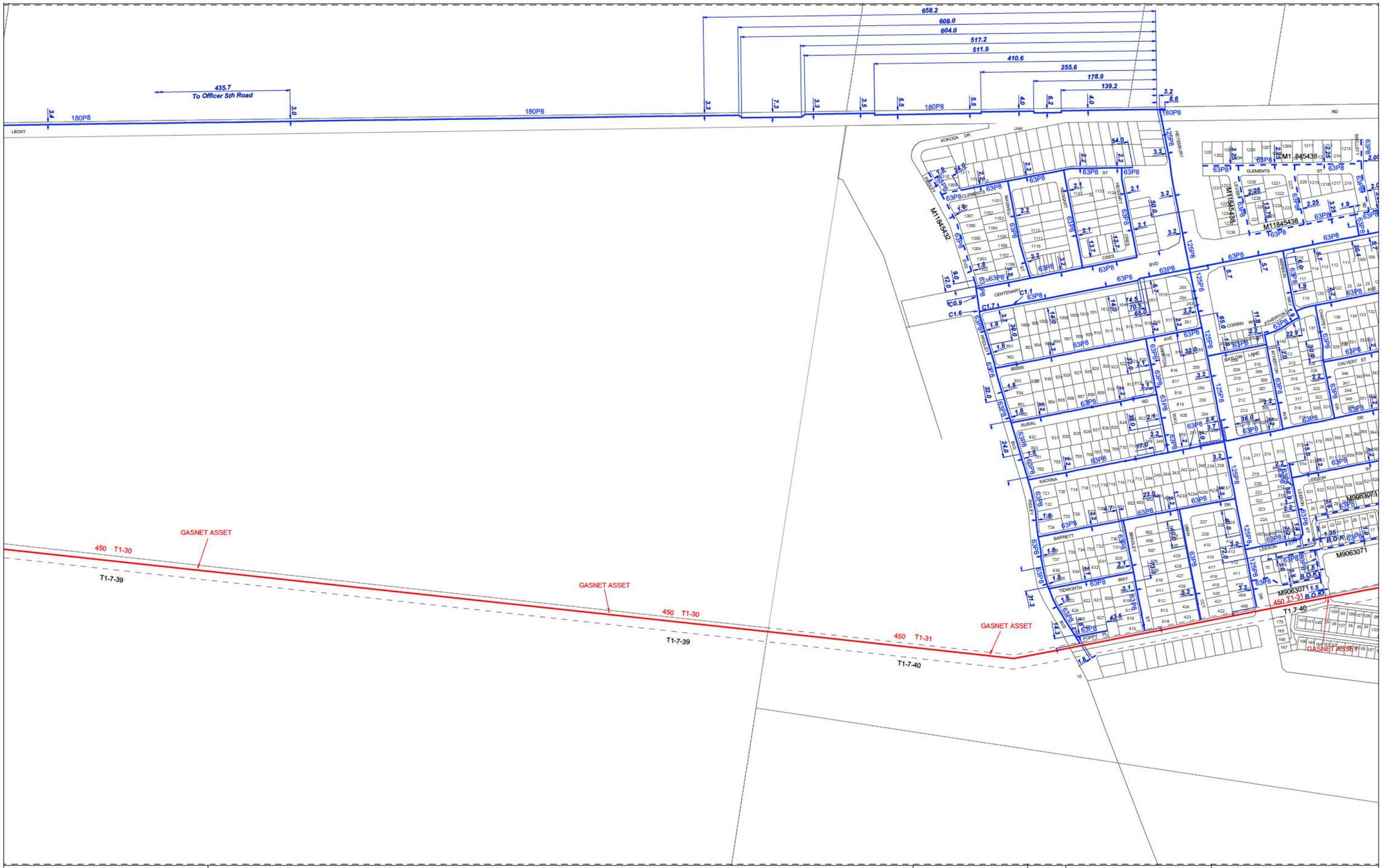
Australian Gas Networks

MUNICIPALITY

CARDINIA

CARRUM 2500

26-20



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HIGH PRESSURE	100kPa - 515kPa
TRANSMISSION PRESSURE	IN EXCESS OF 515kPa

LOCATION/TOWNSHIP: OFFICER, OFFICER SOUTH

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REVISION DATE	22/07/2021
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26-20	27-20	28-20
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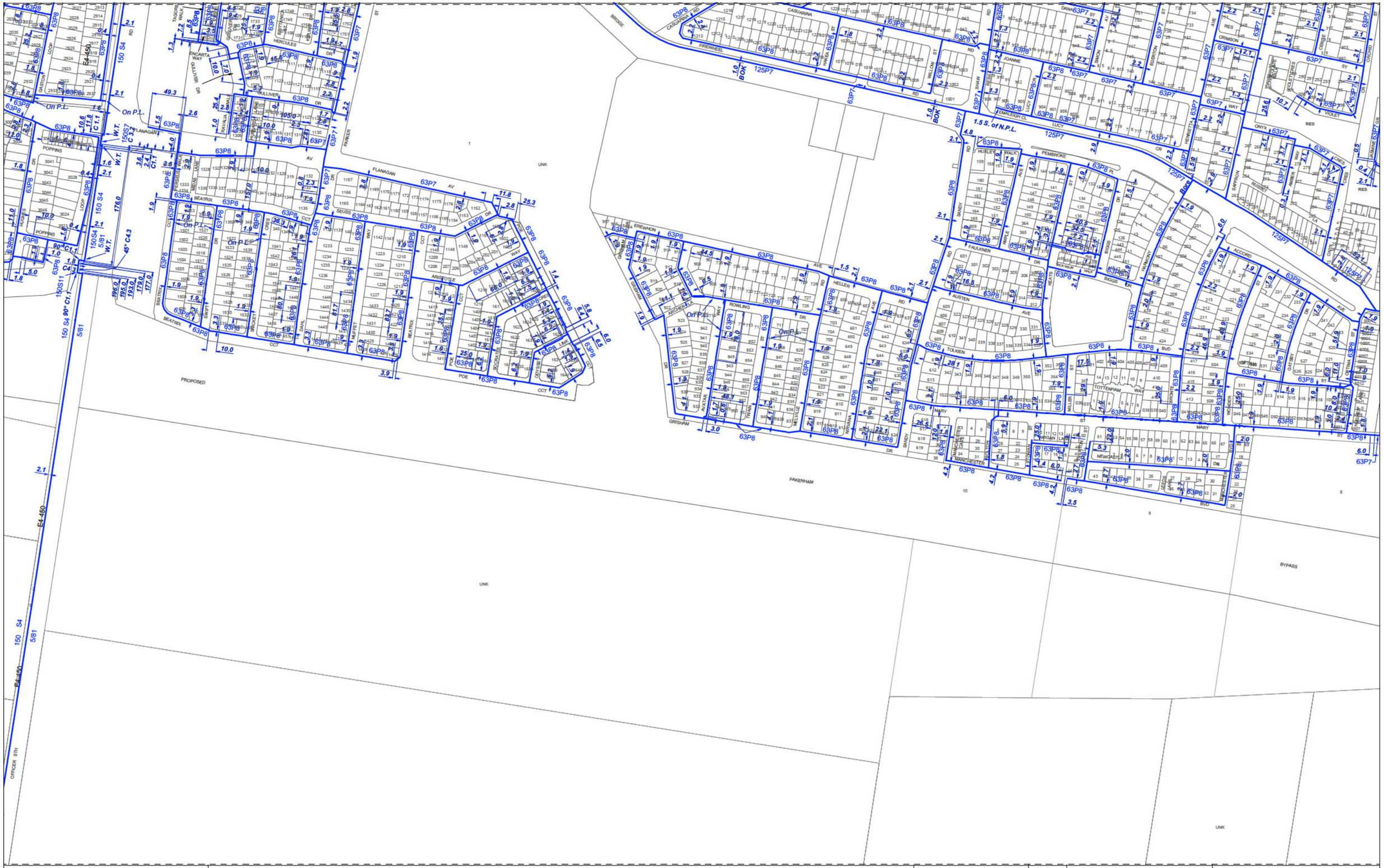
26-18	27-18	28-18

apa Australian Gas Networks

MUNICIPALITY: CARDINIA

CARRUM 2500

27-19



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HIGH PRESSURE	100kPa - 515kPa
TRANSMISSION PRESSURE	IN EXCESS OF 515kPa

LOCATION/TOWNSHIP: OFFICER

REVISED BY A.W.
REVISION DATE 09/11/2021
PRINT DATE 09/11/2021

26-21	27-21	28-21
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Australian Gas Networks

MUNICIPALITY: CARDINIA

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LOCATION/TOWNSHIP: OFFICER

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PRINT DATE	11/10/2021

26-22	27-22	28-22
26-21	27-21	28-21
26-20	27-20	28-20

apa
Australian Gas Networks

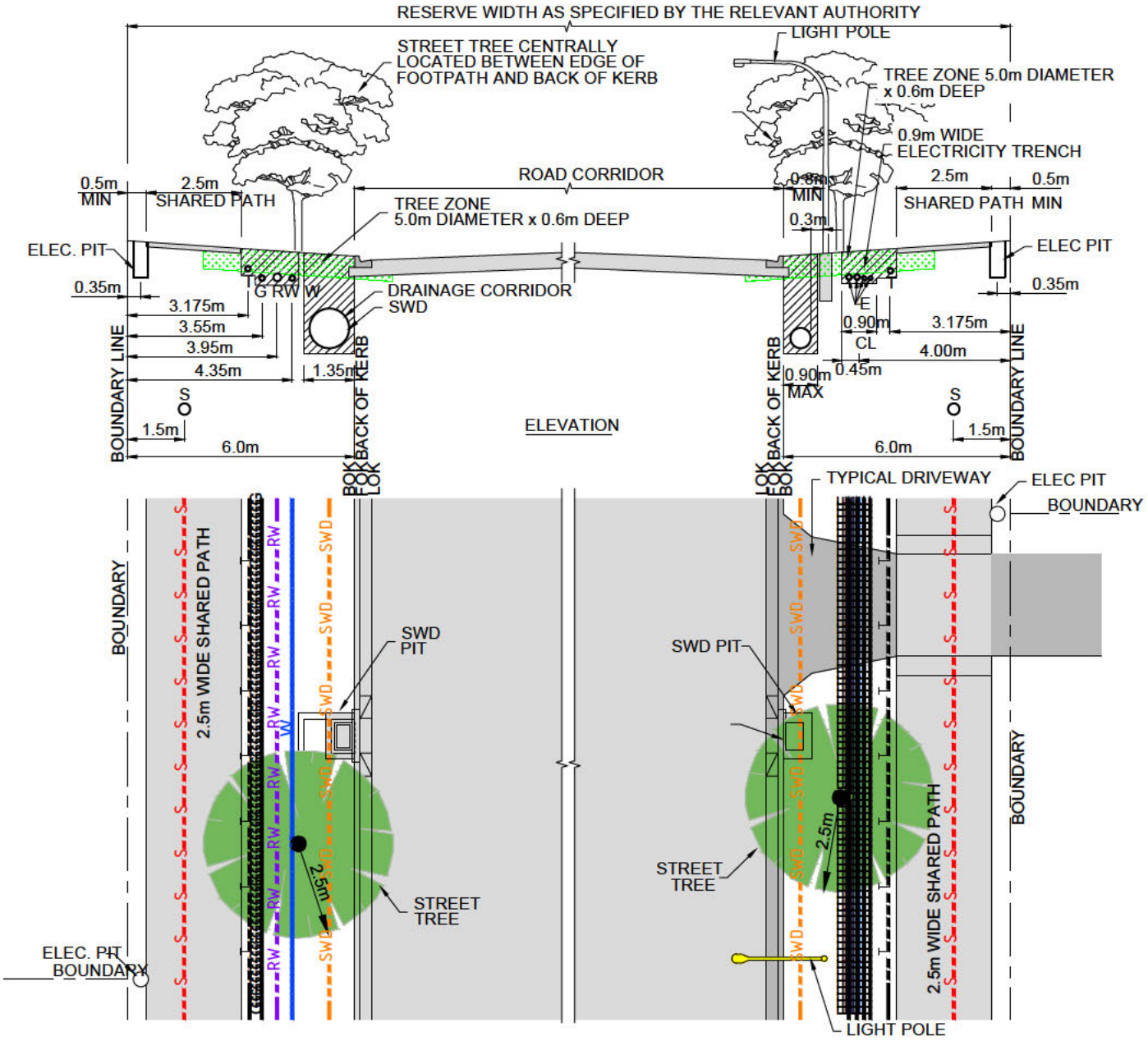
MUNICIPALITY
CARDINIA

CARRUM 2500

27-21

Appendix B

Typical Road Cross Sections



NOTES

1. MINIMUM DEPTH OF COVER TO ALL UTILITY SERVICES WITH THE EXCEPTION OF TELECOMMUNICATIONS SERVICES TO BE 600mm. TELECOMMUNICATIONS SERVICES ARE TO HAVE A MINIMUM DEPTH OF COVER OF 450mm. REFER TABLE A5 FOR FURTHER DETAILS.
2. WHERE STORM WATER ASSETS BELONG TO MELBOURNE WATER AND ARE GREATER THAN 750mm IN DIAMETER, CONTACT SHOULD BE MADE WITH MELBOURNE WATER TO DETERMINE ITS REQUIRED LOCATION IN RELATION TO STREET TREES.
3. LOCATIONS OF STREET TREES, STREET LIGHTS, DRIVEWAYS AND PROPERTY BOUNDARIES ARE SHOWN INDICATIVELY ONLY.

