Kialla West Growth Corridor

Utility Servicing Assessment Report

Greater Shepparton City Council

10 February 2023

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Printed date	27/06/2023 4:48:00 PM
Last saved date	27 June 2023
File name	https://projectsportal.ghd.com/sites/pp17_05/kiallawestgrowthcorr/ProjectDocs/12568262-REP_Kialla West Growth Corridor Utility Servicing Assessment.docx
Author	Emran Heras
Project manager	Marcus Hill
Client name	Greater Shepparton City Council
Project name	Kialla West Growth Corridor Utility Servicing Assessment
Document title	Kialla West Growth Corridor | Utility Servicing Assessment Report
Revision version	0
Project number	12568262

Document status

Revision	Author	Reviewer		Approved for issue		
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Executive summary

GHD was engaged by Greater Shepparton City Council (Council) in 2021 to provide an assessment of existing infrastructure capacity and future servicing requirements of the Kialla West Growth Corridor (KWGC). 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.

Findings considered to be the most significant are summarised in Table 1 below. Key issues and opportunities for utility servicing within the KWGC are summarised in Table 2 below.

Table 1 Key findings

Infrastructure type	Key findings
Stormwater drainage	– A separate stormwater management and hydrological assessment has been commissioned by Council, and readers should refer to this for detailed stormwater assessment information. – Council has limited stormwater drainage infrastructure within the KWGC; infrastructure present is in the form of pipes and table drains. GMW does not have any drainage assets in the area. – A significant portion of the KWGC is affected by a Land Subject to Inundation Overlay, and associated planning conditions will affect development in this area. – Council will require underground pit and pipe infrastructure for new developments, and will only consider above ground channel or swale drainage infrastructure where Council believes it is beneficial to the community.
Water	– Goulburn Valley Water manages a limited number of existing water assets within the KWGC. – There is no recycled water network within the KWGC. – Goulburn Valley Water will carry out upgrades and expansions on an 'as needed' basis and there are no short, medium or long term planned upgrades. – Redevelopment in the KWGC will likely trigger upsizing of existing water assets (both within and outside the KWGC), including trunk water mains, storage tanks and booster pump stations. – Typically, for new developments, water network extensions are constructed by developers and gifted to GVW – Goulburn Murray Water is the authority responsible for rural water supply and manages the Shepparton No.2 channel and pipeline along the western boundary of the KWGC along Raftery Road.
Sewer	– Goulburn Valley Water manages a limited number of existing sewer assets within the KWGC – Goulburn Valley Water will carry out upgrades and expansions on an 'as needed' basis and there are no short, medium or long term planned upgrades. – Redevelopment in the KWGC will likely trigger upsizing of existing sewer assets outside the KWGC to service the development, in particular trunk sewer mains, sewer pump station updates and new sewer pump stations. – Typically, for new developments, sewer network extensions are constructed by developers and gifted to GVW

Infrastructure type	Key findings
Electricity	– Powercor manages the electrical distribution network in the KWGC, and all existing electrical assets within the KWGC. – The KWGC is currently serviced with mainly high voltage assets, both overhead and underground.There are very few low voltage cables providing power to the existing properties. – Powercor has estimated that the electrical demand in the KWGC will increase by 3 MVA in the short term due to the redevelopment. – The existing electrical high voltage feeder servicing the KWGC will initially have the required capacity but will need incremental augmentation as the load increases – Powercor can accommodate local solar photovoltaic electricity generation, and would consider accommodating innovative electrical servicing strategies such as electric vehicles, microgrids and battery storage to support redevelopment. – There is an overhead HV line on Mitchell Road going North-West across the KWGC to Raftery Road. – Powercor have advised that the works are generally funded internally across customer base, unless large high voltage load blocks necessitate advancement.
Gas	– APA Group manages the gas network surrounding the KWGC. See section 6.3 for further information. – There is a 200mm transmission gas pipeline running through the KWGC west to east. – There are some existing reticulation services consisting of both steel and Polyethylene (PE) types. – The current trunk infrastructure in the vicinity of this precinct does not have the capacity to service predicted load in the development, network augmentation will be required to supply the required load. – For the existing assets laid within and at the boundaries of the precinct, the kit title boundary of any infrastructure being built is required to be at least 2 m away from the asset. The façade of any buildings must be 3 m away and no varendahs or canopies are to be built over any assets. – APA requires a staging plan to appropriately plan for gas delivery in the KWGC. – Where there are works required as only being needed to support the supply to KWGC, augmentation costs will be assessed against the viability of delivery of reticulation, which may result with the Developer needing to pay a contribution for these works.
Telecommunications	– The KWGC is currently serviced by Telstra and NBN telecommunications infrastructure. – Developers can choose any telecommunications carrier they wish. NBN is the default statutory infrastructure provider obliged to provide broadband infrastructure. – There are significant Telstra and NBN assets around the boundaries of the KWGC. – The KWGC is partially covered within the NBN's fixed line footprint and also partially in the fixed wireless service.

Table 2 Key issues and opportunities

Infrastructure type	Key issue	Key opportunity
General	– Utility service providers require detailed information, including location of dwellings, lot sizes and alignment of new roads, in order to provide detailed future infrastructure information – Multiple utility services providers advised that appropriate development staging within the KWGC would facilitate efficient utility service delivery	– Undertake an assessment of the ultimate KWGC Structure Plan to determine opportunities for sustainable utility infrastructure planning in consultation with utility service providers – Consult with relevant stakeholders to enable greater understanding of the impact of all development on utility networks – Once the future road cross sections are known, consult with utility service providers to understand requirements for future road and utility cross-sections
Stormwater drainage	– A separate stormwater management and hydrological assessment has been commissioned by Council, and readers should refer to this for detailed stormwater assessment information	– Evaluate the findings of this assessment against the findings of the separate stormwater management and hydrological assessment to understand the next steps for development planning

Infrastructure type	Key issue	Key opportunity
Water	– Water supply pressure and extension of services to new customers – Augmentation of the existing water network is likely required to service the KWGC redevelopment – There is no recycled water network within the KWGC – GMW require a minimum 30m building setback to be maintended from open channels and drains – including the Shepparton No.2 channel. A building setback of 5m is required for pipelines,	– Ensure correct augmentation and construction of the assets are carried out to satisfy the demands of the KWGC – Work with GVW to deliver an Integrated Water Management Solution for the KWGC – Investigate the provision of local/KWGC wide recycled water services – Following the development of the KWGC Structure Plan, develop a staging plan for water infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of water services – Liaise with GMW to determine the extent and timing of channel-to-pipeline conversion required and understand delineation of responsibility.
Sewer	– Flows exceeding maximum capacity of existing assets and existing sewer catchments becoming too large to expand due to the asset being too close to the surface – Augmentation of the existing sewer network is likely required to service the KWGC redevelopment	– Work with GVW to deliver an Integrated Water Management Solution for the KWGC – Investigate the provision of local/KWGC wide sewer mining/recycled water service – Following the development of the KWGC Structure Plan, develop a staging plan for sewer infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of sewer services – Ensure correct augmentation and construction on the assets are carried out to satisfy the demands of the KWGC
Electricity	– Electrical demand in the KWGC is estimated to increase by 3MVA, triggering the need for network augmentation works in the form of a new feeders	– Consider the feasibility of onsite electricity generation to reduce future electrical infrastructure required to service the KWGC – Collaborate with Powercor regarding the provision of innovative electrical servicing strategies such as electrical vehicles, microgrids and battery storage
Gas	– The trunk infrastructure does not have the capacity to service the predicted load. – Augmentation of the infrastructure would comprise duplication of existing assets – The sequencing of development in the KWGC will have a greater impact to managing the delivery of gas servicing than the aggregate development load	– Investigate opportunities to provide a ‘gas-free’ KWGC – Following the development of the KWGC Structure Plan, develop a staging plan for gas infrastructure in collaboration with APA Group (Networks) to ensure the efficient delivery of gas services
Telecommunications	– The KWGC is mostly covered within the NBN’s fixed line and fixed wireless footprint.	– Following the development of the KWGC Structure Plan, develop a staging plan for telecommunications infrastructure in collaboration with telecommunciations utility service providers to ensure the efficient delivery of telecommunications services

Contents

Table index

Figure index

Appendices

1. Introduction

1.1 Project

1.1.1 Kialla West Growth Corridor location

The Kialla West Growth Corridor (KWGC) is located within the City of Greater Shepparton. KWGC is adjacent to the Shepparton South Growth Corridor, with approximately 380 hectares of land, and is bounded by Mitchell Road to the south, Goulburn-Valley Highway and Seven Creeks to the east and Raftey Road to the north and west. The location of the KWGC boundaries is illustrated in Appendix A.

1.1.2 Existing land use

The majority of the KWGC is currently zoned Rural Living Zone (RLZ, it is land in a rural setting, used and developed for dwellings and provides opportunities for some rural uses to occur. Illustrations of the relevant Victorian Planning Zones can be found in Appendix B.

An Urban Floodway Zone (UFZ) covers the majority of the norther and eastern boundaries of the KWGC. The purpose of the UFZ is to identify waterways, major floodpaths, drainage depressions and high hazard areas within urban areas which have the greatest risk and frequency of being affected by flooding, amongst other floodwater related purposes.[1]

Goulburn Valley Highway is zoned Transport Road Zone 2 (TRZ2) which identifies roads that form the principal road network, including declared arterial roads.[2]

1.1.3 Project overview

Council has commenced planning for the KWGC a strategic urban development project. This KWGC Precinct Structure Plan (PSP) planning will guide the future residential development over the next 30 years, and makes provision for approximately 2,500 lots.

The VPA outlined the key objectives and opportunities for the development of the KWGC is to deliver a ‘destination for Shepparton City and significant opportunity to deliver best practice urban development outcomes’.

The aim of a PSP is to provide a ‘big picture’ plan that sets out the vision for developing new communities and is an effective implement for guiding development in identified growth areas. PSPs identify where all the required shared infrastructure such as roads, key intersections, shopping centres, retardation basins, parks and schools will be located.

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

[1] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/37_03.pdf
[2] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/36_04.pdf

1.2 Purpose of this report

The focus of this assessment is to determine the condition and capacity of existing infrastructure servicing the KWGC area, as well as to advise whether upgrades, relocations, network augmentation or alteration works, 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 development process and therefore this report is crucial to maintaining lines of communication with and giving pre-planning development information to Utility Services Providers (USPs), who own or manage utility assets in the development area.

The USPs consulted in this assessment are outlined in Table 3 below. This report integrates their advice regarding existing and required infrastructure to service the KWGC area.

Table 3 Utility Service Providers in Kialla West Growth Corridor

Utility	Utility Service Authority
Electricity	Powercor
Gas	APA Group
Sewer	Goulburn Valley Water
Stormwater Drainage	Greater Shepparton City Council
	Goulburn Broken Catchment Management Authority (CMA)
	Goulburn Murray Water
Telecommunication	NBN Co
	Telstra
Water	Goulburn Valley Water
	Goulburn Murray Water

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 Utility Service Providers. 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 Utility Service Providers. 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 Greater Shepparton City Council and may only be used and relied on by Greater Shepparton City Council for the purpose agreed between GHD and Greater Shepparton City Council as set out in this section.

GHD otherwise disclaims responsibility to any person other than Greater Shepparton City Council 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 Greater Shepparton City Council 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 KWGC 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 DBYD responses. A summary of the infrastructure data type utilised in the Existing Infrastructure Plans is provided below in Table 4.

Table 4 Infrastructure Data Types by Utility Service Provider

Utility Service Authority	Infrastructure Data Type
APA Group	Digitised BYDA Data
Shepparton City Council	Spatial Data
Powercor	Spatial Data
NBN Co	Digitised BYDA Data
Goulburn Valley Water	Spatial Data
Telstra	Georeferenced BYDA Data

Using the estimated proposed development dwelling yields and residential land use predictions provided by Council, 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. Where applicable, USPs also provided indicative costs associated with infrastructure upgrade requirements.

GHD utilised the information provided by USPs to prepare Existing Typical Sections, refer Appedix D which shows typical road sections and the utilities located within.

2. Stormwater drainage infrastructure

2.1 Overview of the stormwater drainage network

The primary purpose of Victoria's stormwater drainage network is to minimise the impact of flooding by directing stormwater flows caused by rain events away from developed areas into appropriate outfalls. Drainage USPs are responsible for the installation and maintenance of drainage infrastructure, including the drainage system capacity and mitigation of floodwater.

The stormwater drainage network in the Shepparton Region is managed by a number of different authorities. Local councils are responsible for the municipal drainage infrastructure. This includes local drains such as underground pipelines and open drains,street gutters and pits. The pitsconnect the gutters to the underground pipes and to minor municipal stormwater drainage catchments.

Goulburn Broken Catchment Management Authority (Goulburn Broken CMA) is responsible for the larger regional drainage network servicing areas over 60 hectares, as well as waterways and floodplains. Goulburn Murray Water (GMW) is responsible for both regulated and unregulated river systems.

GHD understands that a separate stormwater management and hydrological assessment has been commissioned by Council, and therefore this report will focus predominantly on local drainage infrastructure.

2.2 Responsible authorities

The regional drainage network in and surrounding the KWGC is managed by the Goulburn Broken CMA. Council is responsible for the local drainage infrastructure.

2.3 Existing conditions

There are currently a very limited number of drainiage assets in the KWGC, existing stormwater drainage assets and associated overlays are illustrated in Appendix C.

Goulburn Broken CMA advised that it does not own or manage infrastructure or utilities within the KWGC. GMW does not have any drainage assets in the KWGC.

Council has formal drainage infrastructure in the form of a table drain, a D-Table drain and a D-Pipe culvert located on Mitchell Road.

2.4 Flood overlays

A significant area of the KWGC is affected by a Land Subject to Inundation Overlay (LSIO). The LSIO identifies land in a flood storage or flood fringe area affected by the 100-year ARI stormwater flows, and relates to flooding along major waterways. [3]The LSIO requires a permit for certain types of development, and does not prohibit either use, or development of the area.

Goulburn Broken CMA is the floodplain management authority and referral authority for development applications relating to land-use, buildings or works in areas affected by the LSIO. Goulburn Broken CMA, in collaboration with local councils, prepared a number of Local Floodplain Development Plans (LFDPs), to guide the planning of developments affected by LSIOs, FOs and UFZs. The relevant LFPD for the KWGC is the Greater Shepparton Floodplain Development Plan produced in 2006, that outlines planning conditions that apply specifically to developments in flood prone areas within the KWGC.

Council have additionally provided an Integrated Water Management Plan for the KWGC.

[3] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/44_04.pdf

2.5 Planned updates & redevelopment servicing

Goulburn Broken CMA has not advised that there are any planned upgrades to stormwater drainage infrastructure within the KWGC. Please refer to Council's separately commissioned water management plan for planned upgrades to large flood plain, wider catchment or Broken River stormwater drainage infrastructure.

3. Water infrastructure

3.1 Overview of Victoria's regional water network

In regional Victoria, twelve water corporations provide water service customers across the state. Four rural water corporations provide rural water services including irrigation, stock and domestic, environmental and recreational purposes.[4] Kialla is located in Victoria's Hume region, which has an extensive irrigation region and network of rivers and creeks. The majority of water supplied in this region primarily sourced from the Goulburn, Broken, Murray, Steavenson, Rubicon and Delatite River systems and a number of smaller local streams including Sunday Creek and Seven Creeks.[5]

The Victorian water industry is regulated by the Essential Services Commission (ESC).

3.2 Responsible authorities

The primary authority responsible for water supply in the KWGC is Goulburn Valley Water (GVW). Goulburn Murray Water (GMW) is the authority responsible for rural water supply.

3.3 Existing conditions

3.3.1 Potable Water

Existing potable water assets are shown in Appendix C.

GVW manages the water assets within the region. In the KWGC, there are water hydrants present with only one water main of 225 mm diameter on Raftery Road.GVW advised that the condition of the existing water utility assets within the KWGC are good. There are no capacity issues within the existing network. The assets were constructed to meet residential demands. The water supplied to the region is from the Welsford Street Water Treatment Plant. This will remain as the source of water for the KWGC as it has satisfactory capacity to supply the development.

3.3.2 Rural Water

GMW owns, operates and manges the Shepparton No.2 water supply channel and the Shepparton No.2 pipeline within the KWGC. The channel is approximately 2782m in length and has a capacity of 49 ML/d. The pipeline is 450mm in diameter and is approximately 182m in length.

GMW also notes that there are twelve over structured (including culverts, subways, etc.) and 14 meter outlets in the area.

There is no authority owned recycled water network within the KWGC and no recycled water network present nearby. GVW has no alternative water initiatives currently under consideration for the KWGC.

[4] https://www.water.vic.gov.au/water-industry-and-customers/know-your-water-corporation
[5] https://www.gvwater.vic.gov.au/about-us/our-region

3.4 Planned upgrades & redevelopment servicing

GVW advised that the water assets will be sufficient for the development. Augmentation and upgrades to the water supply will only be carried out on an 'as needed' basis due to the current supply not having any issues to satisfying the capacity.

GVW has specified that development in the KWGC is expected to trigger the need for upsizing of existing trunk mains or alternatively constructing new trunk mains. A decline in supply pressure to household metres falling under 20m head pressure will also trigger upsizing of existing water assets to service the development.

In regards to the delivery of sustainable infrastructure, GVW noted that it is working towards its own emission targets and is focussed on delivering energy efficient assets. GVW has indicated that there are currently no plans to provide recycled water to the KWGC. GVW has offered to work with Council to deliver Integrated Water Management solutions for the KWGC, however advises it will have limited impacts on the future water infrastructure required.

GMW has advised that their assets are typically protected by either an easement or registered lease on the title. BMW requires a 30m building setback from open channels and drains (measured from inside top edge of channel/ drain bank) and a 5m building setback from pipeline easement boundaries. A Private Works Licence for works associated with providing access to a property over any GMW assets.

GMW has indicated that there are no planned works across the short (up to 2 years) and medium (3 to 9 years) term outside of routine maintenance and adjustments. Possible refurbishment of replacement of GMW assets may occur within the long term (10+ years). There are currently no plans for major upgrades of realignments within the precinct. Planned works to GMW would be triggered by failure of an asset (channel, drain or structure) or rationalisation of the channel system.

GMW provided the following detailed summary of its rural water servicing strategy for the Precinct:

The presence of rural GMW infrastructure such as the channels and drains within areas of future residential development (such as this precinct) is a situation which has become frequently more encountered a number of shires in the Goulburn-Murray Irrigation District (GMID), which is problematic for GMW, GMW customers, council and also current and future landowners. Where appropriate, GMW is seeking the conversion of rural infrastructure (such as open channels) to pipelines where they occur in residential areas. Such conversion ensures that no GMW customers are adversely affected by potential development. The potential piping of the channels within the precinct will also be of benefit to the developer, reducing the building setback requirements from 30m from any open GMW channels, to 5m from the easement boundary of any GMW pipelines. This reduction in setbacks may significantly alter proposed lot layout and lot yields for any proposed development. The potential pipelines would also provide a more desirable planning outcome for any future subdivision, and also address safety issues associated with open channels (potential drowning) and dangerous wildlife (such as snakes) which are commonly associated with the grasses and other vegetation surrounding channel banks.

In relation to the land within the KWGC for residential growth it is noted that the vast majority of the land has been recognised as part of the residential growth corridor for some time and is currently zoned for residential purposes. GMW does not object to the residential development of these areas as there is opportunity for rationalisation of irrigation infrastructure as required. In relation to any GMW assets necessary to be retained as part of the irrigation network, precedent has been established for piping of channels within the Kialla Corridor (such as in the Kialla Lakes development). The future of GMW assets in the area will be addressed following further consultation and discussion with GMW at the appropriate time.

3.4.1 General redevelopment requirements

The following requirements are generally applicable to the servicing of new developments with water infrastructure:

- Lots of a size less than 4000 metres^2 should be provided with a reticulated water supply service
- For both residential and industrial/commercial multiple unit developers, developers can choose to install common water supply infrastructure either to:
  - AS/NZS 3500 Acceptable Solutions, or AS/NZS 3500 Performance Requirements, with the Owners Corporation owning, operating and maintaining the works, or
  - WSAA MRWA standards with GVW owning, operating and maintaining the assets.
- All dwellings on a development should be within 130 meters[6] of the nearest fire hydrant based on fire authority requirements.
- All multilevel developments must have GVW water services to the property boundary. The maintenance, operation and replacement of the internal plumbing is the responsibility of the property owners.
- The Plan of Subdivision must establish easements to cover any new water service that is proposed to cross private land and all easements need to comply with Section 12 of the Subdivision Act 1988. Reserves need to be established where the proposed water service crosses land owned by another Government Authority

3.4.2 Cost allocation

The following principles are generally applicable to the allocation of cost for water infrastructure delivery:

- Where an existing service is to be realigned due to development or changes to the subdivision of land, the property owner is liable for all associated costs.
- Where an existing service needs to be abandoned due to development or changes to the subdivision or land, the property owner is liable for all associated costs and may have to pay the undepreciated value of the service.
- The water authority is generally responsible for providing shared infrastructure assets (such as headworks, treatment plants, pumping stations and trunk mains) with sufficient capacity in accordance with its asset development plan. Where proposed development will require the provision of shared distribution assets earlier than what has been planned by the water authority, developers will be responsible for the costs associated with bringing forward the provision of these assets ahead of the water authorities asset development sequence.
- Developers are responsible for providing reticulation assets and for the cost of connecting those assets to water authority's existing infrastructure. Reticulation assets are generally defined as water mains or recycled water mains that are 150 mm or less in diameter.
- Generally, if a development requires extensions or upgrade works to the water network, the developer has to arrange and pay for construction. A reimbursement is payable by the water authority when shared distribution assets are required to be constructed for a development and the reimbursement provided varies with the type and value of the asset.
- Temporary works must be approved by the water authority and costs are generally attributable to the developer.
- If existing water authority assets require alteration as a result of a proposed development, the developer must pay the actual cost of this work.
- The water authority may levy new customer contributions by scheduled charges on any connection of a new customer that is separately titled or can be individually metred. GVW's tariff schedule outlines the applicable connection charges, varying by lot size.[7]

[7] https://www.gvwater.vic.gov.au/Portals/0/GV-Water/Documents/Plans-Strategies/2021-2022%20Tariff%20Schedule.pdf?ver=2021-07-06-092617-940

4. Sewer infrastructure

4.1 Overview of Victoria's regional sewerage network

In regional Victoria, twelve water corporations provide water service customers across the state. Four rural water corporations provide rural water services including irrigation, stock and domestic, environmental and recreational purposes. Sewerage servicing catchments are geographically separated, and each catchment is managed by one urban water corporation providing sewerage transport, treatment and recycling.