LEGEND

E	ELECTRICTY
G	GAS
S S	SEWER
W	WATER
RW	RAW WATER
T	TELECOMMUNICATIONS
SWD	STORM WATER
LOK	LIP OF KERB
FOK	FRONT OF KERB
BOK	BACK OF KERB
SWD	STORM WATER DRAIN

PLAN VIEW

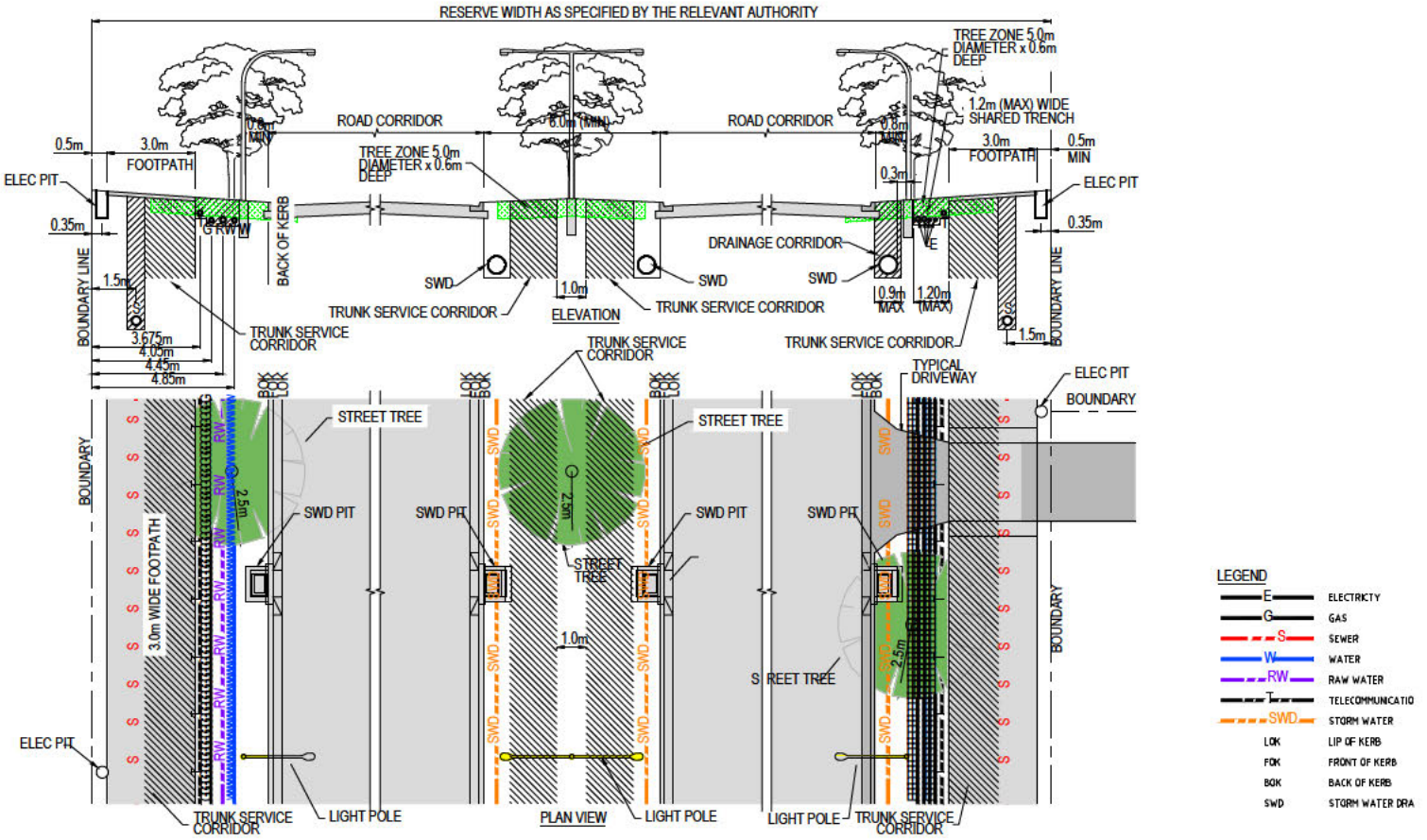
SCALE: NTS

VICTORIAN PLANNING AUTHORITY
OFFICER SOUTH EMPLOYMENT PRECINCT PRECINCT
UTILITIES SERVICE LOCATIONS FOR COLLECTOR LEVEL 1

Job Number 12526394
Revision A
Date SEP 2022
Figure 01

Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au W www.ghd.com

Plot Date 21 September 2022 - 1 29 PM Plotted by Maryam Qasim Cad File No C:\Users\mqasim\OneDrive - GHD\Documents\officer\20220921\CROSS SECTION COLLECTOR LEVEL 1.dwg



PLAN VIEW

SCALE: NTS

VICTORIAN PLANNING AUTHORITY
OFFICER SOUTH EMPLOYMENT PRECINCT
UTILITIES SERVICE LOCATIONS FOR COLLECTOR LEVEL 2

Job Number 12526394
Revision A
Date SEP 2022
Figure 02

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Plot Date 21 September 2022 - 1 23 PM Plotted by Maryam Qasim Cad File No C:\Users\mqasim\OneDrive - GHD\Documents\officer\20220921\CROSS SECTION COLLECTOR LEVEL 2.dwg

Appendix C

Situational Analysis Report

Victorian Planning Authority

Officer South Employment PSP Utility Assessment

Situational Analysis Report

October 2020

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Appendix C Existing Infrastructure Plans and Typical Sections
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1. Introduction

1.1 Project Context

The Officer South Employment Precinct (the Precinct) is located within the Shire of Cardinia, on the south-eastern fringe of metropolitan Melbourne. The Precinct comprises of approximately 1069 hectares of land, bound by the Princes Freeway to the north, Lower Gum Scrub Creek to the east, Patterson Road to the south and Cardinia Creek to the west. A Locality Plan is provided in Appendix A illustrating the location and boundaries of the Precinct.

1.1.1 Existing Land Use

The Precinct is currently predominantly underdeveloped, rural properties. There are several residential properties located throughout the Precinct and there is a service station located to the north of the Precinct along the Princes Freeway.

The Precinct is situated within an Urban Growth Zone (UGZ). The purpose of the UGZ is to allow for urban development[1]. The UGZ is typically associated with a Precinct Structure Plan (PSP) and also permits the existing non-urban use of land prior to the implementation of a PSP.

1.1.2 Project Overview

The Victorian Planning Authority (VPA) has commenced planning for the Officer South Employment Precinct Structure Plan in collaboration with Cardinia Shire Council, authority agencies, landowners and developers. The Precinct will complement existing surrounding development through the provision of mixed used development, incorporating industrial, commercial and residential land uses.

GHD was engaged to undertake the Utility and Servicing Assessment for the Precinct. This assessment consists of a Situational Analysis Report and a Utility Servicing Assessment. Broadly, the Situational Analysis Report identifies key constraints and opportunities associated with existing utility infrastructure. Following the completion of the Situational Analysis Report, the VPA will develop the Precinct's Future Urban Structure, and indicative development yields. GHD will commence discussions with Utility Service Providers (USPs) to identify future utility servicing requirements for the development of the Precinct. The findings of these discussions will form the Utility Servicing Assessment.

1.2 Purpose of this Report

The focus of this assessment is to determine the key constraints and opportunities relating to existing utility infrastructure within and servicing the Precinct. This report includes an assessment of stormwater, water, sewerage, electricity, gas and telecommunications infrastructure. This information will assist the VPA to prepare the Officer South Employment PSP.

This assessment also identifies local and state policy relating to low carbon emissions as well as leading Ecologically Sustainable Development (ESD) practices relevant to employment precincts to assist the VPA in adopting a sustainable approach to planning for the Precinct.

Utility infrastructure has the potential to contribute significant costs and delays if constraints are not identified and addressed early in the development process and therefore this report is crucial to maintaining lines of communication with, and giving pre-planning development information to USPs, who own or manage utility assets in the development area.

1 https //planning-schemes delwp.vic.gov au/schemes/vpps/37_07.pdf

The USPs consulted in this assessment are outlined in Table 1 below. This report integrates their advice regarding existing and required infrastructure to service the Precinct. Opticomm responded to the Dial Before You Dig (DBYD), however upon consultation indicated that its assets are located outside of the Precinct boundaries.

Table 1 Utility Service Providers in the Precinct

Utility	Utility Service Provider	Contact Details
Electricity	AusNet Electricity	Andrew Webber Design Team Leader
	AusNet Transmission	[redacted]
Gas	APA Group Networks	Rebecca May Planning Manager [redacted]
	APA Group Transmission	Michael Mielczarek Senior Urban Planner [redacted]
Sewer	South East Water	Matthew Snell Group Manager Growth [redacted]
Stormwater Drainage	Cardinia Shire Council	Marcelle Bell Growth Area Strategic Planner [redacted]
		Emma Cadd Development Coordinator [redacted]
	Melbourne Water Corporation	Laurence Newcome Precinct Structure Planning Coordinator, Catchment Strategies and Services, Development Services

		[redacted]
Telecommunications	NBN Co	Ferdous Alam Area Planner [redacted]
	Optus / Uecomm	Paul Lowe Senior Project Engineer VIC/TAS Operations [redacted]
	Opticomm	[redacted]
	Telstra	David A Stanley Fundamental Planning Specialist Access Network Planning [redacted]
		David Carricondo Project Specialist Network Integrity Project specialist : Vic/Tas/SA [redacted]
Water	South East Water	Matthew Snell Group Manager Growth [redacted]

1.3 Limitations and Assumptions

The location of existing services has been approximately determined based on Dial Before You Dig (DBYD) information and information provided by USPs. The location and depth of existing infrastructure is approximate and service proving is recommended to confirm the location and depth.

Assessment of the condition and capacity of existing infrastructure has been based on advice and data received from USPs. Information provided by stakeholders is preliminary information only, subject to change and should not be relied upon without verification.

This report has been prepared by GHD for the Victorian Planning Authority and may only be used and relied on by the Victorian Planning Authority for the purpose agreed between GHD and the Victorian Planning Authority as set out in this section.

GHD otherwise disclaims responsibility to any person other than the Victorian Planning Authority arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this section of the report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by the Victorian Planning Authority and others who provided information to GHD (including Government and Utility Service Providers), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report, which were caused by errors or omissions in that information.

1.4 Methodology

GHD undertook an initial investigation into the utility infrastructure within the Precinct area through a desktop study. This research involved using information obtained through a Dial Before You Dig (DBYD) enquiry.

Following the desktop investigation, GHD obtained spatial data from each USP to create Existing Infrastructure Plans, provided in Appendix C. Where spatial data was not able to be obtained from USPs, it has been digitised from the USPs' DBYD responses. A summary of the infrastructure data type utilised in the Existing Infrastructure Plans is provided below in Table 2.

Table 2 Infrastructure Data Types by Utility Service Provider

Utility Service Provider	Infrastructure Data Type
APA Group	Digitised DBYD Data and VPA supplied data
AusNet	Digitised DBYD Data
Cardinia Shire Council	Spatial Data
Melbourne Water Corporation	Spatial Data
South East Water	Spatial Data
NBN Co	Digitised DBYD Data
Optus/Uecomm	Digitised DBYD Data
Opticomm	Digitised DBYD Data
Telstra	Spatial Data

GHD consulted with the relevant USPs to gain a qualitative understanding of the capacity, size and condition of utility infrastructure within and servicing the Precinct, as well as key constraints and opportunities relating to existing utility infrastructure.

GHD provided USPs with a questionnaire to identify the following:

- The location, condition and capacity of existing utility infrastructure

- Affected transmission and trunk assets outside the boundaries of the Precinct and any associated buffers that may impact the Precinct
- Key constraints and opportunities relating to existing utility infrastructure and implications for the future planning of the Precinct
- The nature, timing, location, and costing of any planned works (maintenance, upgrades, network augmentation, extensions, relocations etc.).

GHD undertook a high level research investigation to identify local and state policy that supports low carbon emissions and to identify global leading practice in ESD for employment precincts. This information was assessed, synthesised and compiled into this Situational Analysis Report, along with relevant findings and conclusions for the future development of the Precinct.

2. Stormwater Drainage Infrastructure and Flooding Conditions

The regional drainage network in the Precinct is managed by Melbourne Water Corporation (MWC). Cardinia Shire Council (Council) is responsible for the local drainage network.

2.1 Existing Infrastructure

Existing stormwater drainage infrastructure is shown in Appendix C.

2.1.1 Melbourne Water Corporation

MWC is the floodplain management authority for the Precinct.

The Precinct is bounded by Cardinia Creek in the west and Lower Gum Scrub Creek in the east.

MWC is responsible for a short length of 1800 mm diameter pipe crossing Lecky Road at the Lecky Road and Officer South Road intersection, and a short length of 1200 mm diameter pipe on Lecky Road on the eastern perimeter of the Precinct.

2.1.2 Cardinia Shire Council

Council drainage infrastructure within the Precinct is predominantly above ground drainage channels (swales) and short stormwater pipes connecting the swales. Swales are grass lined or vegetated channels that transfer stormwater[2]. In the Precinct, swales are located in the road reserve of Officer South, Lecky and Stephens Roads, as well as Handford Lane.

Council stated that there are also several private dams in the Precinct.

2.1.3 Flood Overlays

A Land Subject to Inundation Overlay (LSIO) is applicable to areas of the Precinct. These areas are predominantly located around the Precinct perimeter, at the locations of Cardinia Creek and Lower Gum Scrub Creek, and on Officer South Road. The extents of the LSIO are shown in Appendix B.

The LSIO identifies land in flood storage or flood fringe area affected by stormwater flows generated in a rainfall event with a 1% chance of occurring in any year (100-year average recurrence interval). The LSIO relates to flooding along major waterways, or any other area determined by the floodplain management authority. The purpose of the LSIO is to ensure that any proposed development does not generate negative impacts on existing flooding and drainage conditions.

A Floodway Overlay (FO) affects areas within and bounding the Precinct. Again this overlay is associated with the Cardinia Creek and Lower Gum Scrub Creek. The FO identifies waterways, major flood paths drainage depressions and high hazards areas that are prone to active flood flows in excess of 1 m deep. The extents of the FO are shown in Appendix B.