The Victorian sewer industry is regulated by the Essential Services Commission (ESC).

4.2 Responsible authorities

GVW is responsible for the sewerage network in the KWGC.

4.3 Existing conditions

There are no existing sewerage assets in the KWGC.

4.4 Planned upgrades & redevelopment scenarios

GVW advised that the sewer assets will be sufficient for the development. Augmentation and upgrades to the sewage demands will only be carried out on an 'as needed' basis due to the current supply not having any issues to satisfying the capacity.

GVW has not undertaken supply side assessments to understand the capacity of existing infrastructure to service redevelopment within the KWGC, however, GVW will trigger upgrade works in the instance of sewer flow approaching maximum allowable flow rates and sewer surcharging or predicted spills which are modelled to occur. This will be require new sewer catchments and pump stations in order for the existing catchment become feasible

4.4.1 General redevelopment requirements

The following requirements are generally applicable to the servicing of new developments with sewer infrastructure:

– Lots of a size less than 4000 metres^2 should be provided with a reticulated sewer supply service
– For both residential and industrial/commercial multiple unit developers, developers can choose to install common sewer supply infrastructure either to:
    - AS/NZS 3500 Acceptable Solutions, or AS/NZS 3500 Performance Requirements, with the Owners Corporation owning, operating and maintaining the works, or
    - WSAA MRWA standards with GVW owning, operating and maintaining the assets.
– The Plan of Subdivision must establish easements to cover any new water service that is proposed to cross private land and all easements need to comply with Section 12 of the Subdivision Act 1988. Reserves need to be established where the proposed water service crosses land owned by another Government Authority

4.4.2 Cost allocation

The following principles are generally applicable to the allocation of cost for sewer infrastructure delivery:

- Where an existing service is to be realigned due to development or changes to the subdivision of land, the property owner is liable for all associated costs.
- Where an existing service needs to be abandoned due to development or changes to the subdivision or land, the property owner is liable for all associated costs and may have to pay the undepreciated value of the service.
- The water authority is generally responsible for providing shared infrastructure assets (such as trunk mains, sewer pump stations, sewer treatment facilities, pressure sewer systems) with sufficient capacity in accordance with its asset development plan. Where proposed development will require the provision of shared distribution assets earlier than what has been planned by the water authority, developers will be responsible for the costs associated with bringing forward the provision of these assets ahead of the water authorities asset development sequence.
- Developers are responsible for providing reticulation assets and for the cost of connecting those assets to water authority's existing infrastructure. Reticulation assets are generally defined as sewer mains that are 225 mm or less in diameter.
- Generally, if a development requires extensions or upgrade works to the sewer network, the developer has to arrange and pay for construction. A reimbursement is payable by the water authority when shared distribution assets are required to be constructed for a development and the reimbursement provided varies with the type and value of the asset.
- Temporary works must be approved by the water authority and costs are generally attributable to the developer.
- If existing water authority assets require alteration as a result of a proposed development, the developer must pay the actual cost of this work.
- The water authority may levy new customer contributions by scheduled charges on any connection of a new customer that is separately titled or can be individually metred. GVW's tariff schedule outlines the applicable connection charges, varying by lot size.[8]

[8] https://www.gvwater.vic.gov.au/Portals/0/GV-Water/Documents/Plans-Strategies/2021-2022%20Tariff%20Schedule.pdf?ver=2021-07-06-092617-940

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, connecting 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: 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.

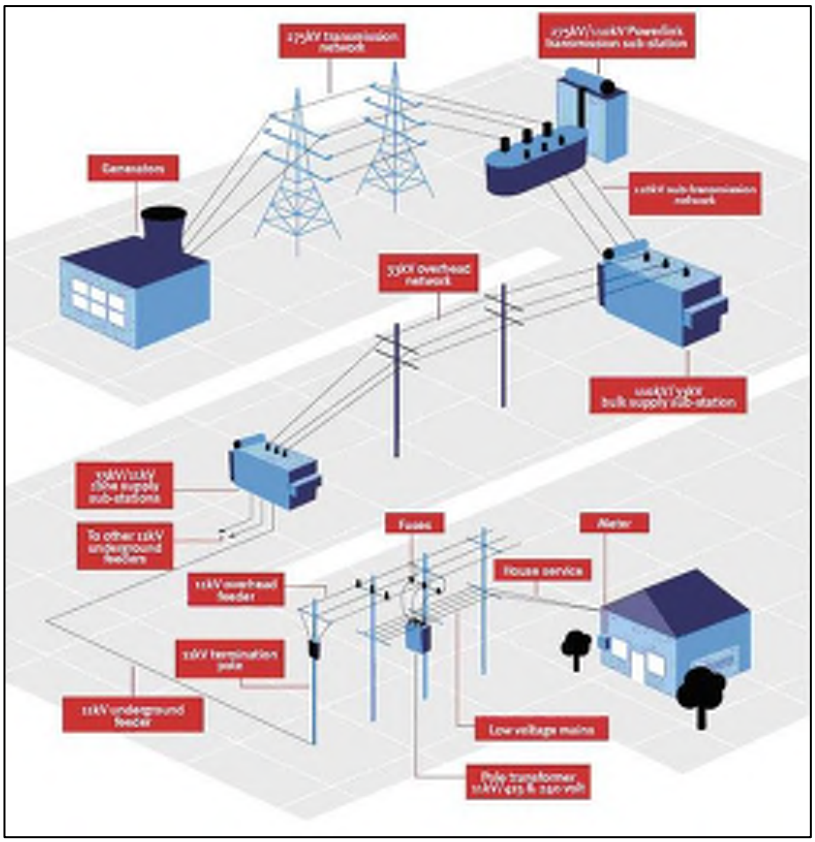

Figure 1 ***Typical Electricity Transmission and Distribution Network, Australian Energy Regulator 2015 'Consumer guide to Victorian electricity distribution pricing review' p5***

5.2 Responsible authorities

Victoria's electricity industry is privately owned. The transmission electricity network is regulated by the Australian Energy Market Operator and distribution electricity network is regulated by the Australian Energy Regulator. The transmission network in Victoria is operated by AusNet Services (AusNet), and the distribution network is operated by 5 distributors, separately into geographical regions.

The electrical network in the KWGC is operated by Powercor and there are no transmission assets in the KWGC.

5.3 Existing conditions

Existing electrical assets are shown in Appendix C.

Powercor operates a number of existing electrical assets in the KWGC, in the form of both overhead high voltage (HV), low voltage (LV),including:

– Overhead HV assets and electrical poles on Raftery Road, Bennetts Road and across the KWGC from Mitchell Road in a North-Western direction to Raftery Road.
– Only a limited number of LV cables are present in the KWGC on Raftery Road, River Road West and Bennetts Road.

Powercor advised that the existing electrical assets are in good condition.

Confirmation from Powercor has been sought to confirm the source of the KWGC's electrical supply.

5.4 Planned upgrades

Powercor advised that increases in future load would trigger planned electrical network works. Powercor assets are in good condition but near capacity, therefore they can be augmented for the next 5-10 years of growth in the KWGC. In the long-term future (10+ years), Powercor has estimated that the electrical demand in the KWGC will increase by 10 Megavolt amperes (MVA), and new powerlines would be required to provide the additional capacity. The capital expenditure of these upgrade works is not current known, and Powercor noted that the works will likely be staged incrementally as the electrical demand increases.

Powercor provided supply side information regarding the electrical infrastructure required to support the KWGC redevelopment, and the following bullet points summarise its indicative servicing strategy for the KWGC:

– A new overhead HV feeder will be required along the Goulburn Valley Highway.
– This servicing strategy is based on the growth forecast information provided in this assessment
– Powercor has assumed that all new residences require authority supplied electrical power
– The capital expenditure associated with the works cannot be understood without more detailed KWGC planning
– The infrastructure will be delivered as required to meet the proposed electrical demand
– Powercor advises that provision should be made in the KWGC planning stages for overhead HV electrical assets in the existing/proposed road reserves with appropriate clearance to vegetation

Powercor does not foresee integrated approaches with other utility services in the future servicing strategy of the Kialla North Growth Corridor.

Powercor will aim to reduce greenhouse gas emissions by providing solar and battery hosting capability in distribution supplies. Powercor noted that it would consider accommodating innovative electrical servicing strategies for the KWGC inclusive of: electric vehicles, microgrids, large scale battery storage. It is possible for the planning of upgrade works to account the innovative electrical servicing strategies, by mitigating the proposed demand and decreasing the requirements for new authority owned electrical infrastructure.

5.4.1 General redevelopment requirements

The following are general requirements applicable to electrical servicing for redevelopments:

– Powercor requires 5 years for load planning to existing terminal stations, and 3 years for load planning to other shared network electrical assets (feeders etc)
– Powercor does not have a mandatory policy in place that requires developers to relocate existing high and low voltage assets underground. Undergrounding assets is based on developed requirements, or it the proposed construction or development does not comply with Powercor's No Go Zone requirements

5.4.2 Cost allocation

Powercor's *Connection Policy*[9] sets out the circumstances in which connection applicants/developers may be required to pay connection charges to Powercor and explains how those charges will be calculated, by applying the principles set out in the National Electricity Rules and Australian Energy Regulator's *Connection Charge Guidelines for Electricity Retail Customers.*[10]

– Powercor applies a basic connection service charge to most routine connections where adequate supply is available at the property, and the proposed demand is below 170 amps
– Powercor applies a negotiated connection service charge for proposed connections that are large and/or complex, and where adequate supply is not available. These charges are calculated for each connection request and consider the cost of the works, and the incremental revenue for the electrical authority
– Powercor applies a shared network charge (the cost of augmenting the electrical network) for customers requiring larger connection capacities.
– As the requirement for new electrical infrastructure is generally triggered by the first development requiring electrical servicing, Powercor has a 'pioneer scheme' whereby developers that are required to fund shared network assets may be entitled to a partial refund of their connection charge when future developments require use of the network assets. Similarly later developers can be required to make a financial contribution to the cost of customers already connected.
– Powercor also operates an equalisation scheme for developers under which it may contribute towards the cost of installing HV assets within residential subdivisions. Powercor contributes to ensure the original estate developer in an area does not pay for the network assets used by all subsequent developers
– Planned upgrade works initiated byPowercor will generally be funded by Powercor. Should any upgrade works be initiated by customers as a result of new supply or an increase in supply, the customer will be required to pay a contribution towards the works.
– Any asset relocation costs required by a development will be at the developer's expense. An exception to this may be where the electrical authority has plans to retire or relocate those assets
– Undergrounding of existing overhead assets would need to be fully funded by the developer. Costs vary according to the type and location of the existing assets

[9] https://media.powercor.com.au/wp-content/uploads/2021/06/25113814/Powercor-Connection-policy-1-1-July-2021.pdf
[10] Available at < https://www.ausnetservices.com.au/-/media/Files/AusNet/New-Connections/National-Electricity-Rules-chapter5A.ashx?la=en>

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.

The assets in the KWGC are owned by the Australina Gas Infrastructure Group (AGIG).

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

6.2 Responsible authorities

APA Transmission (APA VTS) owns the gas transmission network servicing the KWGC and APA Group Networks (APA) operates and manages the natural gas distribution network servicing the KWGC on behalf of Australian Gas Networks (AGN). There are no gas transmission assets inside (or close to) the KWGC, and therefore APA VTS was not consulted in this assessment.

6.3 Existing conditions

Existing gas assets are shown in Appendix C and Figure 3.

There is a 200mm transmission gas pipeline running near to River Road West across the KWGC. APA Group have advised that the Shepparton - Kyabram high pressure gas pipeline is located within a 20m wide easement and has a 170m wide measurement length either side of the pipeline.

There is a high pressure gas main present on Raftery Road from the River Road West intersection along the road heading north. The Gas main verges from the Eastern boundary to the Western boundary.

The gas assets are shown in Appendix C and Figure 3, highlighting the location of the high pressure gas pipeline and other assets outside the boundary of the KWGC.

6.4 Planned upgrades & redevelopment scenarios

Network augmentation will be required to supply the KWGC precinct. Staging of development in this precinct will dictate the augmentation works required, mainly involving duplication of existing assets to support the additional demand. There will also be a number of crossings of the Seven Creeks in order to extend reticulation. There is currently one crossing which is not sufficient to service this whole area. These crossing will require considerable lead time in thier planning, approval and construction due to compliance to environmental, planning, heritage and authority conditions.

In order to extend reticulation, there will be a number of crossings of the Seven Creeks. There is currently one crossing which is not sufficient to service this whole area. These crossings will require considerable lead time in their planning, approval and construction due to compliance to environmental, planning, heritage and authority conditions.

APA provided advice on how it (or the delivery of gas infrastructure) could facilitate a sustainable approach to utility servicing in the KWGC. APA advise that the gas asset owner (AGIG) have a long term strategy to decarbonise the networks by 2050. AGIG could consider connection to the KWGC as an island network, a fully decarbonised reticulation grid. This would however have to be arranged directly with AGIG under a separate commercial arrangement. AGIG will also require an allocation of land and buffer for generation equipment. The end consumers will need to be notified that they will be reticulated with green hydrogen gas and will therefore have to install appliances that are compatible to run on the green hydrogen gas. AGIG are looking at a phased approach to changing the energy they transport from natural gas (methane) to renewable gas. The target is to introduce 10% renewable gas by volume by 2030 and eventually to fully decarbonise the distribution networks before 2050.

6.4.1 General redevelopment requirements

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.

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 from its assets:

– Property boundary to distribution sized gas main less than 100 mm diameter 1 metre
– Property boundary to distribution supply gas mains greater than 100 mm diameter 2 metres

In high density areas, distribution supply gas mains greater than 100 mm diameter are required to be offset a minimum of 3 metres from the predominant building boundary, regardless of their alignment

APA advised the following general gas delivery principles for new infrastructure:

– It's preferred offset from the title boundary is 2.1 meters
– If large mains are to be installed (i.e 125 mm diameter steel/concrete mains, or 180 mm PE mains, or greater) a minimum clearance of 3 meters is required from the main building façade to the gas main
– Larger diameter mains should generally be located along arterial or main feeder roads, as generally their alignment is already existing or is known early in the planning stage
– If an additional main is required for augmentation purposes, this should be allowed for in the road reserves at the planning stage, as gas may have significant clearance requirements from other utility services
– Where possible, gas mains are generally installed in a shared trench with water infrastructure at the time of construction

6.4.2 Cost allocation

There are two types of tariff arrangements for gas customers depending on the volume of gas required: tariff volume (Tv) customers include residential, small industrial and commercial end customers, and tariff demand customers (Td) include larger commercial and industrial end customers. APA provides general advice for distinguishing between the two customer types based on gas consumption: Tv customers have gas consumption below 10 terajoules per year and Td customers have gas consumption above 10 terajoules per year. Customers such as residential developers usually fall into the category of a Tv customer. Td customers have an extremely high peak hourly load or annual volume required. Cost for gas is less expensive for Td customers but they are liable for greater capital costs in financing extensions and network augmentation.

Typically, provision of gas is at a lower cost to the asset owner for areas where high pressure gas mains are present or in close proximity. Financing of extensions and network augmentation would be economically assessed in accordance with Table 5 below.

Table 5 Gas tariff arrangements

	Tariff volume Tv	Tariff demand Td
Financing of extensions	Economic feasibility tested	Almost always fully chargeable to developer. A proposal will be analysed to see if any non-chargeable network benefit would be realised
Financing of network augmentation	Funded by APA (specific case dependent)	Economic feasibility testedm, requiring that any revenue shortfall required to establish an economic proposal is generally chargeable to developers unless some augmentation component is incorporated to allow for other non-Td future development

In line with regulatory requirements gas project funding is determined in several ways. The potential requirement for new infrastructure will be assessed on an individual request evaluation made via a gas retailer. This evaluation includes a review of the economic viability of the connection based upon the requested demand against the gas supply infrastructure required, inclusive of any mains extensions.

Where a request is made for installation of a gas main to a building or site for the purposes of enabling future connection, with no connection requests being current at the time of installation, the full construction cost is passed onto the developer.

Any development charges, levies or applicant contribution will be deemed applicable on a case by case basis, in line with the requirements of the National Gas Rules.

The costs of relocating APA gas infrastructure are fully attributable to the developer. The cost of any new assets is determined through a comparison of the incremental cost and the future incremental revenue of the asset to be installed, and this is usually determined by the gas retailer.

7. Telecommunications infrastructure

7.1 Overview of Victoria's telecommunications network

The Australian Federal Government's *Telecommunications in New Developments (TIND) Policy*[11] outlines the policy for the provision of telecommunications in new developments. The TIND policy has two key objectives: to provide people moving into new developments with ready access to modern telecommunications, both voice and broadband; and to support a competitive and sustainable market for the provision of such infrastructure by fostering efficiency, innovation and choice.

The following points summarise the key elements of this policy with regarding to the provision of telecommunications infrastructure:

– In Australia, the provision of telecommunications networks and services is generally split to promote competition and consumer choice. Carriers generally provide networks, and retail service providers supply services. Both are involved in delivering services to new developments and premises.
– Developers are responsible for organising and meeting the cost of telecommunications in their developments. Developers must arrange for a carrier to install network infrastructure in their developments. The network is generally run to the property boundary if not to the new building.
– Developers can choose any telecommunications carrier they wish. If they do not choose to use another carrier, NBN Co is the default statutory infrastructure provider for broadband for Australia. To ensure services will be available, NBN Co is obliged to provide broadband infrastructure where another carrier has not been selected.
– Telstra is obliged to provide telephone services on reasonable request by customers. Telstra will use NBN Co's fixed-line network to provide these services where it is available, but outside the fixed-line footprint Telstra can choose what technology it uses and may use wireless or satellite.
– Unless exempted, under Commonwealth law, developers must also provide underground pit and pipe. If a development is located in a rural, bushland or remote area, it may be eligible for exemption from this requirement.
– Carriers generally charge developers for the installation of telecommunications infrastructure in their developments. This will be reflected in the cost of properties. Property owners need to meet the cost of 'on property' facilities not already provided. Carriers may also charge a customer contribution to network installation costs. Retail service providers typically pass this cost to the customer.

7.2 Responsible authorities

The KWGC is serviced by the following telecommunication authorities; NBN and Telstra

7.3 Existing conditions

Existing telecommunication assets are illustrated in Appendix C.

7.3.1 Telstra infrastructure

Telstra assets are located on the following roads in the KWGC: Raftery Road, Bennetts Road, Goulburn Valley Highway and Mitchell Road.

7.3.2 NBN infrastructure

The KWGC is covered within the NBN's fixed line footprint as well as partial areas being covered by satellite. Its network in the KWGC current consists of NBN conduits running through Raftery Road, Goulburn Valley Highway and Bennetts Road.

[11] https://www.infrastructure.gov.au/department/media/publications/telecommunications-new-developments

7.4 Planned upgrades & redevelopment scenarios

7.4.1 Telstra infrastructure

Telstra's advice regarding planned network upgrades in a precinct includes:

– upgrades triggered by a limited network capacity, customer service orders and new estate developments
– upgrades that require additional land, particularly to expand mobile coverage
– upgrades that are staged to align with estate development plans and forecasted customer demand
– upgrade works can require customer contributions from land owners and/or developers.

Regarding Telstra's servicing strategy for developments:

– Telstra's trunk network infrastructure may require an upgrade. The nature of this upgrade will be determined once further development details are understood.
– Telstra's servicing strategy for will include an extension of Telstra's optical fibre network from suitable fibre access points to locations where customer demand growth is forecasted.
– Asset relocation might be required. The nature of any required relocations will be determined once further development details are understood.
– Telstra's pit and pipe infrastructure delivery can be designed and coordinated with other utility services to reduce potential asset relocation, future excavation works and reinstatement of existing infrastructure.

Telstra deploys network infrastructure with consideration to climate change, environmental factors, heritage impacts, forecasted service demand and specific customer service requirements. Telstra plans and designs network infrastructure to minimise impacts on climate change and heritage issues and continues to implement sustainable work practices which minimise carbon emissions. Telstra endeavours to support Councils' and developers' net zero carbon objectives by delivering 'state of the art' telecommunications technology.

7.4.2 NBN infrastructure

NBN advised that it can review and plan new cables to support growth in the Precinct, and provided the following advice regarding servicing the redevelopment with telecommunications infrastructure:

– NBN has an existing distribution fibre network within the Precinct, but its capacity to support redevelopment is currently unknown. Generally, the NBN allows for 33% spare fibres within infrastructure deployment for future growth in any area.
– The typical service area module size services approximately 4000 service locations (SLs). NBN would likely require a new service area module for the KWGC if future growth of the area results in over 4000 SLs. A new service area module requires a new distribution fibre network from a local fibre access node site.
– NBN advises that planning for telecommunications infrastructure early in the planning process can avoid inefficient/poor planning

7.4.3 General redevelopment requirements

NBN requires at least 6 months' notice of any request for services and is generally unable to provide telecommunications infrastructure any earlier.

Telstra requires approximately 20 weeks to plan for asset relocation works. For new telecommunications infrastructure, Telstra requires a 3 month lead time to prepare infrastructure designs.

Telstra's general mode of operation is to ask the developer to include pit & pipe dedicated to Telstra

7.4.4 Cost allocation

The information provided in this section reflects the likely cost allocation for NBN infrastructure to be provided to the KWGC.

7.4.4.1 In-estate infrastructure

Developers will be liable for the cost of connection infrastructure as shown in Table 6 below. Premises is defined by NBN as a single place capable of having its own physical address for which the end user may require broadband services.

Table 6 NBN deployment contributions on developers for in-estate infrastructure

Lot Type Developer Contribution	Lot Type Developer Contribution
Single-Dwelling Unit Lot/Premises (SDU)	$600
Multi-Dwelling Unit Premises (MDU)	$400

7.4.4.2 Backhaul infrastructure

Backhaul costs are attributable to the developer if the length of backhaul required is greater than 1 kilometre. The indicative cost allocation for backhaul for NBN infrastructure is outlined in Table 7 below. NBN has stated that the a new distribution fibre network will be required for the redeveloped KWGC to be fully serviced by NBN telecommunications infrastructure, therefore it is likely that there will be costs associated with backhaul infrastructure.