2.2 Key Issues and Opportunities

2.2.1 Melbourne Water Corporation

MWC provided indicative flood extents for the Precinct. This information is shown in Appendix C. These flood extents encroach into the Precinct and are generally associated with Cardinia

2 https://www.melbournewater.com.au/planning-and-building/stormwater-management/options-treating-stormwater/swales

Creek and Lower Gum Scrub Creek that are located at the perimeter of the Precinct. MWC identified the following limitations associated with the flood extents:

- Gum Scrub Creek flood extent is based on the Dandenong Valley and Western Port Authority (DVWPA) modelling and does not accurately represent current best practice modelling or current flow information
- Cardinia Creek flood extent is indicatively shown as the extent does not currently match with designated flood levels.

MWC also advised the following:

- The Officer South Drain is unmapped. In a major event, the majority of flow from this drain is expected to enter Gum Scrub Creek by flooding the properties to the north of Lecky Road.
- There is an unmapped tributary in the western portion of the Precinct that would have an associated flood extent
- It is likely that majority of the Precinct is subject to shallow sheet flooding

MWC provides Development Services Schemes (DSS) for urban growth areas. A DSS outlines the drainage strategy at a catchment scale, and details the relevant drainage infrastructure required such as pipelines, overland flow paths, retarding basins, wet-lands, flood ways and other drainage and water quality treatment measures[3].

There are currently two DSS within the Precinct, the Officer South DSS and Lower Gum Scrub Creek DSS. MWC stated that further background studies (e.g. Environmental, Geomorphic and Land Capability) and designs are underway to further progress both the schemes. These background studies will also reconfirm flood extents, retarding basin locations, waterway widths, the existing condition of the Officer South Drain and outfalls to Cardinia Creek.

MWC advised that there is a previous agreement with Development Victoria to offset a retarding basin required to the north of the Princes Freeway onto land under its control within the Precinct.

MWC identified the following potential constraints that may impact the development of the DSS in the Precinct:

- Sequencing of future development
- The location of the transmission gas pipeline
- Future provision of downstream outfalls

Additionally, MWC highlighted that the requirements of the Cardinia Creek main outfall and Lower Gum Scrub Creek outfall need to be identified, as these may impact the development planning for the Precinct. MWC advised that there is opportunity for integrated water management (IWM) within the Precinct, in line with its *Healthy Waterways Strategy 2018*[4] performance objectives.

2.2.2 Cardinia Shire Council

Council advised the following regarding the Precinct:

- The key flooding issues in the Precinct are the areas affected by the LSIO.

3 https //www.melbournewater.com.au/planning-and-building/developer-guides-and-resources/drainage-schemes-and-contribution-rates/find-0

4 https://www.melbournewater.com.au/about-us/strategies-achievements-and-policies/healthy-waterways-strategy

- Achieving appropriate outfall from the Precinct, for existing flows entering the Precinct from urban development to the north of the Precinct and flows generated within the Precinct, is a significant concern for both Council and MWC due to the topography of the Precinct.
- Outfall requirements for the Precinct and the impact of the Precinct on downstream catchment needs to be considered during the development of the Precinct as it is a significant issue.

Council stated that it is advocating for a closed loop, carbon neutral integrated water network to contribute to a more sustainable and liveable community by planning and delivering innovative water supply, waterways and sewerage services to the Precinct.

Currently there are no planned works to Council drainage infrastructure other than regular maintenance programs. Any planned works such as upgrades or augmentation would be undertaken as part of any future PSP development.

3. Water Infrastructure

South East Water (SEW) is the water retailer responsible for the distribution and reticulation infrastructure within the Precinct. MWC advised it has no trunk water supply assets in the Precinct.

3.1 Existing Infrastructure

Existing potable and recycled water infrastructure is shown in Appendix C.

3.1.1 Potable Water

There is one existing water asset in the Precinct, located along Officer South Road. This asset is a DN50 un-plasticised polyvinyl chloride pipe (UPVC) dead end main. This asset is a private asset servicing the residential properties in the Precinct. This private asset is maintained by SEW under supply by agreement. SEW advised that the private water main supplies the existing residential properties. SEW stated that under the supply agreement, SEW does not guarantee water quality or a certain rate of water flow or pressure. SEW indicated that as additional potable water infrastructure becomes available in the Precinct it is likely that this agreement will be abandoned.

3.1.2 Recycled Water

There are currently no recycled water assets within the Precinct.

Residential estates outside the Precinct, including Kudana Park, Arcadia, Beaconsfield Roses and Berwick Waters are currently serviced by SEW with recycled water. The locations of these residential estates are illustrated in Figure 1 below.

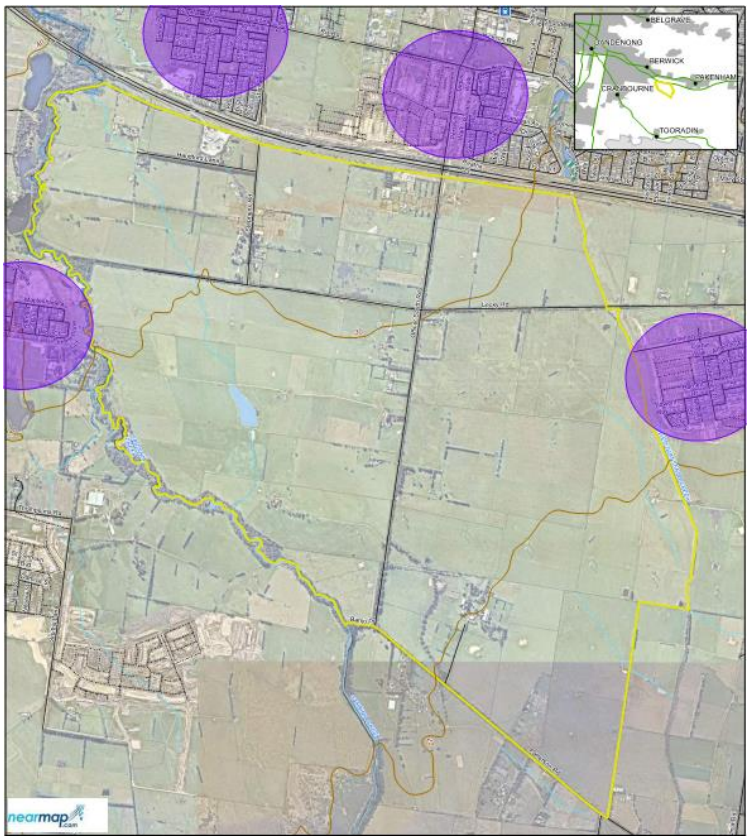


Figure 1 Residential estates serviced by recycled water

3.2 Key Issues and Opportunities

3.2.1 Potable Water

SEW advised that the future development in the Precinct will be serviced by the future Clyde-Officer PR (pressure reducing) 85 m zone. Pressure reducing refers to the hydraulic head of the reservoir being reduced. It is likely the hydraulic head (pressure) of water from the reservoir is greater than 85 m and deemed unsuitable for reticulation infrastructure. It is likely that a pressure reducing valve will be required in the network to reduce the Precinct's water supply pressure to 85 m.

SEW has advised it will deliver future the water infrastructure shown blue in Figure 2 below as part of its capital works program. SEW does not expect any additional land required for the proposed infrastructure.

SEW stated that the planned water infrastructure will be delivered in alignment with PSP development. SEW advised that all distribution assets including pipes greater than DN225 delivered by the developer will be (at least partially) cost reimbursed by SEW in line with its Land Development Policy. Future reticulation assets, DN150 or smaller, required to service the Precinct development will be provided by the developer at the developer's cost.

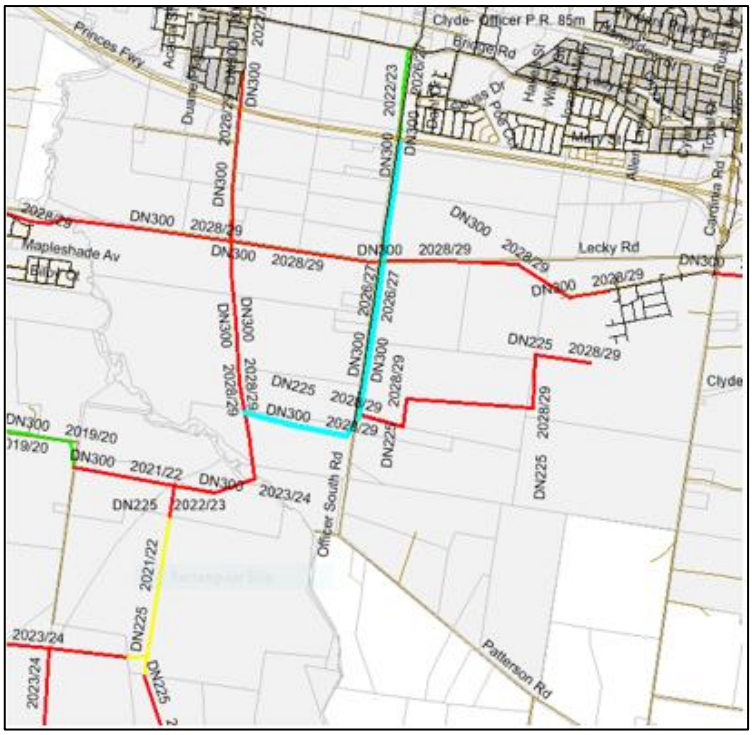


Figure 2 Proposed Distribution Water Infrastructure, South East Water 2020

3.2.2 Recycled Water

SEW does not have any recycled water infrastructure planned for the Precinct as part of its current capital works program. It advised that if recycled water is required in the Precinct, it will be supplied from the future Cranbourne – Clyde – Officer R.W (recycled water) 80 m zone, as indicated by the pink shading in Figure 3 below. SEW advised that this area is supplied from the Pakenham Treatment Plant, which will become a regional plant.

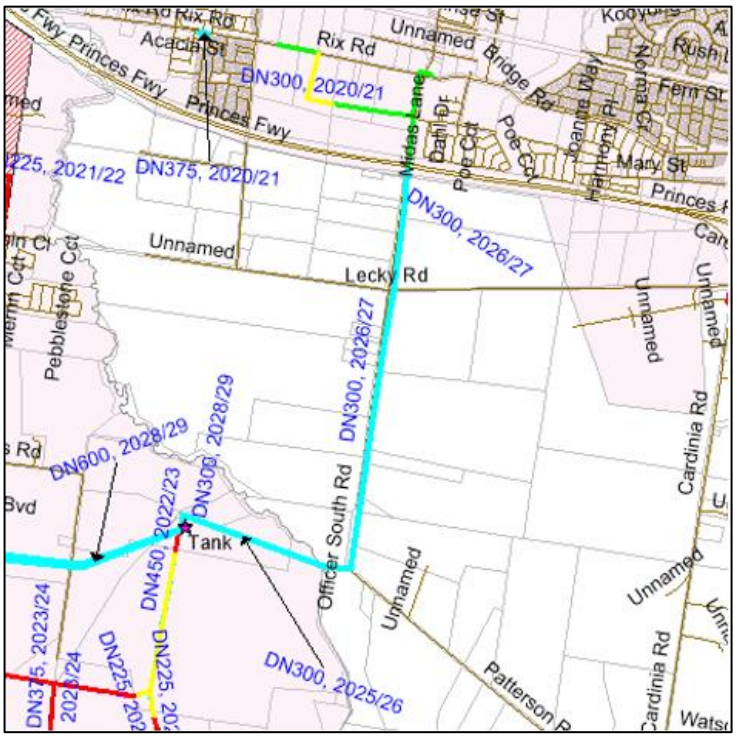


Figure 3 Proposed Recycled Water Infrastructure and R.W Zone, South East Water 2020

3.2.3 Integrated Water Management

IWM provides a sustainable and innovative approach to water servicing, taking into consideration the entire water cycle to deliver water to developments.

SEW advised that, in addition to the possibility of recycled water infrastructure, there are stormwater and rainwater harvesting opportunities within the Precinct and any USP works relating to potential stormwater and rainwater harvesting would be triggered by government funding opportunities. Individual developers will also have the opportunity to provide their own IWM strategies.

Council encourages the implementation of recycled water infrastructure within the Precinct, whether or not this is supplied by SEW.

4. Sewer Infrastructure

SEW is the authority responsible for the distribution and reticulation sewerage network in the Precinct. MWC confirmed it has no trunk sewer assets in the Precinct.

4.1 Existing Infrastructure

Existing sewer infrastructure is shown in Appendix C.

Existing sewer assets are located predominantly along the northern boundary of the Precinct. The network comprises of both gravity pipelines and pressured rising main pipelines parallel to the Princes Freeway. The gravity sewer pipeline is a 1280 mm diameter glass reinforced plastic (GRP) pipe and crosses Officer South Road. The rising main pipeline is a 600 mm GRP diameter pipe. The 600 mm diameter rising main connects to an 800 mm diameter rising main GRP pipe in the north-western corner of the Precinct.

The Officer South Road sewer pump station is located in the north of the Precinct, to the west of Officer South Road.

4.2 Key Issues and Opportunities

SEW stated that there is a 200 m buffer area around the Officer South Road sewer pump station. This buffer prohibits the following land uses:

- Residential development
- Restaurants and take away shops
- Food based retail
- Community facilities such as libraries
- Education facilities including child care centres, schools and universities
- Any other uses that may be sensitive to odour

SEW indicated that the Precinct would likely require an additional pump station, located along Patterson Road, south of the Precinct. SEW advised that this proposed sewer pump station would also have an associated 200 m buffer area. There is opportunity to liaise with SEW to explore strategies to reduce the buffer area of the existing and proposed pump stations.