Table 7 NBN deployment contributions on developers for backhaul infrastructure

Component	NBN Average Cost	Developer Contribution 50% of the first $1,000 per premises	Developer Contribution 100% above first $1,000 per premise
Haul	$13/metre	$6.5/metre	$13/metre
Construction	$60/metre	$30/metre	$60/metre

NBN requires an end-user (consumer) contribution of $300 per premises that is allocated to the Retail Service Provider, which may be passed through to the end-user. This end-user contribution is only applicable in new developments and developments of existing built-up areas for further construction such as this KWGC.

8. Typical road cross sections

This assessment included the preparation of typical cross sections in order to illustrate the location of existing utility services within the major road reserves. Typical road cross section have been provided in Appendix D.

Typical sections have been prepared for the following existing significant roads within the KWGC:

– Raftery Road
– Bennetts Road
– River Road West
– Goulburn Valley Hwy

The typical sections highlight the approximately location of existing utility infrastructure within the road reserves. They have been informed by a desktop assessment of online information, an assessment of spatial information received from USPs, and liaison with USPs. The location of existing services is approximate only and has not been physically confirmed on site.

9. Summary

This assessment provided a high level review of the infrastructure requirements and impacts of the proposed KWGC development on existing utility infrastructure, as established through consultation with key Utility Service Providers.

9.1 Key findings

Key findings of this assessment are outlined in Table 8 below.

Table 8 Key findings

Infrastructure type	Key findings
Stormwater drainage	– A separate stormwater management and hydrological assessment has been commissioned by Council, and readers should refer to this for detailed stormwater assessment information. – Council has limited stormwater drainage infrastructure within the KWGC; infrastructure present is in the form of pipes and table drains. – A significant portion of the KWGC is affected by a Land Subject to Inundation Overlay, and associated planning conditions will affect development in this area. – Council will require underground pit and pipe infrastructure for new developments, and will only consider above ground channel or swale drainage infrastructure where Council believes it is beneficial to the community. – GMW does not have any drainage assets in the area.
Water	– Goulburn Valley Water manages a limited number of existing water assets within the KWGC. – There is no recycled water network within the KWGC. – Goulburn Valley Water will carry out upgrades and expansions on an 'as needed' basis and there are no short, medium or long term planned upgrades. – Redevelopment in the KWGC will likely trigger upsizing of existing water assets (both within and outside the KWGC), including trunk water mains, storage tanks and booster pump stations. – Typically, for new developments, water network extensions are constructed by developers and gifted to GVW – GMW is the authority responsible for rural water supply and manages the Shepparton No.2 channel and pipeline along the western boundary of the KWGC along Raftery Road.
Sewer	– Goulburn Valley Water manages a limited number of existing sewer assets within the KWGC – Goulburn Valley Water will carry out upgrades and expansions on an 'as needed' basis and there are no short, medium or long term planned upgrades. – Redevelopment in the KWGC will likely trigger upsizing of existing sewer assets outside the KWGC to service the development, in particular trunk sewer mains, sewer pump station updates and new sewer pump stations. – Typically, for new developments, sewer network extensions are constructed by developers and gifted to GVW

Infrastructure type	Key findings
Electricity	– Powercor manages the electrical distribution network in the KWGC, and all existing electrical assets within the KWGC. – The KWGC is currently serviced with mainly high voltage assets, both overhead and underground.There are very few low voltage cables providing power to the existing properties. – Powercor has estimated that the electrical demand in the KWGC will increase by 3 MVA in the short term due to the redevelopment. – The existing electrical high voltage feeder servicing the KWGC will initially have the required capacity but will need incremental augmentation as the load increases – Powercor can accommodate local solar photovoltaic electricity generation, and would consider accommodating innovative electrical servicing strategies such as electric vehicles, microgrids and battery storage to support redevelopment. – There is an overhead HV line on Mitchell Road going North-West across the KWGC to Raftery Road. – The works are generally funded internally across customer base, however large high voltage load blocks will need to be further discussed.
Gas	– APA Group Networks manages the reticulation gas network surrounding the KWGC. – There is a 200mm transmission gas pipeline running through the KWGC west to east. – There are some existing reticulation services consisting of both steel and Polyethylene (PE) types. – The current trunk infrastructure in the vicinity of this precinct does not have the capacity to service predicted load in the development, network augmentation will be required to supply the required load. – For the existing assets laid within and at the boundaries of the precinct, the kit title boundary of any infrastructure being built is required to be at least 2 m away from the asset. The façade of any buildings must be 3 m away and no varendahs or canopies are to be built over any assets. – APA requires a staging plan to appropriately plan for gas delivery in the KWGC. – Where there are works required as only being needed to support the supply to KWGC, augmentation costs will be assessed against the viability of delivery of reticulation, which may result with the Developer needing to pay a contribution for these works.
Telecommunications	– The KWGC is currently serviced by Telstra, and NBN telecommunications infrastructure. – Developers can choose any telecommunications carrier they wish. NBN is the default statutory infrastructure provider obliged to provide broadband infrastructure. – There are significant Telstra and NBN assets around the boundaries of the KWGC. – The KWGC is partially covered within the NBN's fixed line footprint and also partially in the fixed wireless service.

9.2 Key issues and opportunities

Table 9 Key issues and opportunities

Infrastructure type	Key issue	Key opportunity
General	– Utility service providers require detailed information, including location of dwellings, lot sizes and alignment of new roads, in order to provide detailed future infrastructure information – Multiple utility services providers advised that appropriate development staging within the KWGC would facilitate efficient utility service delivery	– Undertake an assessment of the ultimate KWGC Structure Plan to determine opportunities for sustainable utility infrastructure planning in consultation with utility service providers – Consult with relevant stakeholders to enable greater understanding of the impact of all development on utility networks – Once the future road cross sections are known, consult with utility service providers to understand requirements for future road and utility cross-sections

Infrastructure type	Key issue	Key opportunity
Stormwater drainage	– A separate stormwater management and hydrological assessment has been commissioned by Council, and readers should refer to this for detailed stormwater assessment information	– Evaluate the findings of this assessment against the findings of the separate stormwater management and hydrological assessment to understand the next steps for development planning
Water	– Water supply pressure and extension of services to new customers – Augmentation of the existing water network is likely required to service the KWGC redevelopment – There is no recycled water network within the KWGC – GMW is the authority responsible for rural water supply and manages the Shepparton No.2 channel and pipeline along the western boundary of the KWGC along Raftery Road.	– Ensure correct augmentation and construction of the assets are carried out to satisfy the demands of the KWGC – Work with GVW to deliver an Integrated Water Management Solution for the KWGC – Investigate the provision of local/KWGC wide recycled water services – Following the development of the KWGC Structure Plan, develop a staging plan for water infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of water services – Liaise with GMW to determine the extent and timing of channel-to-pipeline conversion required and understand delineation of responsibility.
Sewer	– Flows exceeding maximum capacity of existing assets and existing sewer catchments becoming too large to expand due to the asset being too close to the surface – Augmentation of the existing sewer network is likely required to service the KWGC redevelopment	– Work with Goulburn Valley Water to deliver an Integrated Water Management Solution for the KWGC – Investigate the provision of local/KWGC wide sewer mining/recycled water service – Following the development of the KWGC Structure Plan, develop a staging plan for sewer infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of sewer services – Ensure correct augmentation and construction on the assets are carried out to satisfy the demands of the KWGC
Electricity	– Electrical demand in the KWGC is estimated to increase by 3MVA, triggering the need for network augmentation works in the form of a new feeders	– Consider the feasibility of onsite electricity generation to reduce future electrical infrastructure required to service the KWGC – Collaborate with Powercor regarding the provision of innovative electrical servicing strategies such as electrical vehicles, microgrids and battery storage
Gas	– The trunk infrastructure does not have the capacity to service the predicted load. – Augmentation of the infrastructure would comprise duplication of existing assets – The sequencing of development in the KWGC will have a greater impact to managing the delivery of gas servicing than the aggregate development load	– Investigate opportunities to provide a ‘gas-free’ KWGC – Following the development of the KWGC Structure Plan, develop a staging plan for gas infrastructure in collaboration with APA Group (Networks) to ensure the efficient delivery of gas services
Telecommunications	– The KWGC is mostly covered within the NBN’s fixed line and fixed wireless footprint.	– Following the development of the KWGC Structure Plan, develop a staging plan for telecommunications infrastructure in collaboration with telecommunciations utility service providers to ensure the efficient delivery of telecommunications services

Appendices

Appendix A

Locality Plan

Utilities details are provided for information purposes only. GHD does not warrant, guarantee or make any representations regarding the completeness, accuracy, reliability, or any other aspect, of the information presented. In some case asset positions have been digitised from pdf plans The user accepts sole responsibility and all risk for accessing, using and relying upon any information or material provided. GHD does not accept any liability for any claims, loss or damage which may be incurred as a result of accessing, using or relying upon this information.

Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

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

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GHD

Greater Shepparton City Council
Kialla West Growth Corridor
Utility Servicing Assessment

Project No. **31-12568262**
Revision No. **B**
Date **09/02/2023**

Locality Plan

Figure 1

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Print date: 09 Feb 2023 - 15:28

Data source: DEWLP, VicMap, 2021; GHD, 2021; MetroMap Imagery 09032021 Created by: ekafai