5. Electrical Infrastructure

The entirety of the Victorian electricity transmission network is owned and operated by AusNet Services (AusNet).The distribution network in the Precinct is operated by AusNet Electricity, one of five electricity distributors in Victoria.

5.1 Existing Infrastructure

Existing transmission and distribution electrical infrastructure is shown in Appendix C.

5.1.1 Transmission Network

Three AusNet overhead transmission lines (two overhead 500 kV lines and an overhead 66 kV sub-transmission line) run east-west in the southern portion of the Precinct. These assets are located within a 146.30 m wide easement.

5.1.2 Distribution Network

AusNet is responsible for the high voltage (HV) overhead lines within the Precinct located on Handford Lane, Stephens Road and Officer South Road. There are HV overhead lines extending into private property from Handford Lane and Officer South. There is a small section of HV underground electrical infrastructure located at the northern boundary of the Precinct on Officer South Road and within private property further south of Officer South Road.

There are overhead single wire earth return (SWER) lines adjacent to the southern boundary along Patterson Road that enter into the Precinct These SWER lines service the surrounding properties.

5.2 Key Issues and Opportunities

5.2.1 Transmission Network

5.2.1.1 Easements

The purpose of the transmission line easement is to ensure there is adequate land for both existing and future lines, access for maintenance and repair purposes and safety control measures.[5] AusNet stated that there is provision for a future 220 kilovolt (kV) line within the existing easement, should it be required. AusNet advised that the existing transmission easement must be retained.

AusNet has the authority to restrict activities that can be carried out within the easements, AusNet approval is required for development or construction within the transmission easement.

AusNet provided general advice regarding permitted uses of transmission line easements and some non-exclusive examples are provided below:

- Sewerage, drainage and water pipes constructed from non-conductive materials
- Trees, vegetation, landscaping and paving
- Ground level sporting activities
- Parking of sedan and utility types of vehicles

AusNet advised that proposed roads are not permitted parallel and within the easement, however proposed roads are permitted to run parallel and outside of the easement.

5 https //www.ausnetservices.com.au/-/media/Files/AusNet/Residential-Electricity/Safety/A-guide-to-living-with-transmission-line-easements.ashx?la=en

Perpendicular road crossings are permitted outside a 30 metre arc of transmission tower centres.

5.2.1.2 Servicing

AusNet stated that the current loading connected of the Precinct is approximately 2,150 kilovolt amperes (kVA). AusNet advised that there is currently limited capacity in the surrounding 22 kV feeders (ORF21 and ORF22). It is expected that these feeders will exceed their capacity in the short to medium term.

AusNet advised that the AusNet System Planning Team will need to be engaged to review the proposed load requirements for the Precinct to determine the appropriate servicing strategy for the Precinct.

AusNet indicated two possible scenarios to service the Precinct:

- New 22kV feeders to be installed from the existing Officer Zone Substation (OFR) and/or Clyde Zone Substation (CLN), depending on final available capacity and load requirements of the Precinct. In this scenario, a second 22 kV switchboard in the OFR zone substation would be necessary. The works associated with a second 22 kV switchboard requires a lead time of 3 years.
- A new zone substation would be required if the load requirements of the Precinct exceed the capacity available in the existing network. The new zone substation would require approximately 10,000 m^2 of additional land take. In this scenario an overhead 66 kV double circuit line along Officer South Road is required.

AusNet advised that the existing overhead line in Officer South Road cannot be undergrounded. AusNet stated that in the scenario where a new zone substation would be required, the associated double circuit 66 kV lines would likely be installed above ground as it is cost prohibitive to install these assets underground.

AusNet stated that any planned works to its network will be funded by AusNet. Any works associated with additional private load requirements may require financial contributions from the customer. AusNet advised that the cost of the new zone substation and associated works would be approximately $25 million.

5.2.2 Distribution Network

AusNet advised the following regarding its distribution network:

- As the Precinct develops and an alternative electrical supply is available, it is likely that the existing SWER lines can be decommissioned.
- Provisions for easements or reserves are required for any future substations and underground cables, should there be a preference for underground assets.
- Additional land will be required for local kiosk substations.
- Throughout the development of the Precinct, ensuring that its existing customers are supplied with electricity is a priority and therefore planning is necessary to ensure planned shut downs are kept to a minimum.

AusNet requires that any development will need to adhere to clearances from AusNet's electricity assets as per *Electricity Safety (Installations) Regulations 2009.*[6]

6 Available at http://www6.austlii.edu.au/cgi-bin/viewdb/au/legis/vic/consol_reg/esr2009470/

6. Gas Infrastructure

APA Group owns the gas transmission network and APT O&M services (APA) operates and manages the natural gas reticulation network within the Precinct on behalf of Australian Gas Networks (AGN).

6.1 Existing Infrastructure

Existing transmission and distribution gas infrastructure is shown in Appendix C.

6.1.1 Transmission Network

APA Group is responsible for the T1 Morwell-Dandenong high pressure gas pipeline, a 450 mm diameter transmission pipeline that runs west-east through the Precinct. This asset is contained within a 20.1 m wide easement. There is approximately 1.2 m of cover from the top of the pipe to the existing surface level.

6.1.2 Distribution Network

APA controls distribution assets within the Precinct. This includes a 180 mm diameter high pressure gas pipeline in the Lecky Road road reserve to the east, and a 150 mm diameter high pressure gas pipeline located in an easement in private property, adjacent to the Officer South Road road reserve in the north of the Precinct at an offset of 2.1 m.

6.2 Key Issues and Opportunities

6.2.1 Transmission Network

APA Group stated that the easement associated with the transmission pipeline allows for access to the existing pipeline and any future duplication if required. APA Group does not permit road reserves or any utility infrastructure to be located within the easement, other than perpendicular utility service crossings approved by APA Group.

Council advised the following regarding the easement associated with APA's transmission pipeline:

- Linear parks and shared user paths may be permitted along easement
- APA Group may consider the easement to be located within the front of private lots where there is car parking and landscaping. In this scenario, APA retains the legal access to the pipeline.
- APA Group is developing a policy to identify the permitted types of landscaping within the easement.

The Australian Standard 2885 (Pipelines – Gas and Liquid Petroleum) (AS2885) governs the operation of high pressure gas transmission pipelines. The measurement length (ML) of the T1 Morwell-Dandenong high pressure gas pipeline is 275 m either side of the pipeline. APA Group identified the following sensitive land uses should be located outside of the ML, and requires risk management consideration if located within the ML:

- Aged care facilities
- Retirement villages
- Child care/ family day care centres
- Cinema based entertainment facility

- Schools or other educational establishments
- Prisons/corrective institutions
- Hospitals and medical centres
- Places of assembly or worship
- Retail premises (large scale – high density)
- Service stations
- Higher density residential uses (greater than 50 dwellings per hectare)
- Industrial development which store or create large volumes of volatile materials (e.g. explosive factory or refinery).

APA Group advised that in accordance with AS2885, a Safety Management Study (SMS) is required when the land use classification changes within the ML. APA Group stated that proposed development would likely require a change in land classification and therefore an SMS should be undertaken prior to the development commencing. VPA stated that an SMS will be conducted as part of the development of the Precinct Structure Plan (PSP) process.

The purpose of an SMS is to assess the risk associated with a change in land use, including both construction risks and ongoing land use risks. The SMS will also identify appropriate controls to reduce risks to 'as low as reasonably practicable' (ALARP). The SMS will also consider what controls are necessary, such as the requirement for a construction management plan in a designated area around the pipeline.

The SMS may also find, based upon the pipeline design and credible threats in the area that a number of the sensitive land uses listed above may be able to be safely located in inside the ML. VPA advised that in the Pakenham East PSP, the SMS identified that the high design quality of the gas pipeline and the likelihood of a rupture in the pipeline was deemed to be non-credible. Subsequently in this instance, the trigger area was reasonably applied to the areas of highest possible consequence or risk, rather than the full ML.

6.2.2 Distribution Network

Gas is not an essential service and therefore individual developers have the option whether or not to service their development with gas. Given the limited amount of gas distribution infrastructure within the Precinct, it is highly likely that any development requiring a gas servicing would require additional distribution infrastructure.

APA advised the following regarding its distribution network and future servicing:

- The existing 150 mm diameter pipeline currently located in an easement in private property needs to be preserved.
- The existing distribution assets will require a 2.0 m clearance from title boundaries and a 3.0 m clearance from building facades, inclusive of verandas and canopies.
- There are currently no planned works in the Precinct
- Any additional distribution infrastructure would be provided in response to a customer connection request. If a customer connection requests triggers augmentation to the distribution network, it is likely that the customer would be required to make a financial contribution.
- Developers can choose to provide a natural gas reticulation network, the costs associated with this infrastructure would be fully attributable to the developer.

- APA requires an indication of the proposed demand of each building and the location of expected proposed supply point (metering) to evaluate capacity and asset alignment.
- For residential development, APA only requires the number of proposed lots to evaluate network capacity and asset alignment.

7. Telecommunication Infrastructure

The Precinct is serviced by three telecommunication service providers: Telstra, NBN and Optus. As developers are entitled to choose their own telecommunications provider, the Infrastructure of Last Resort (IPOLR) is the telecommunications provider that must provide the developer with a commercial offer for telecommunication services.

NBN is the IPLOR in new development consisting of 100 lots or more. Telstra is the IPOLR for developments less than 100 lots until the NBN access network rollout commences in the area[7].

7.1 Existing Infrastructure

Existing telecommunication infrastructure is shown in Appendix C.

7.1.1 Telstra

Telstra assets throughout the Precinct currently comprise of pit and pipe infrastructure in Handford Lane, Officer South and Stephens Road road reserves. A major fibre optic asset is located in the Precinct in Lecky Road, from Officer South Road to Soldiers Road. This major fibre optic runs from Cranbourne, Berwick South and Pakenham and is vital to the Telstra network.

Telstra stated that the existing infrastructure is operational and meets the current demand.

7.1.2 NBN

There is NBN pit and pipe infrastructure in Officer South Road and Lecky Road. The NBN roll out map[8] indicates that the Precinct is currently serviced via a fixed wireless connection from transmission towers[9]. NBN advised that infrastructure within the Precinct is transit cable infrastructure and not used for connection.

7.1.3 Optus

Optus considers its assets in the Precinct as critical fibre assets. Optus cables are present on Officer South Road, the west of Lecky Road and along Stephens Road. Optus stated that its cables are co-located with Telstra assets along Lecky Road and the north of Officer South Road.

7.2 Key Issues and Opportunities

7.2.1 Telstra

Telstra advised that the major fibre asset along Lecky Road requires consideration in the Precinct planning and may require protection. Telstra's Network Integrity team indicated that any works occurring within 3.0 m of the asset would trigger an Impact Study to identify the necessary protection measures and clearances.

Telstra stated that there are currently no planned works in the Precinct. Any planned works would be triggered by commercial agreements with developers and requests for service by individual businesses.

Telstra stated that it can provide telecommunication services to the Precinct as development occurs via fibre optic and wireless networks. Telstra requires provision for a Telstra conduit in a

7 https://www.nbnco.com au/corporate-information/about-nbn-co/policies/telecommunications-policies

8 https //www.nbnco com au/learn/rollout-map

9 https://www.nbnco.com au/learn/network-technology/fixed-wireless-explained

main road easement to service the Precinct. Telstra advised that it may require one or more parcels of land for future mobile phone towers. Once the Precinct's demand for telecommunications servicing is understood, Telstra can provide further information about the type and number of future mobile phone towers required.

7.2.2 NBN

There is a lack of fixed line infrastructure throughout the Precinct. NBN fixed line infrastructure comprises of backhaul and new build construction. Backhaul infrastructure is the infrastructure required to connect new developments to the broader telecommunications network. This infrastructure involves a connection from the new development to an access point that has capacity to service the new development.[10] Due to the underdeveloped nature of the Precinct it is likely that both backhaul and new build infrastructure would be required for the Precinct.

NBN advised that there is no NBN pit and pipe infrastructure in the area available for connection. NBN requires information regarding the Precinct's telecommunication demand to provide advice regarding the infrastructure requirement and costs necessary to service the Precinct.

7.2.3 Optus

Optus advised it requires clear access to its assets at all times and advises that any future assets be located within road reserve or open space. Optus does not have any planned upgrades to its infrastructure in the Precinct and planned upgrades would be triggered by a customer request. Optus advised that any upgrades would likely be to its existing conduits, as these have capacity for additional cables.

10 https://www nbnco.com.au/content/dam/nbnco2/documents/backhaul-contributions-fact-sheet.pdf

8. Ecologically Sustainable Development

A key goal of the VPA in planning for the development of the Precinct is to facilitate a low carbon emissions development. GHD undertook a high level desktop study to understand how local and state policy could facilitate low carbon emissions development, as well as to obtain examples of employment precincts already utilising innovative electricity servicing models.

8.1 Low Carbon Emissions Development Policies

8.1.1 Renewable Energy Target

The Victorian government set a Renewable Energy Target of 25% renewal energy by 2020 and 40% by 2025[11]. These targets will increase renewable energy investment in Victoria, creating thousands of new jobs and moving the state towards a future of sustainable energy. The Victorian government is considering both policy level and financial support to meet its renewable energy target.

8.1.2 Net Zero by 2050 Emissions Reduction Target

In response to the Independent Review of the Climate Change Act 2010, the Victorian government has set a net zero greenhouse gas emissions by 2050. As part of this target the Victorian government sets interim targets every five years until 2050 to ensure the target is met[12].

8.1.3 National Energy Productivity Plan

Endorsed by the Council of Australian Governments (COAG) Energy Council, the National Energy Productivity Plan (NEPP) is aimed at improving Australia's energy productivity by 40% by 2030[13].

Energy productivity is a measure of the value received from an investment in energy and energy infrastructure. By implementing energy efficiency activities, in the commercial and residential sectors, there is opportunity to reduce energy consumption by 104 petajoules (PJ) and 84 PJ respectively[14].