Appendix B

Planning Zones and Overlays

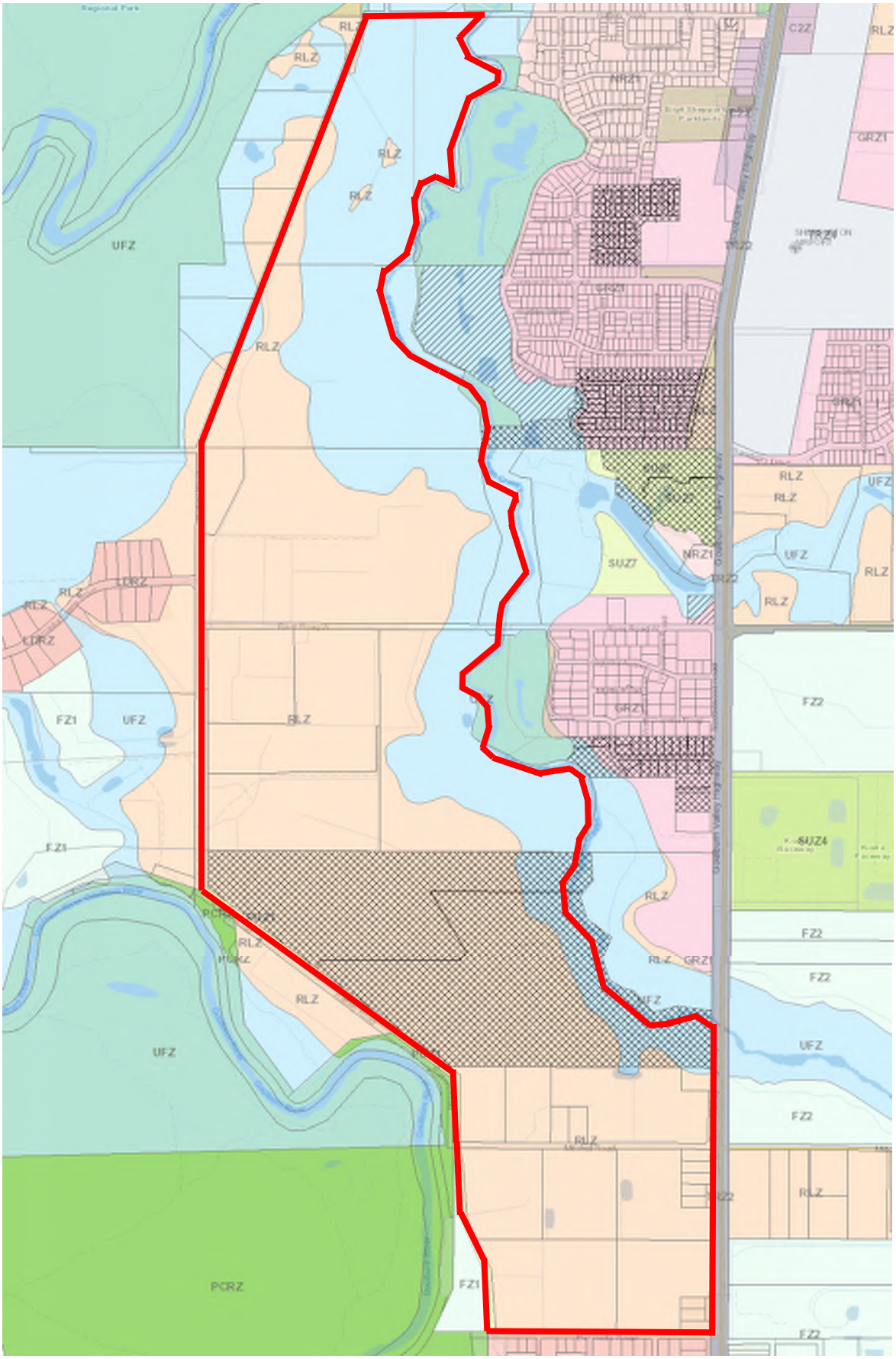


Figure B-1 ***Planning Zones in the Kialla West Growth Corridor , VicPlan April 2022, available at < https://mapshare.vic.gov.au/vicplan/>***

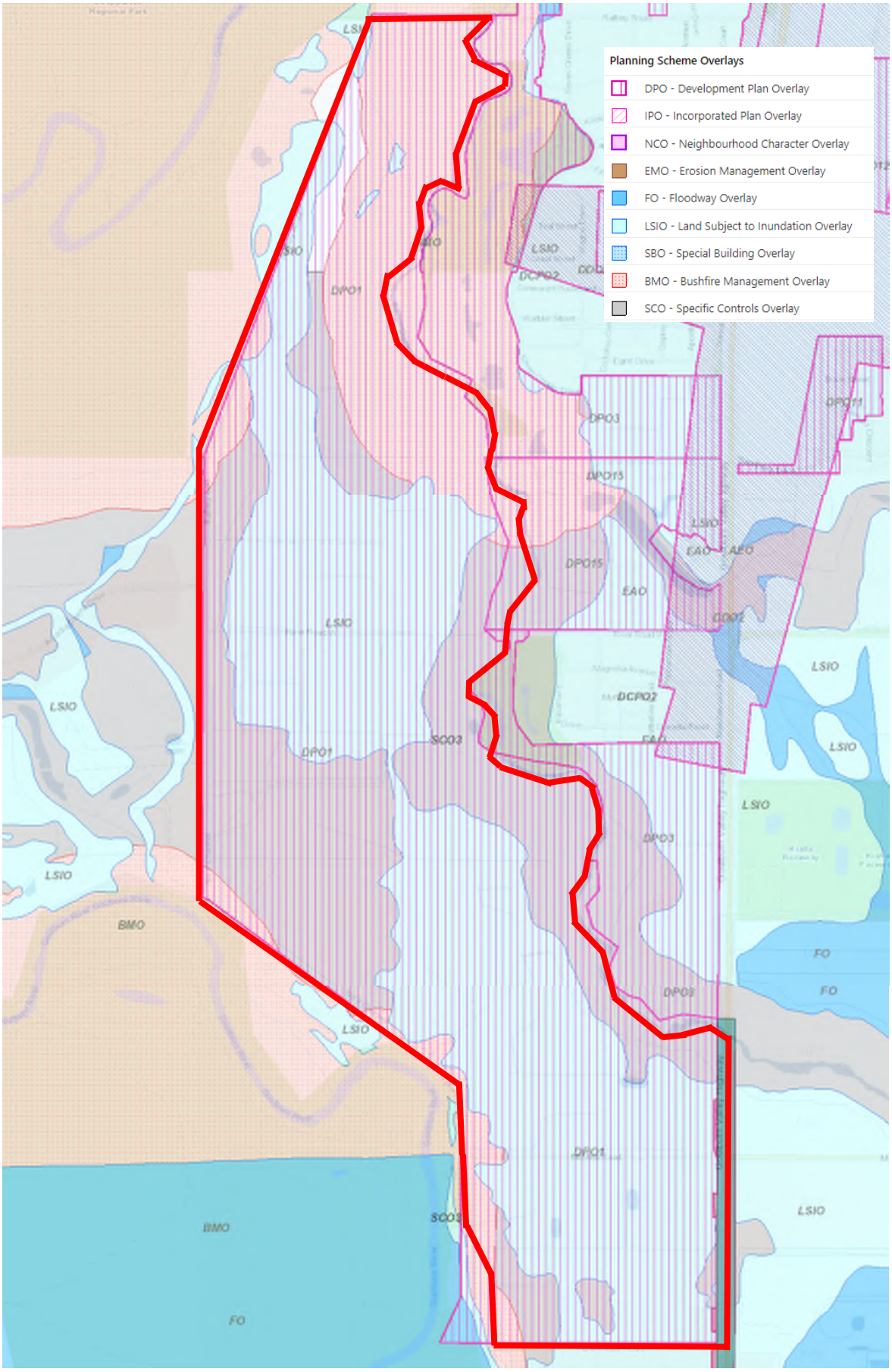
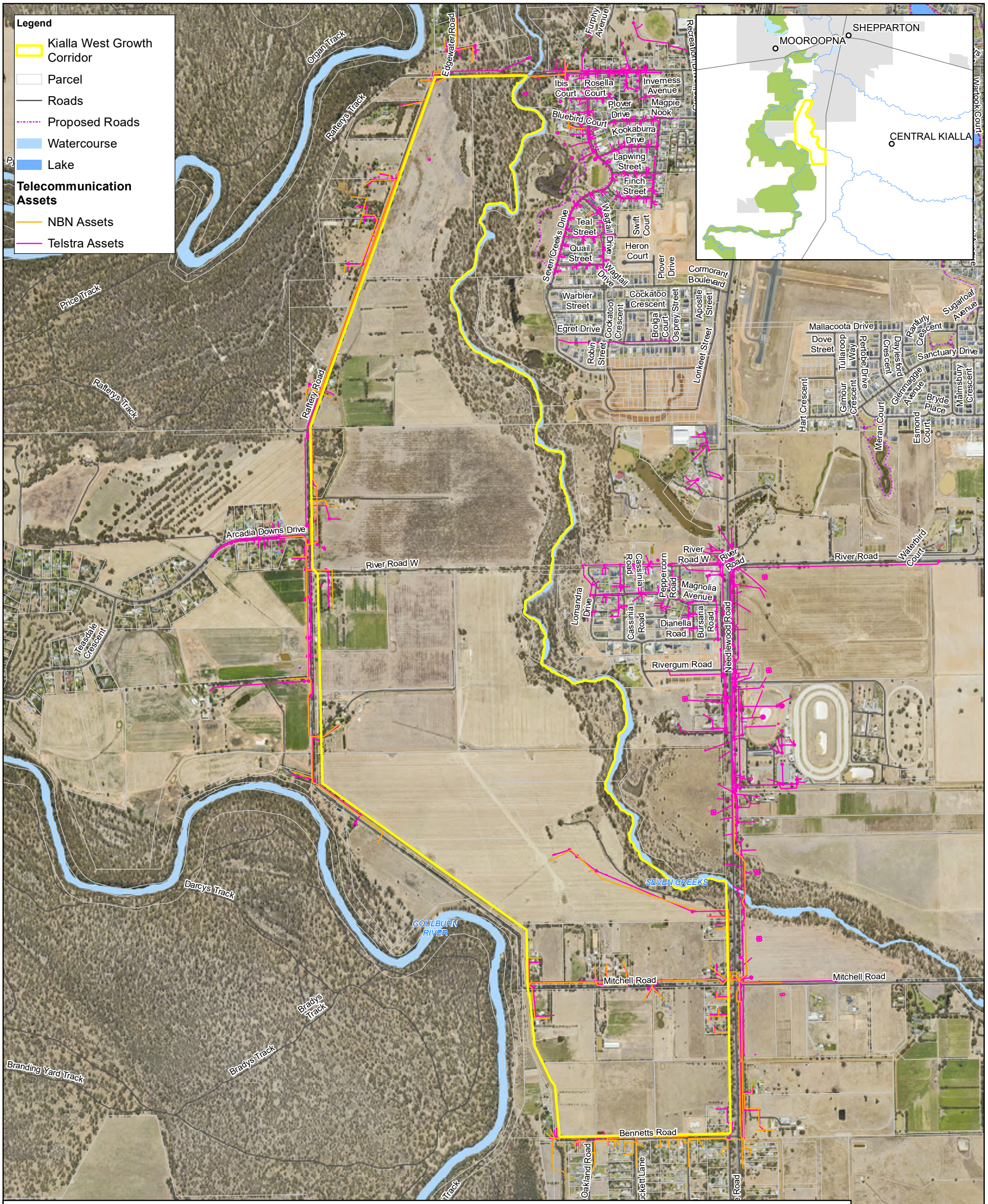


Figure B-2 *Planning Overlays in the Kialla West Growth Corridor, VicPlan April 2022, available at <https://mapshare.vic.gov.au/vicplan/>*

Appendix C

Existing Infrastructure Plans



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

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

N

GHD

Greater Shepparton City Council
Kialla West Growth Corridor
Utility Servicing Assessment

Project No. **31-12568262**
Revision No. **B**
Date **10/02/2023**

Telecommunication Assets

Figure 4

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Print date: 10 Feb 2023 - 10:41

Data source: DEWLP, VicMap, 2021; GHD, 2021; MetroMap Imagery 09032021; Telstra DWG provided though Dial before you dig, 2022; Optus and NBN asset have been digitised as per DBYD PDFs,2022
Created by: ekafai

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

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

N

GHD

Greater Shepparton City Council
Kialla West Growth Corridor
Utility Servicing Assessment