8.1.4 Plan Melbourne 2017 - 2050

Plan Melbourne 2017-2050 supports Ecologically Sustainable Design (ESD) that considers geography, planning and design in ways that facilitates connections between people, places and resources[15]. It also supports the inclusion of energy efficiency and renewable energy to assist in the delivery of cost-effective environmental outcomes.

8.1.5 State Planning Policy Framework (SPPF)

The State Planning Policy Framework (SPPF) currently includes high-level strategic objectives and statements, which encourage developments to incorporate ESD and consider the environment in land use and development.

Clause 11.07 of the SPPF seeks to develop environmentally sustainable regions and settlements in regional Victoria. This clause identifies key principles to guide settlement

11 https://www energy.vic.gov.au/renewable-energy/victorias-renewable-energy-targets

12 https://www climatechange.vic.gov.au/media-releases/victorias-net-zero-by-2050-emissions-reduction-target

13 https://www energy.gov au/government-priorities/energy-productivity-and-energy-efficiency/national-energy-productivity-plan

14http://www coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/National%20Energy%20Productivity%20Plan%20release%20version%20F NAL_0.pdf

15 https://planmelbourne.vic.gov au/__data/assets/pdf_file/0005/377123/Plan_Melbourne_2017_Implementation_plan pdf

planning in Victoria's regions (including peri-urban areas), and provides strategies to respond to the impacts of climate change include:

- Siting and designing subdivisions to minimise the impact on the natural environment
- Encouraging reduced energy and water consumption through environmentally sustainable subdivision and building design.

8.1.6 Cardinia Council Aspirational Energy Transition Plan 2014 – 2024

Council's Aspirational Energy Transition Plan[16] includes the following emission reduction targets

- Zero net emissions for Council operations by 2024
- 36% reduction in emissions per resident by 2024

This plan also proposes several community actions and initiatives to support the emission reduction targets.

8.2 Ecologically Sustainable Development for Employment Precincts

ESD describes the type of development that does not negatively impact natural ecologically processes. ESD practices in employment precincts ensure that the user's needs are met while simultaneously ensuring that the availability of resources required for future generations and development is not compromised.

8.2.1 Distributed and Renewable Energy Generation

Distributed energy generation refers to a variety of different grid-connected energy technologies that generate electricity at, or close to, the location of use. Whilst a number of different technologies can be utilised, the most accessible technologies for the residential or commercial sectors are solar photovoltaic panels and small wind-turbines. The use of solar photovoltaic panels in an employment precinct is beneficial, particularly when there is provision provided to allow for the installation of solar photovoltaic panels.

Distributed and renewable energy grids provide numerous benefits to residents and businesses within an employment precinct, including energy security and the potential for energy export and income generation. When combined with energy storage technologies, a distributed network can reduce the load on centralised utilities and provide reduced and predictable energy pricing.

8.2.2 Energy Efficient Buildings

The benefits to increased energy efficiency in buildings include moderated temperatures, lower energy bills and increased air quality. It also provides benefit to residents and business owners in the form of increased resale value.[17]

In relation to building efficiency, the COAG Energy Council direction for new buildings is towards net zero energy and carbon ready buildings[18].

All new homes and buildings in Victoria must comply with the Building Code of Australia. The National Australian Built Environment Rating System (NABERS) and National House Energy Rating Scheme (NatHERS) can be used to measure a building's energy efficiency and carbon emissions.

16 https://www cardinia.vic.gov.au/downloads/download/286/aspirational_energy_transition_plan_2014%E2%80%9324_-_cardinia_shire_council

17 https://www sustainability.vic.gov.au/betterbuildings

18 http://coagenergycouncil gov.au/sites/prod.energycouncil/files/publications/documents/Trajectory%20for%20Low%20Energy%20Buildings.pdf

Many new urban developments implement a target building energy efficiency rating, and some precincts may mandate minimum energy efficiency building ratings.

8.2.3 Waste Management, Smart Separation and Disposal

Waste collection in Australia is highly dependent on regional and local requirements, often involving the collection of waste using garbage trucks.

An emerging technology in waste industry is the use of an underground pneumatic waste conveyance system. The system transports waste from residential and commercial buildings through a system of underground pipes that appear above ground at collection points. The system is suitable to high-density urban environments and represents a significant reduction in resources in terms of labour, hours and fuel when compared to the traditional waste collection practices[19].

The system is being used or trialed around the world, including locations such as the Pearl-Qatar (Doha), Wembley (UK), Singapore and in the Maroochydore City Centre (Queensland)[20].

Effective waste management systems also support ESD and some of these practices can include:

- On-site management of food, garden and organic waste. At a commercial scale this can involve composting or organics processing technologies[21]
- Allowing for the provision of additional glass recycling in residential and commercial sites
- Co-locating recycling and general waste bins to encourage recycling
- Considering the use of smart bins to reduce the frequency in which the bins are emptied.

8.2.4 Encouraging Electric Vehicle Use

By 2040, it is predicted that 70% of all new vehicle sales will be represented by Electric Vehicles (EVs)[22]. One of the major barriers for EV uptake is the availability of public charging station infrastructure. In sustainable precinct developments, EV charging stations should be provided in anticipation of increased demand. Many cities around the world already have extensive public charging infrastructure. The world leaders in this field are Norway and the Netherlands, each with over 1,500 public charging points per million population.[23] Whilst there are currently fewer than 800 charging stations located throughout Australia, the development of a more extensive infrastructure network has been identified as a high priority initiative by Infrastructure Australia.

8.2.5 Integrated Water Management and WSUD

IWM encourages a sustainable and holistic approach to water servicing by considering the entire water life cycle.

To reduce the demand for potable water, a number of strategies and technology can be used including:

- The installation and use of rainwater tanks
- Water harvesting from rainwater and storm water collection for use in laundries and toilets and using recycled waste water for gardens
- Water reuse systems

19 https://www hdb.gov sg/cs/infoweb/about-us/our-role/smart-and-sustainable-living/hdb-greenprint/waste-management

20 https://www sunshinecoast.qld gov.au/Council/Planning-and-Projects/Infrastructure-Projects/Automated-Waste-Collection-System

21 https://www sustainability.vic.gov.au/Government/Waste-and-resource-recovery/Waste-management-in-multi-unit-developments

22 Infrastructure Australia, (2019), Infrastructure Priority List: Project and Initiative Summaries

23 https://www smartcitiesworld.net/news/news/netherlands-and-norway-lead-the-way-in-electric-car-adoption-3959

- Closed loop systems

Water Sensitive Urban Design (WSUD) aims to provide drainage systems that provide water quality treatment and flood management. WSUD is an approach to planning and design which integrates the management of total water cycle into urban development. Elements of WSUD include:

- Storage treatment and beneficial use of storm water runoff
- Treatment and reuse of wastewater
- Use of vegetation for treatment purposes, water efficient landscaping and enhanced bio diversity
- Water saving measures associated with residential, commercial and industrial land uses
- Implementation of ‘green’ public realm elements (streetscape, waterways, buildings etc.)

8.2.6 Gas Free Energy Servicing

Gas is not considered an essential service and developers can elect whether or not they wish to service the development with gas. The transition from natural gas servicing to electrical servicing has environmental benefits as electricity generation moves towards renewable energy sources.

9. Summary

This assessment identified the key issues and opportunities related to existing utility infrastructure that may impact on the preparation of the Officer South Employment Precinct (OSEP) masterplan, as established through consultation with USPs.

9.1 Key Issues and Opportunities

The following Table 3 outlines the key issues and opportunities related to utility infrastructure in the Precinct.

Table 3 Key Issues and Opportunities

Utility	Key Issues	Key Opportunities
Stormwater Drainage	• Achieving appropriate outfall from the Precinct for existing flows and flows generated from adjacent developments due to the topography of the Precinct • Flows generated from a major flood event from the Officer South Drain will likely flood properties north of Lecky Road • Flood extents associated with Cardinia and Lower Gum Scrub Creek will impact the adjacent land. • Current flood extents are based on past modelling and is not representative of current best practice modelling or current flow information. There is also an unmapped tributary that would likely have additional associated flood extents. • Majority of the Precinct is likely subject to shallow sheet flooding • The Development Victoria retarding basin north of the Precinct and its implications will need to be considered throughout	• Consult with MWC, SEW and Council to facilitate a closed loop, carbon neutral integrated water network within the Precinct. • Consult with MWC to workshop flood mitigation strategies for the Officer South Drain, and the Cardinia and Lower Gum Scrub Creeks • Undertake updated flood modelling to accurately understand the current flood extents and impacts on development planning. • Two Development Service Schemes are underway for the Precinct, further MWC background studies are underway to progress these schemes.

	development of the Precinct • The location of the transmission gas pipeline and its constraints relating to stormwater drainage infrastructure crossings. • The staging and sequencing of the OSEP. • LSIO and FO overlays on the Precinct impose limitations on land use.	
Potable and Recycled Water	• There are limited potable water reticulation assets within the Precinct • Recycled water is important for the Precinct • SEW indicated that there is no provision in its capital works program to supply recycled water supply to the Precinct.	• Recycled water can be supplied from Cranbourne-Clyde-Officer RW 80 m zone if required, the Pakenham Treatment Plan is being upgraded to a regional facility. • Liaise with SEW to confirm that recycled water will be required to service the Precinct, • There are stormwater and rainwater harvesting opportunities for the Precinct and these opportunities would be triggered by government funding schemes. • Local recycled water infrastructure can be implemented in the Precinct regardless of whether it is provided by SEW
Sewer	• There is a 200 m buffer[24] around existing and proposed sewer pump stations. This buffer restricts specific types of land use that may be sensitive to odour.	• Consultation with SEW to explore strategies to reduce the existing and proposed 200 m buffer area.

	• There are limited sewer reticulation assets throughout the Precinct. • SEW advised that there a future sewer pump station will be required to service the Precinct and will be located within the Precinct along Patterson Road.	
Electrical	• Three transmission lines run east-west in the southern portion of the Precinct and the associated 146.30 m wide easement restricts development and construction. • There is limited capacity to support the Precinct via the surrounding 22 kV distribution feeders. • The servicing strategy for the Precinct is dependent on the available capacity of the existing network and proposed load requirements of the Precinct. • Depending on the demand load from the Precinct, it will either require new distribution feeders from the existing OFR and/or CLN zone substations, or the provision of a new zone substation. • New distribution feeders will require a second 22 kV switchboard in the OFR zone substation that requires a 3 year lead time. • A new zone substation will require approximately 10 000 m2 land take and a capital expenditure of	• AusNet advised that it is unlikely that planned works will take into account new generation technology. • Consult with AusNet to understand the demand load required to trigger a future zone substation • Consult with AusNet to determine whether environmentally sustainable electrical servicing strategies could be utilised to reduce future electrical demand • Consult with AusNet to identify any opportunities to co-locate IWM elements (WSUD and stormwater harvesting) under transmission lines. • Explore opportunities to utilise the transmission easement for public open space infrastructure and landscaping.

	approximately $25 million. This scenario involves new 66 kV double circuit lines along Officer South Road that are generally installed above ground.	
Gas	• There is a 450 mm diameter high pressure transmission gas pipeline has an associated 20.1 m wide easement. This asset imposes constraints such as utility and road crossings and land uses surrounding the area. • A Measurement Length of 275 m either side of the gas pipeline restricts development by prohibiting sensitive land uses. • An SMS is required prior to development commencing and developers are responsible for the cost of an SMS. • Future utility or road crossings of the transmission pipeline (specifically drainage) can be costly and will require detailed investigations and coordination with APA. • There are limited gas distribution assets within the Precinct.	• Gas is not an essential service. Although Councils cannot enforce a prohibition on gas servicing, Councils can discourage applications from using gas and encourage the switch to electrical servicing. • The findings of the SMS may indicate that the development area affected by the transmission pipeline is less than the existing Measurement Length. • APA Group is developing a landscaping policy to identify permitted landscaping treatments within the transmission pipeline easement.
Telecommunications	• There is limited fixed line telecommunications infrastructure throughout Precinct. • Consultation with Telstra's Network Integrity team is necessary to understand the possible protection measures required for the major	• Undertake Impact Assessment in collaboration with Telstra to identify constraints associated with Telstra major fibre and whether protection measures will be required • Consult with telecommunications USPs to determine the optimal

	fibre asset along Lecky Road. • Telstra may require one or more land parcels for mobile phone towers. • Optus requires clear access to its critical fibre asset at all times. • NBN has no fixed pit and pipe infrastructure within the Precinct	future servicing strategy for the Precinct

10. Next steps and Recommendations

GHD will commence the Utility Servicing Assessment for the OSEP, following the completion of VPA's Future Urban Structure and indicative employment typologies and dwelling yields.

10.1 Utility Servicing Assessment Next Steps

GHD will consult with USPs regarding the following:

- Potential relocations, protection, undergrounding, connections, decommissioning of upgrades required to support redevelopment
- Potential indicative servicing arrangements for the future development of the OSEP including proposed land or easement needs.
- Potential high level funding implications including indicative utility servicing cost implications to inform the VPA's Infrastructure Contribution Plans (ICPs).
- Approximate USP lead in times for applications and approvals for infrastructure works
- Key infrastructure issues and opportunities for future development in the Precinct including implications for staged development
- Opportunities to integrate innovative and/or sustainable approaches to utility servicing, particularly in regards to innovative electricity servicing alternatives

Based on information provided by USPs GHD will also develop Future Infrastructure Plans and Future Typical Cross Sections.

10.2 Recommendations

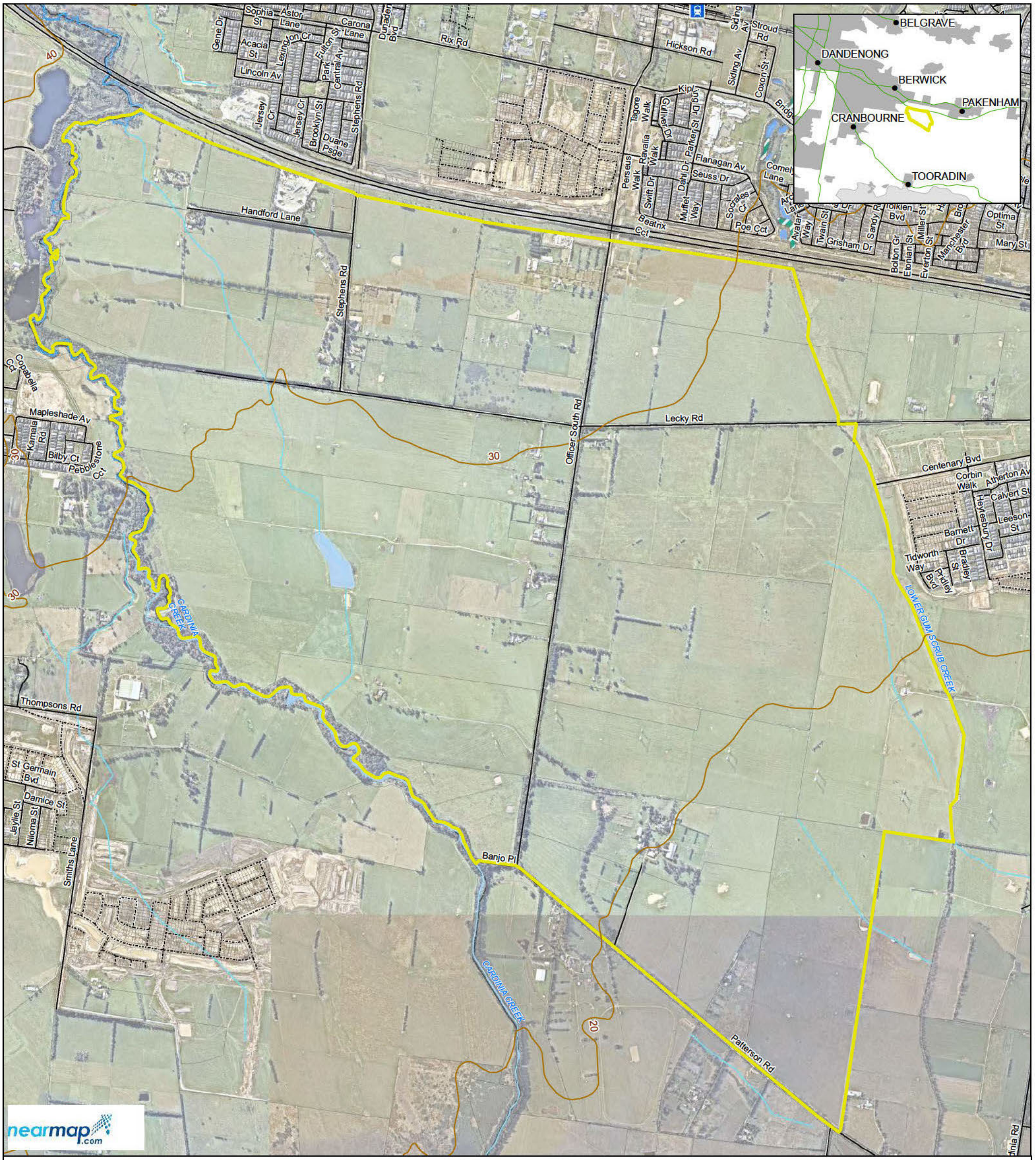
The following actions are recommended for the next stage of planning in the OSEP:

- VPA to undertake consultation with MWC to understand the following:
  - Current scope and timing of ongoing MWC investigations regarding existing flood extents and conditions within the Precinct
  - MWC flood mitigation strategies for the Precinct including the Officer South Drain, and the Cardinia and Lower Gum Scrub Creeks
  - The implications to development planning of the Precinct from Lower Gum Scrub Creek DSS and Officer South DSS.
- VPA to undertake consultation with MWC, SEW and Council to understand the requirements, opportunities and constraints for an integrated water management network including the following:
  - Closed loop, carbon neutral IWM network
  - Stormwater and rainwater harvesting and reuse
  - Water reuse systems
  - WSUD and implementation of 'green' public realm elements (streetscape, waterways, buildings etc.)
  - Waste to energy opportunities
- VPA to undertake consultation with SEW to understand the following:
  - Opportunities to reduce impact of existing and future pump stations, in particular minimising the impact of odour from the sewer pump stations and reducing the associated buffer areas

  - Understand the additional investigation works and revised sewer servicing strategy for the OSEP
  - Opportunities to service the OSEP with recycled water
- VPA to undertake consultation with AusNet team to understand the following:
  - AusNet demand load estimates for AusNet proposed infrastructure options including future distribution feeder upgrades and future zone substation
  - Appropriate locations for future zone substation and ancillary electrical infrastructure
  - Alternative electrical servicing opportunities including new generation technology
  - Opportunities to utilise the transmission easement for public open space infrastructure and landscaping.
- VPA to undertake Safety Management Study in consultation with APA to understand the following:
  - Risks associated with a change in land use, inclusive of both construction and ongoing land use risks
  - Constraints imposed on development surrounding the existing transmission gas pipeline including the extent of impact on sensitive land uses
  - APA Group's Landscaping Policy identifying permitted types of landscaping within the transmission pipeline easement
- VPA to undertake Impact Study in collaboration with Telstra to understand the following:
  - Location of existing major fibre within existing road reserves
  - Constraints of existing major fibre on proposed development including the location and cross sections of roads within the Precinct
  - The requirement for, and type of, protection measures for the major fibre
- VPA to prepare a Future Urban Structure to determine optimised location of dwellings, lot sizes and alignment of new roads.
- VPA to prepare indicative employment typologies and dwelling based on the Future Urban Structure
- VPA to ensure the OSEP planning works are consistent with current State ESD policies and best practice.
- VPA to consider Council's Ecologically Sustainable Development (ESD) policies in its OSEP planning works
- VPA to explore and confirm Ecologically Sustainable Development objectives to be implemented in the OSEP

Appendices

Appendix A Locality Plan



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LEGEND

- Rail station
- Contour 10 m
- Roads
- Proposed Roads
- River
- Stream
- Railway
- Project Study Area
- Watercourse
- Lake
- Swamp
- Parcel

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Victorian Planning Authority

Victorian Planning Authority
Officer South Employment Precinct

Locality Plan and Contour Map

Job Number 12526394
Revision B
Date 19/10/2020

Figure 1

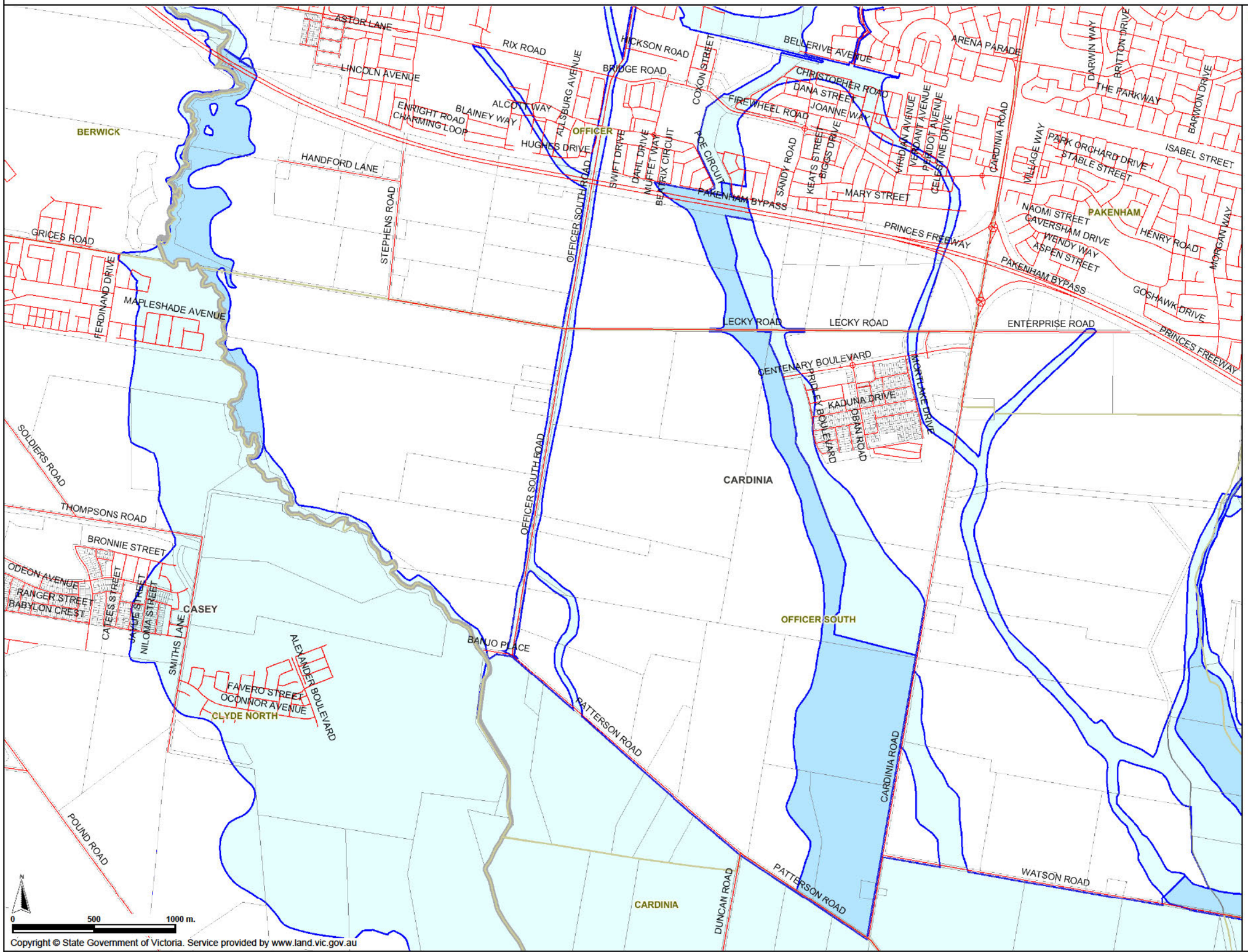
G:\31\12526394\GIS\Maps\Deliverables\12526394_KBM_A3P.mxd

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020 Created by: cjauniau

Appendix B Flood Overlays

Planning Map
Flood Overlays

Department of
Environment, Land
Water and Planning



Legend

- WARRNAMBOOL — Major Town
- Major Road, Road
- BOURKE STREET — Road name
- Railway, Tramway
- Property/Parcel, Selected
- 25 2 1C — Address, Lot, Crown allotment
- River, Stream, Coastline
- Waterbody
- Locality
- SEDDON — Locality Name
- Local Government Area
- BRIMBANK — Local Government Name
- Urban Growth Boundary (UGB)
- Area outside the UGB
- Investigation Area
- Land added to UGB since 2005
- Boundary of Searched Suburb

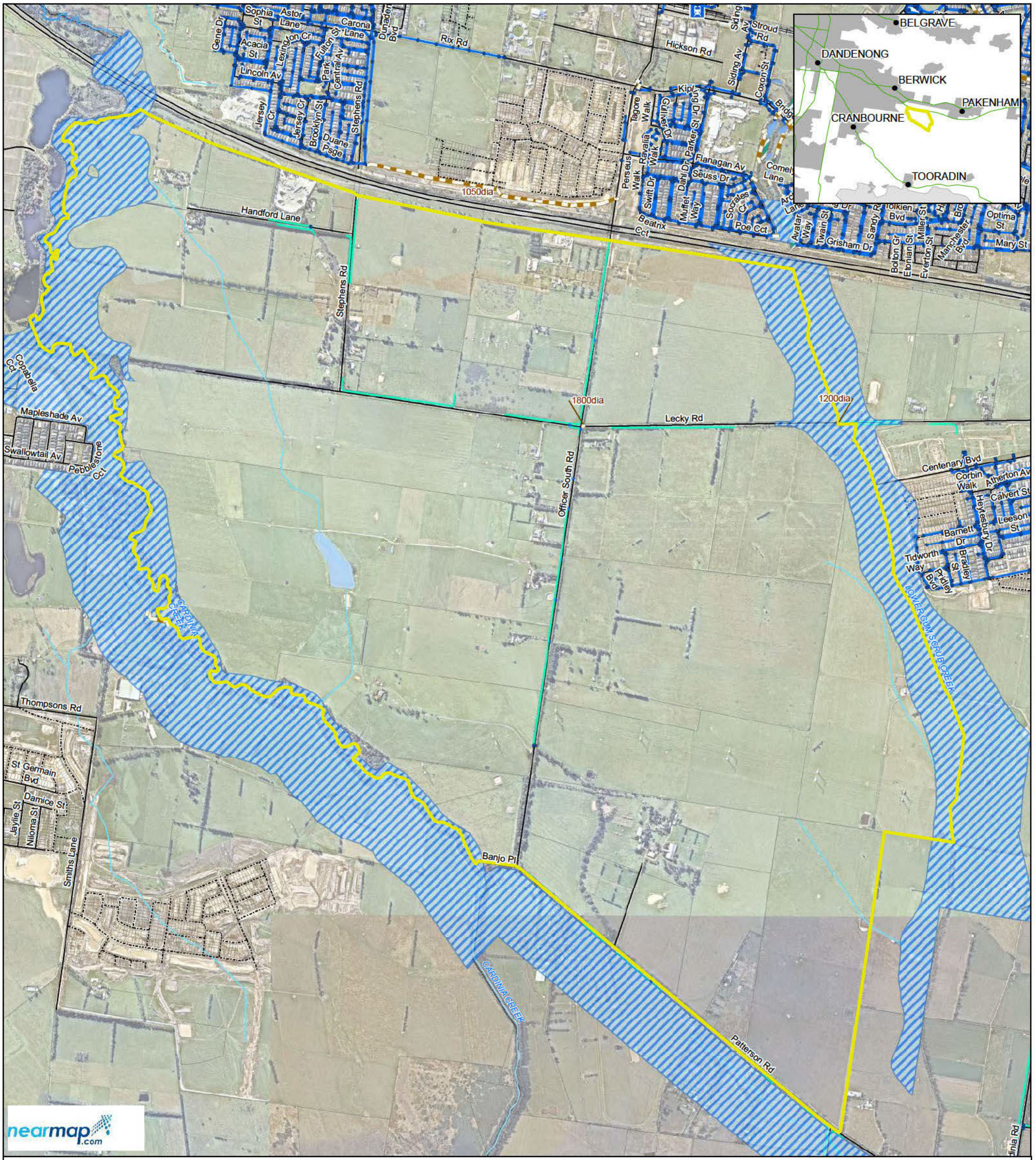
OVERLAYS

- AEO - Airport Environs
- BMO - Bushfire Management
- CLPO - City Link Project
- DCPO - Development Contributions Plan
- DDO - Design & Development
- DDOPT - Design & Development Part
- DPO - Development Plan
- EAO - Environmental Audit
- EMO - Erosion Management
- ESO - Environmental Significance
- FO - Floodway
- HO - Heritage
- ICPO - Infrastructure Contributions Plan
- IPO - Incorporated Plan
- LSIO - Land Subject to Inundation
- MAEO1 - Melbourne Airport Environs 1
- MAEO2 - Melbourne Airport Environs 2
- NCO - Neighbourhood Character
- PO - Parking
- PAO - Public Acquisition
- RO - Restructure
- RCO - Road Closure
- SBO - Special Building
- SLO - Significant Landscape
- SMO - Salinity Management
- SRO - State Resource
- VPO - Vegetation Protection