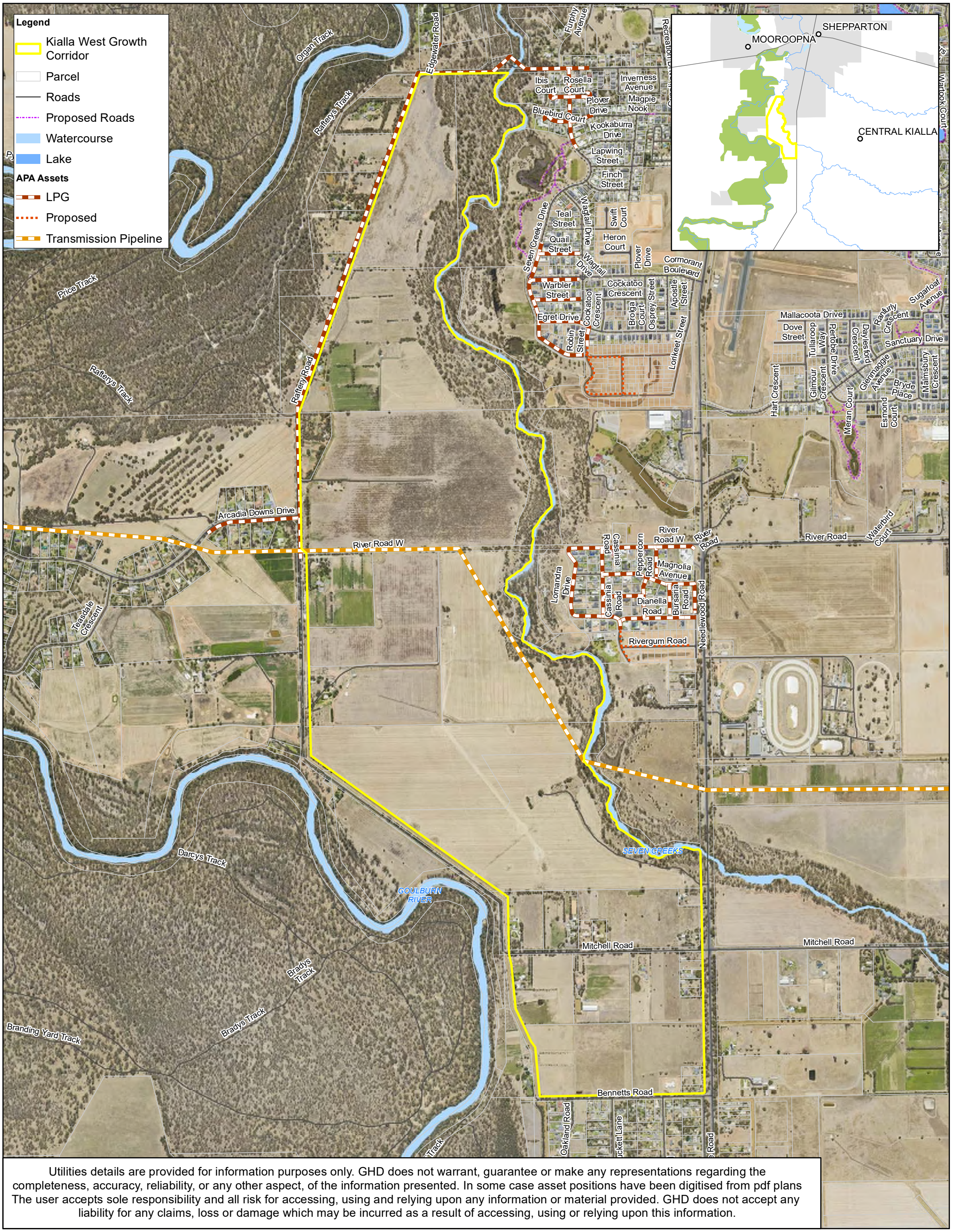
Project No. **31-12568262**
Revision No. **B**
Date **09/02/2023**

Electricity Assets

Figure 5

G:\31\12568262\GIS\Maps\Deliverables\12568262_KBM_A3P.mxd
Print date: 09 Feb 2023 - 16:23

Data source: DEWLP, VicMap, 2021; GHD, 2021; MetroMap Imagery 09032021; Created by: ekafai



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

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

N

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Greater Shepparton City Council
Kialla West Growth Corridor
Utility Servicing Assessment

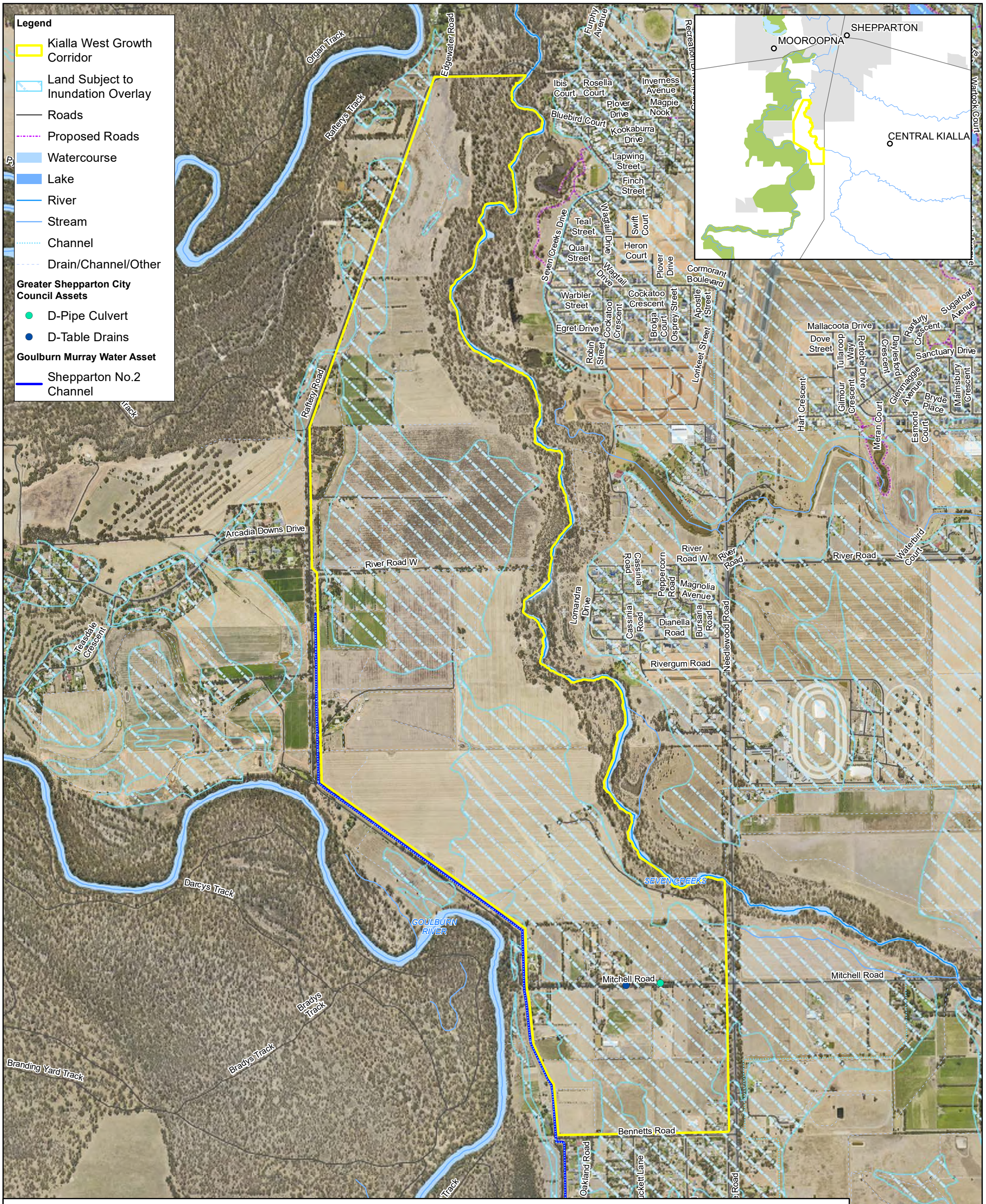
Project No. **31-12568262**
Revision No. **C**
Date **09/02/2023**

Gas Assets

Figure 6

G:\31\12568262\GIS\Maps\Deliverables\12568262_KBM_A3P.mxd
Print date: 09 Feb 2023 - 16:23

Data source: DEWLP, VicMap, 2021; GHD, 2021; MetroMap Imagery 09032021; APA Assets Digitised as per DBYD, 2022 Created by: ekafai



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

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

N

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Greater Shepparton City Council
Kialla West Growth Corridor
Utility Servicing Assessment

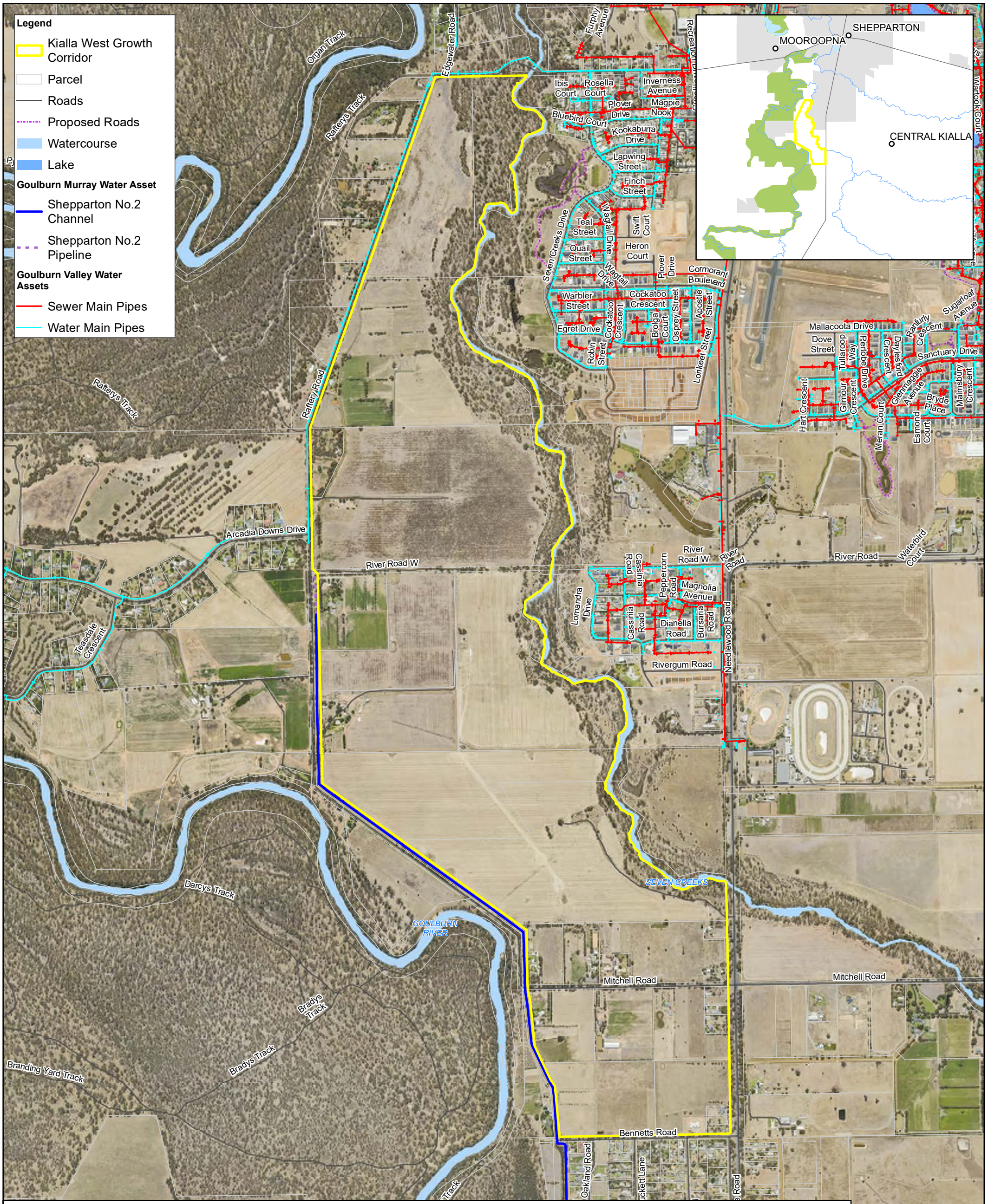
Project No. **31-12568262**
Revision No. **B**
Date **09/02/2023**

Stormwater Drainage Assets

Figure 2

G:\31\12568262\GIS\Maps\Deliverables\12568262_KBM_A3P.mxd
Print date: 09 Feb 2023 - 16:46

Data source: DEWLP, VicMap, 2021; GHD, 2021; MetroMap Imagery 09032021; Greater Shepparton City Council,2022 Created by: ekafai



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Paper Size ISO A3

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Kilometers

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

N

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Utility Servicing Assessment

Project No. **31-12568262**
Revision No. **B**
Date **09/02/2023**

Water and Sewer Assets

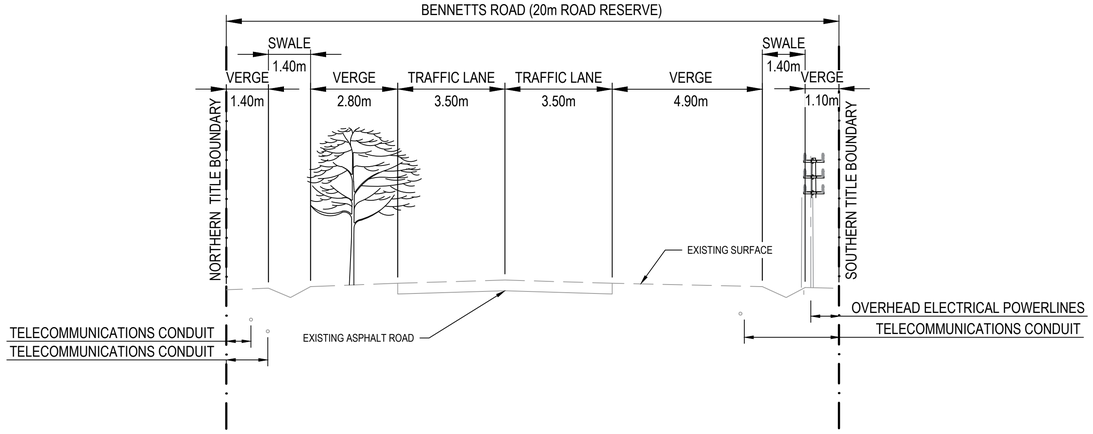
Figure 3

G:\31\12568262\GIS\Maps\Deliverables\12568262_KBM_A3P.mxd
Print date: 09 Feb 2023 - 16:42

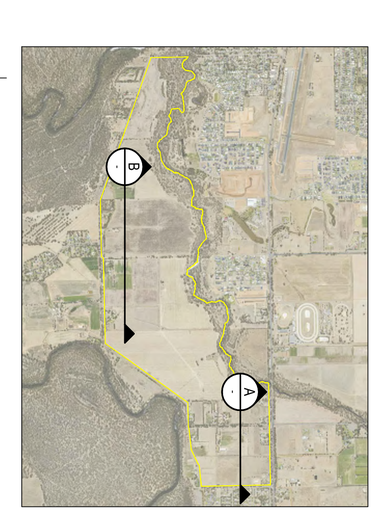
Data source: DEWLP, VicMap, 2021; GHD, 2021; MetroMap Imagery 09032021;GVW,2022 Created by: ekafai

Appendix D

Typical Road Cross Sections



A SECTION
- SCALE 1:100



KEY PLAN
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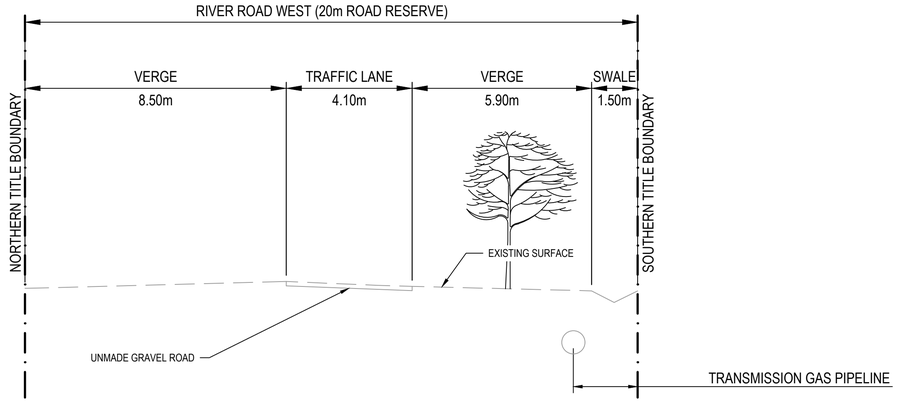

B SECTION
- SCALE 1:100

NOTES:

1. ALL SERVICES SHOWN ARE EXISTING SERVICES
2. THESE DRAWING ARE NOT FOR CONSTRUCTION
3. THE EXISTING SERVICES SHOWN ON THE ROAD MAY DIFFER OUTSIDE OF THE KIALLA GROWTH CORRIDORS
3. DIMENSIONS SHOWN ARE APPROXIMATIONS BASED ON HIGH LEVEL MAP INFORMATION.
4. THE EXISTING SERVICES SHOWN ON THE ROAD MAY DIFFER OUTSIDE OF THE KIALLA GROWTH CORRIDORS
5. TRANSMISSION HAS PIPELINE INSTALLATION STATUS UNKNOWN AND NOT ABLE TO BE VALIDATED BY EXISTING SURFACE FEATURES

WARNING

SERVICES SHOWN ON THIS DRAWING ARE APPROXIMATE ONLY. THE EXACT LOCATION IS TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK

Rev	Description	Checked	Approved	Date
A	ISSUED FOR INFORMATION	AP		5.04.23

Author	E.HERAS	**Drafting Check**	D.KOKOTOVIC
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0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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Project No. 12568262

Client GREATER SHEPPARTON CITY COUNCIL

Project KIALLA WEST GROWTH CORRIDOR UTILITY SERVICING ASSESSMENT

Status FOR INFORMATION — Status Code S2

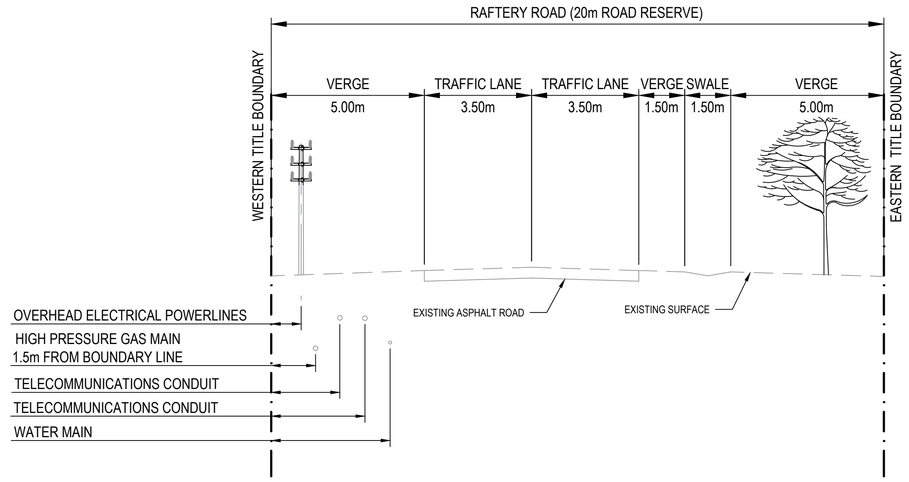
Drawing Title TYPICAL SECTIONS SHEET 1 OF 2

Size A1

Drawing No. 12568262-C001

Rev A

Plot Date: 5 April 2023 - 5:14 PM Plotted by: Alina Pham File Name: \\ghdnet\ghd\AU\Melbourne\Projects\31\12568262\CADD\Drawings\12568262-KW-C001-C002.dwg



C - SECTION
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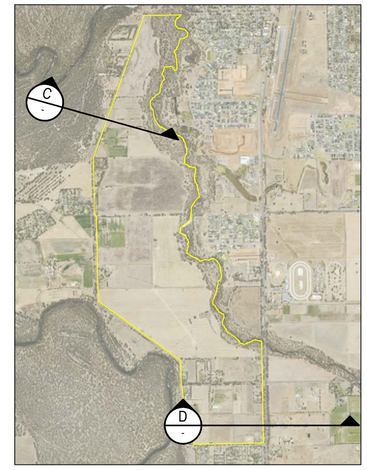
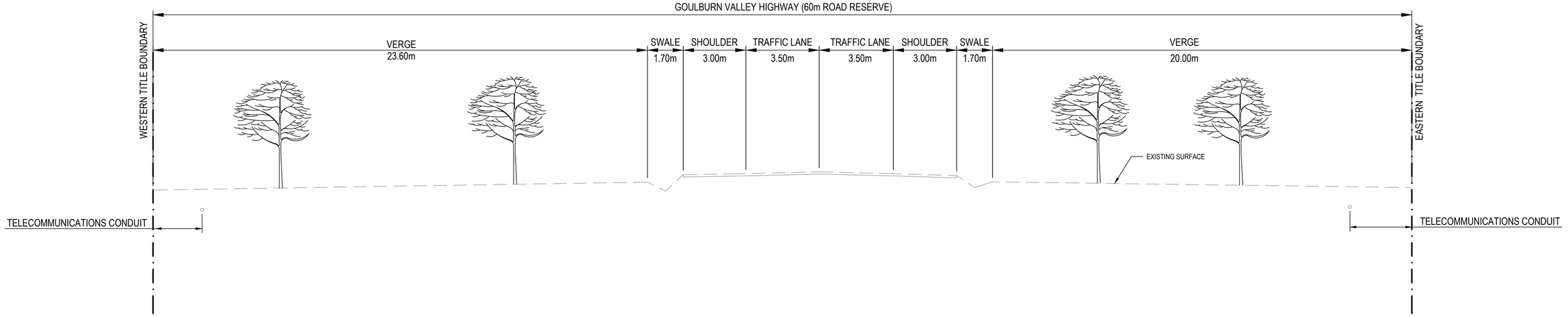


KEY PLAN
N.T.S.



D - SECTION
SCALE 1:100

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Rev	Description		Checked	Approved	Date
A	ISSUED FOR INFORMATION		AP		05.04.23
Author	E.HERAS	**Drafting Check**	D.KOKOTOVIC		
Designer	E.HERAS	**Design Check**	A.V. EEDEN		

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

GREATER SHEPPARTON

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Project No. 12568626

Client GREATER SHEPPARTON CITY COUNCIL

Project KIALLA WEST GROWTH CORRIDOR UTILITY SERVICING ASSESSMENT

Status FOR INFORMATION Status Code S2

Drawing Title TYPICAL SECTIONS SHEET 2 OF 2

Size A1

Drawing No. 12568626-C002

Rev A

Plot Date: 5 April 2023 - 5:15 PM Plotted by: Alina Pham

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