Map Centre - Melways 214 H12
Map Scale 1:23,260
June 18, 202012:41:11 PM

VICTORIA State Government | Environment, Land, Water and Planning

Appendix C Existing Infrastructure Plans and Typical Sections



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LEGEND

- Rail station
- Railway
- Roads
- Proposed Roads
- River
- Stream
- Project Study Area
- Watercourse
- Lake
- Swamp
- Parcel

Melbourne Water Assets

- Drainage Pipe
- Flood Extent (Melbourne Water)

Cardinia Shire Assets

- Drainage Pit
- Drainage Pipe
- Drainage Swale

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Victorian Planning Authority
Officer South Employment Precinct

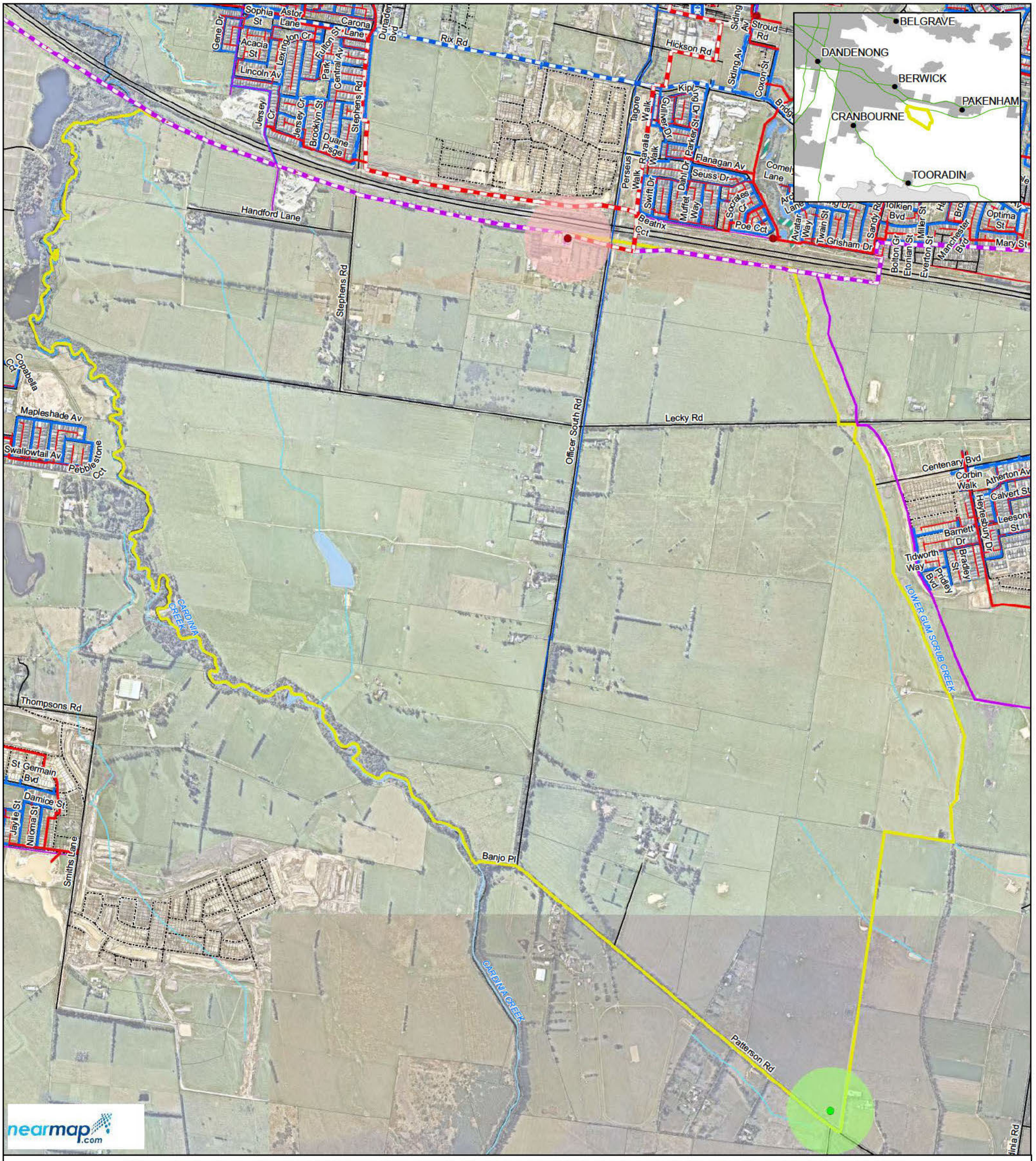
Job Number 12526394
Revision B
Date 19/10/2020

Stormwater Drainage Assets

Figure 2

G:\31\12526394\GIS\Maps\Deliverables\12526394_KBM_A3P.mxd

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020; Drainage, Melbourne Water data,2020; Shire Council Assets Drainage, 2020 Created by: cjauniau



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LEGEND

- Project Study Area
- Rail station
- Roads
- Proposed Roads
- River
- Stream
- Railway
- Watercourse
- Lake
- Swamp
- Parcel
- Proposed Sewer Pump Station 200m buffer
- Proposed Sewer Pump Station

South East Water Assets

- Sewer Pump Station
- Sewer Pipe,<150mm dia
- Sewer Pipe, >150mm - 300mm dia
- Sewer Pipe, >300mm - 1280mm dia
- Rising Main,<150mm dia
- Rising Main, >150mm - 300mm dia
- Rising Main, > 300 - 800mm dia
- Water Pipe, 50mm - 90mm dia
- Water Pipe, >90mm -230mm dia
- Water Pipe, >230mm - 600mm dia
- Sewer Pump Station 200m buffer

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Victorian Planning Authority
Officer South Employment Precinct

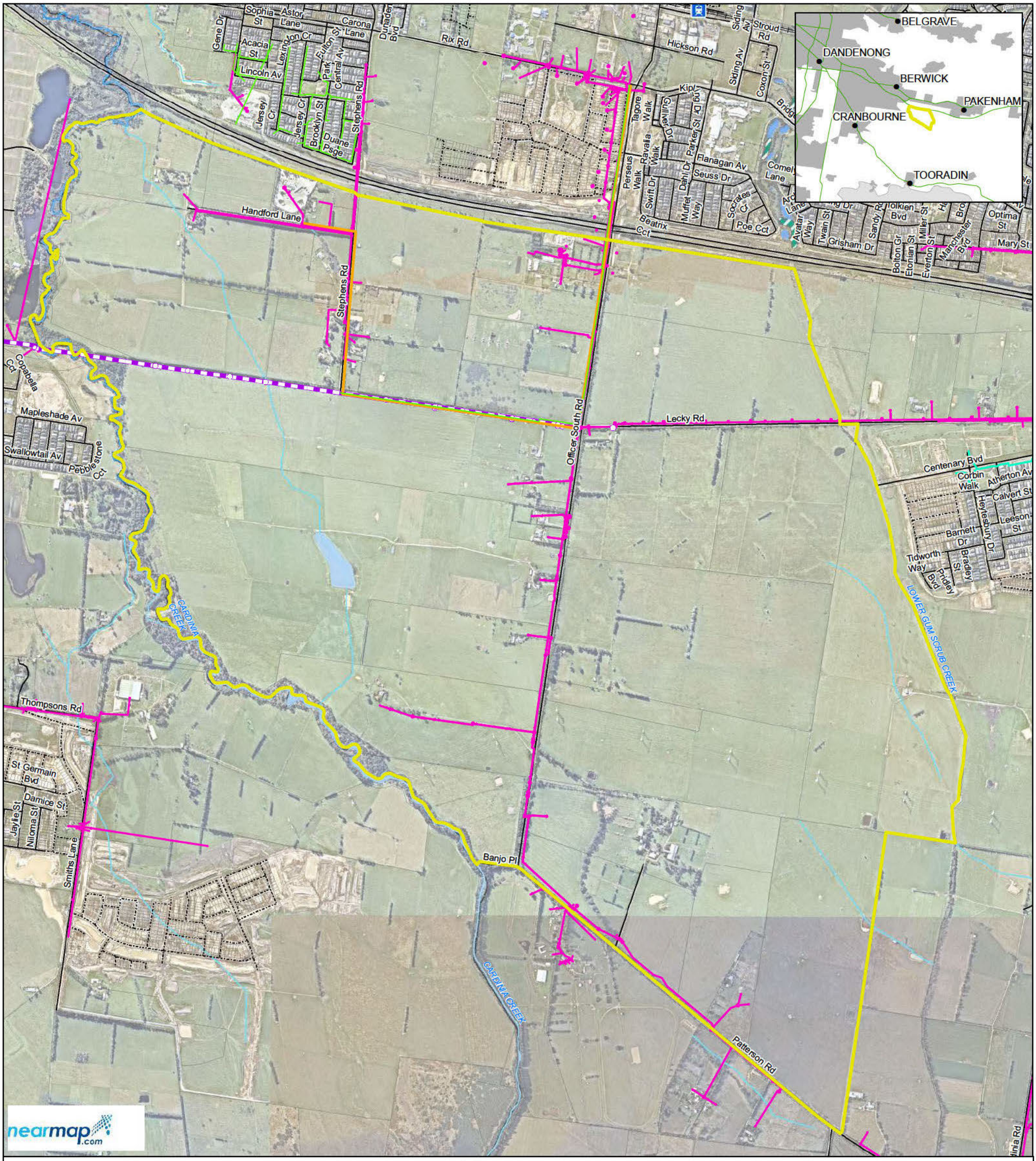
Water and Sewer Assets

Job Number	12526394
Revision	C
Date	19/10/2020

Figure 3

G:\31\12526394\GIS\Maps\Deliverables\12526394_KBM_A3P.mxd

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020; South East Water sewer and water main, South East Water, 2020; Created by: cjauniau



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LEGEND

- Project Study Area
- Rail station
- Roads
- Proposed Roads
- River
- Stream
- Railway
- Watercourse
- Lake
- Swamp
- Parcel
- Telstra Assets
- Major Telstra Fibre
- Optus Assets
- NBN Assets
- OptiComm Assets

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Victorian Planning Authority
Officer South Employment Precinct

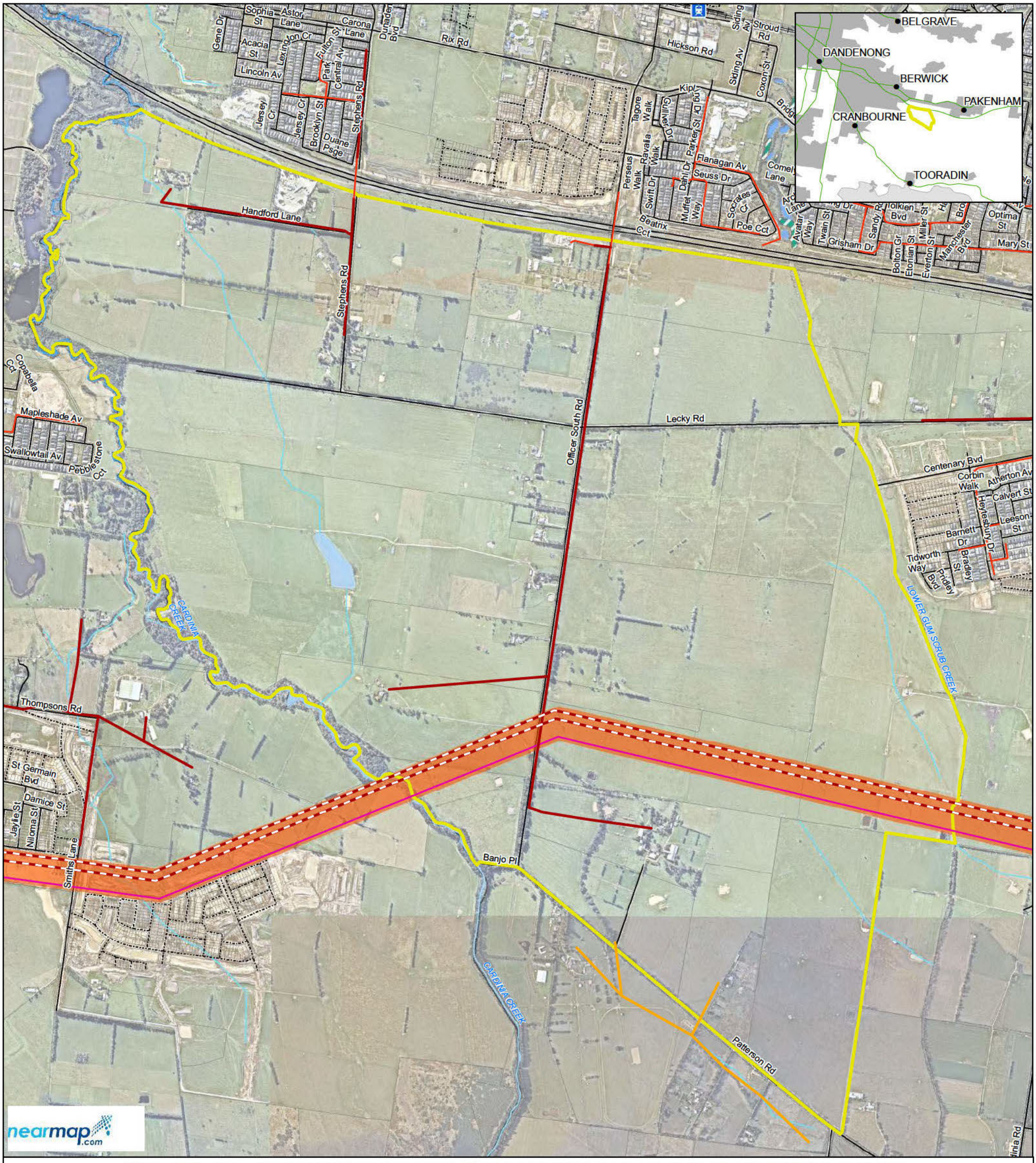
Job Number 12526394
Revision C
Date 19/10/2020

Telecommunication Assets

Figure 4

G:\31\12526394\GIS\Maps\Deliverables\12526394_KBM_A3P.mxd

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020; Optus Assets digitised from DBYD, 2020; NBN Assets digitised from DBYD,2020; Telstra Asset DWF received from DBYD georeferenced by GHD,2020 Created by: cjauniau



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LEGEND

- Project Study Area
- Rail station
- Roads
- Proposed Roads
- River
- Stream
- Railway
- Watercourse
- Lake
- Swamp
- Parcel

AUSNET Assets

- High Voltage Overhead Line
- High Voltage Underground Cable
- HV SWER (single wire earth return) Overhead cable
- Overhead Transmission Line
- Overhead Sub-transmission line

- Approximate AUSNET Easement

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Victorian Planning Authority

Victorian Planning Authority
Officer South Employment Precinct

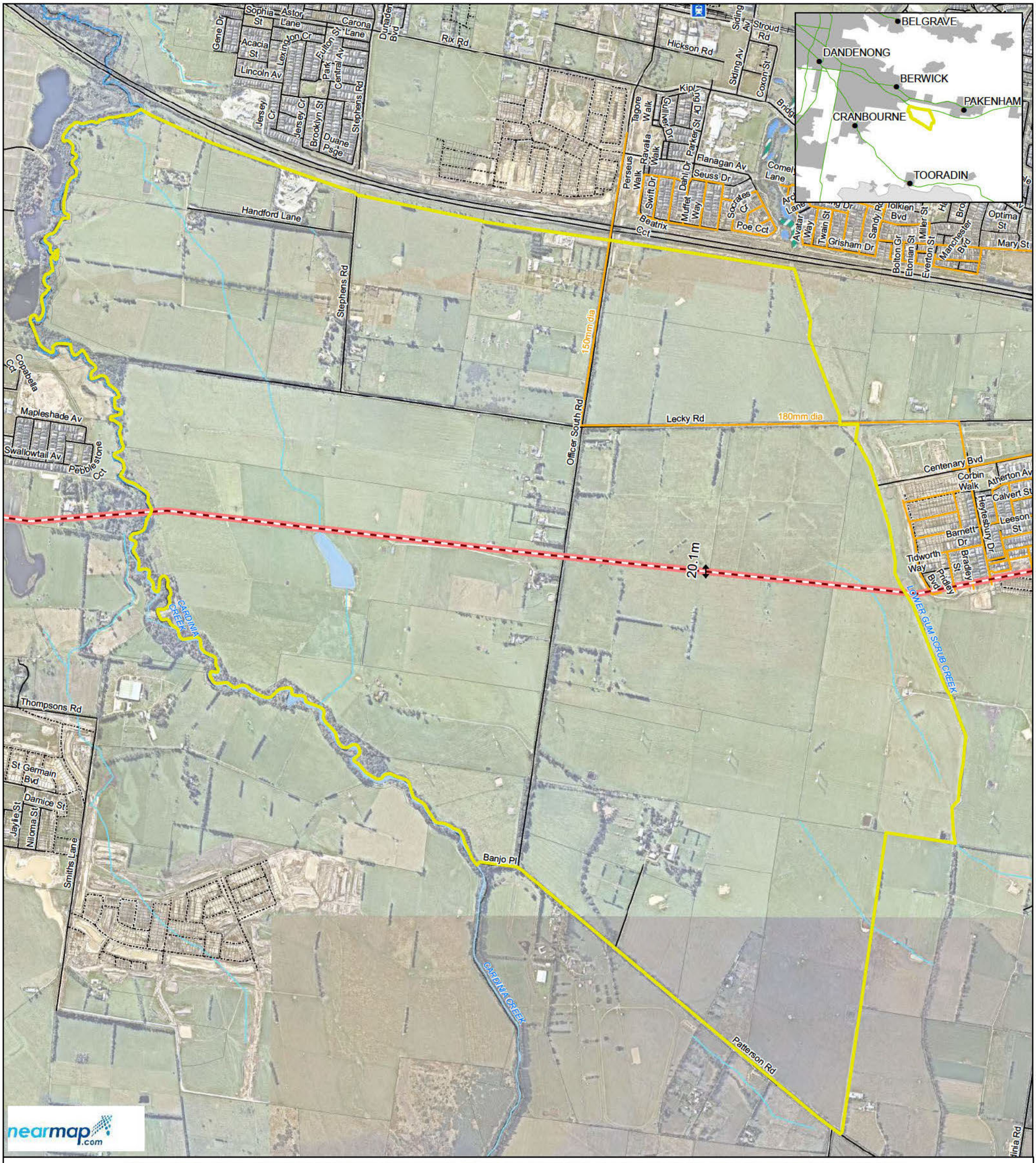
Job Number	12526394
Revision	E
Date	19/10/2020

Electricity Assets

Figure 5

G:\31\12526394\GIS\Maps\Deliverables\12526394_KBM_A3P.mxd

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020; AUSNET asset digitised from DBYD,2020 Created by: cjauniau



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LEGEND

- Project Study Area
- Rail station
- Roads
- Proposed Roads
- River
- Stream
- Railway
- Watercourse
- Lake
- Swamp
- Parcel

APA Assets

- Transmission Pressure Gas Pipeline, 450mm dia
- Distribution High Pressure Gas Pipeline, 63 -180mm dia
- APA Easement

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Victorian Planning Authority

Victorian Planning Authority
Officer South Employment Precinct

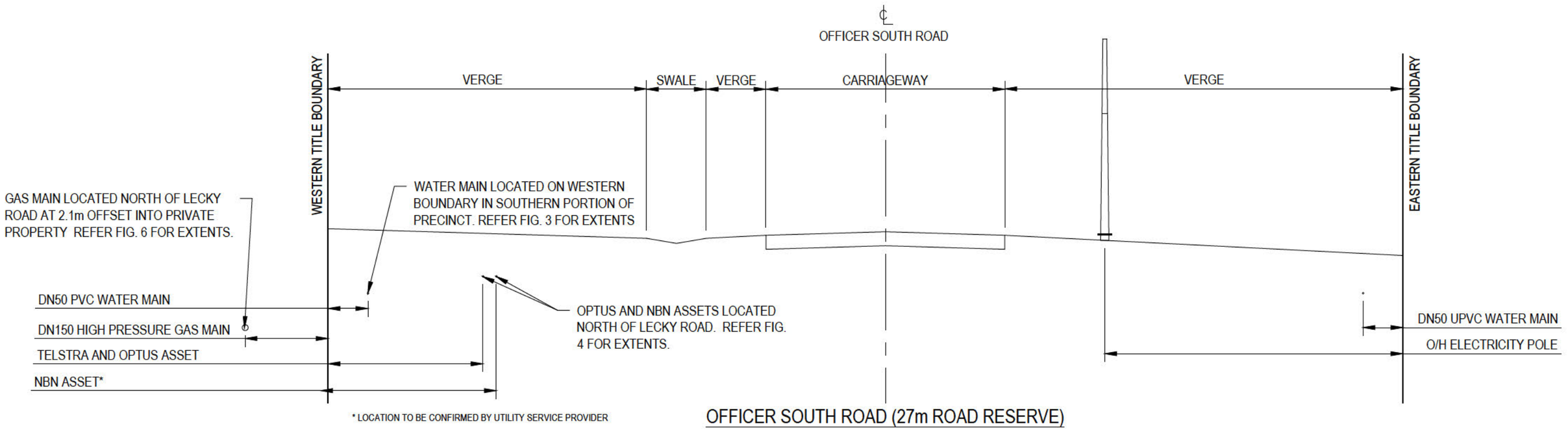
Job Number 12526394
Revision C
Date 19/10/2020

Gas Assets

Figure 6

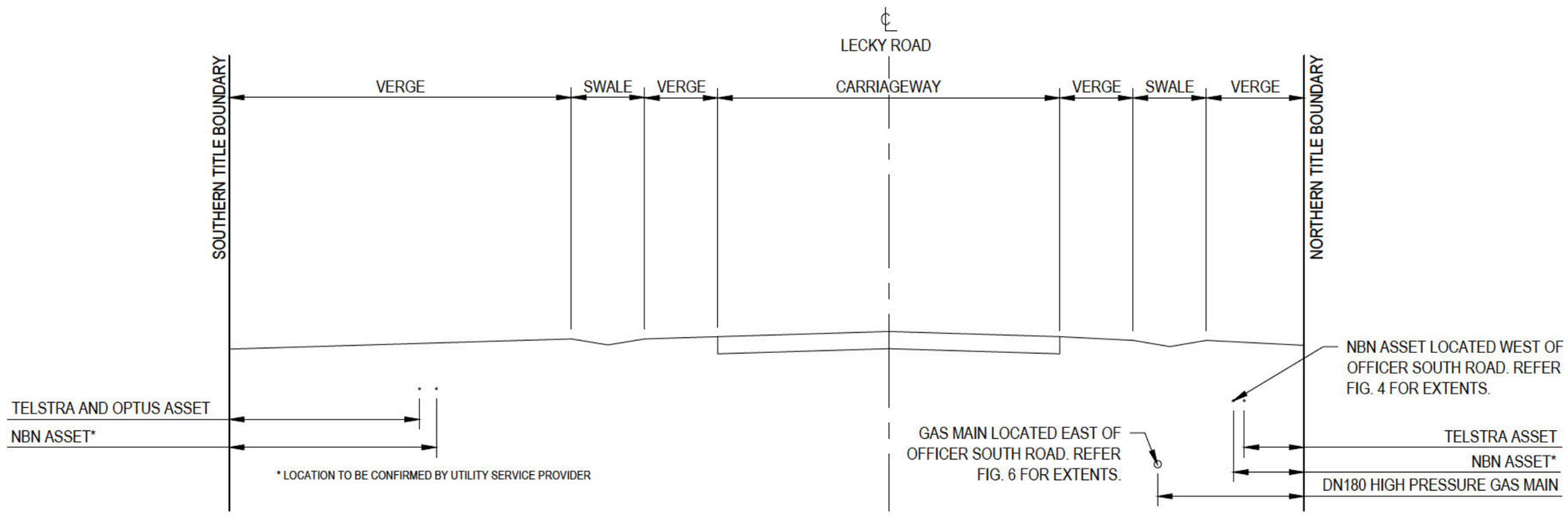
G:\31\12526394\GIS\Maps\Deliverables\12526394_KBM_A3P.mxd

Data source: DEWLP, VicMap, 2020; GHD, 2020; Nearmap Imagery 28/04/2020;APA asset digitised from DBYD,2020 Created by: cjauniau



OFFICER SOUTH ROAD (27m ROAD RESERVE)

SCALE 1:200



LECKY ROAD (22m ROAD RESERVE)

SCALE 1:200

NOTE:

1. ALL SERVICES SHOWN ARE EXISTING SERVICES.
2. THESE DRAWINGS ARE NOT FOR CONSTRUCTION.

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Paper Size A3

0 2 4 6m

SCALE 1:200 AT ORIGINAL SIZE

Victoria Planning Authority
Officer South Employment Precinct
Utility Servicing Assessment

Existing Typical Sections

Job Number 12526394
Revision C
Date October 2020

Figure 7

Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com.au **W** www.ghd.com

Plot Date: 19 October 2020 - 6:18 PM Plotted by: Alina Pham Cad File No: \\ghdnet\ghd\AU\Melbourne\Projects\31\12525394\CADD\Drawings\12526394-TYPICAL SECTIONS.dwg

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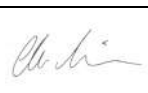
12526394-12242-11/https://projectsportal.ghd.com/sites/pp17_03/officersouthemployme/ProjectDocs/12526394 - REP - Situational Analysis Report.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft A	A. Pham	T. Cooley		L. Morrison		23/06/20
Draft B	A. Pham	T. Cooley		L. Morrison		07/07/20
Final 0	A. Pham	T. Cooley		L. Morrison		19/10/20

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