



→ The Power of Commitment

Kialla North Growth Corridor

Utility Servicing Assessment Report

Greater Shepparton City Council

15 July 2022



→ 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 Greater Shepparton City Council (Council) in 2021 to provide an assessment of existing infrastructure capacity and future servicing requirements of the Kialla North Growth Corridor (KNGC).

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

Table 1 Key findings

| Infrastructure type | Key findings |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stormwater drainage | <ul style="list-style-type: none"> – Council has limited stormwater drainage infrastructure within the KNGC; infrastructure present is in the form of table drain and D-Table drains only on Hoopers Rd. – A significant portion of the KNGC is affected by a Land Subject to Inundation Overlay, and planning conditions will affect development in this area – Recent flood modelling results limit development area within the growth corridor and certain areas will need to be filled in to raise ground levels above water for the possibility of development – As per Goulburn Broken Catchment Management Authority (GB CMA) guidelines, a minimum 50m distance from Goulburn River and a 30m distance from any other water ways will be considered as a buffer zone. |
| Water | <ul style="list-style-type: none"> – Goulburn Valley Water manages a limited number of existing water assets within the KNGC – There is no recycled water network within the KNGC – Goulburn Valley Water will carry out upgrades and expansions on an 'as needed' basis so therefore there are currently no short, medium or long term planned upgrades. – Redevelopment in the KNGC will likely trigger upsizing of existing water assets (both within and outside the KNGC), including trunk water mains, storage tanks and booster pump stations – The cost of trunk/distribution water infrastructure and the cost of reticulation mains is attributable to Goulburn Valley Water as it lies within the GVW service boundary. |
| Sewer | <ul style="list-style-type: none"> – Goulburn Valley Water manages a limited number of existing sewer assets within the KNGC – The KNGC is outside of the current sewer district boundary, and existing properties are serviced by private septic systems – Goulburn Valley Water will carry out upgrades and expansions on an 'as needed' basis so therefore there are currently no short, medium or long term planned upgrades. – Redevelopment in the KNGC will likely trigger upsizing of existing sewer assets outside the KNGC to service the development, in particular trunk sewer mains, sewer pump station updates and new sewer pump stations |
| Electricity | <ul style="list-style-type: none"> – Powercor manages the electrical distribution network in the KNGC, and all existing electrical assets within the KNGC – The KNGC is currently serviced with only high voltage assets, both overhead and underground – Powercor has estimated that the electrical demand in the KNGC will increase by 3 MVA in the short term due to the redevelopment – The existing electrical high voltage feeder servicing the KNGC 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 |

| Infrastructure type | Key findings |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gas | <ul style="list-style-type: none"> – APA Group Networks manages the reticulation gas network surrounding the KNGC, and there is currently no reticulation gas network within the KNGC – No infrastructure is to be built within 3m of the steel transmission pipeline on the western boundary of the KNGC – The current trunk infrastructure in the vicinity does not have the capacity to service the predicted load of the development – A program of upstream network augmentation will be required to supply the KNGC – The sequencing of development in the KNGC will have a greater impact to managing the delivery of gas servicing than the aggregate development load – APA requires a staging plan to appropriately plan for gas delivery in the KNGC |
| Telecommunications | <ul style="list-style-type: none"> – The KNGC is currently serviced by Telstra, Optus and NBN telecommunications infrastructure – Developers can choose any telecommunications carrier they wish, and NBN is the default statutory infrastructure provider obliged to provide broadband infrastructure – There are significant Telstra assets in all the roads within the growth corridor, NBN assets are more predominant on the north-west border of the KNGC and will need to be extended out to River Road, Doyles Road and parts of Archer Road and Hoopers Road – A smaller portion of the KNGC covered within the NBN's fixed line footprint while a larger area is within the fixed wireless footprint <p><i>Note: As of issue date of this draft report, responses have not been received from NBN and Optus authorities.</i></p> |

Table 2 Key issues and opportunities

| Infrastructure type | Key issue | Key opportunity |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General | <ul style="list-style-type: none"> – Utility service providers require detailed information, including location of dwellings, lot sizes and alignment of new roads, to provide detailed future infrastructure information – Multiple utility services providers advised that appropriate development staging within the KNGC would facilitate efficient utility service delivery | <ul style="list-style-type: none"> – Undertake an assessment of the ultimate KNGC 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 | <ul style="list-style-type: none"> – A significant portion of the KNGC is affected by a Land Subject to Inundation Overlay, and planning conditions will affect development in this area – Recent flood modelling results limit development area within the growth corridor – As per GB CMA guidelines, a minimum 50m distance from Goulburn River and a 30m distance from any other water ways will be considered as a buffer zone. | <ul style="list-style-type: none"> – Evaluate the findings of this assessment against the new findings from the Council in the form of the questionnaire. Additionally, if a separate stormwater management and hydrological assessment is provided, as it was for Kialla West Growth Corridor, this would further assist the next steps for development planning. |

| Infrastructure type | Key issue | Key opportunity |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water | <ul style="list-style-type: none"> – Augmentation of the existing water network is likely required to service the KNGC redevelopment – There is no recycled water network within the KNGC – Water supply pressure and extension of services to new customers | <ul style="list-style-type: none"> – Work with Goulburn Valley Water to deliver an Integrated Water Management Solution for the KNGC – Investigate the provision of local / KNGC wide recycled water services – Following the development of the KNGC Structure Plan, develop a staging plan for water infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of water services – Ensure correct augmentation and construction on the assets are carried out to satisfy the demands of the KNGC |
| Sewer | <ul style="list-style-type: none"> – Augmentation of the existing sewer network is likely required to service the KNGC redevelopment – 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. | <ul style="list-style-type: none"> – Investigate the provision of local / KNGC wide sewer mining / recycled water service – Following the development of the KNGC 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 KNGC |
| Electricity | <ul style="list-style-type: none"> – Electrical demand in the KNGC is estimated to increase by 3MVA, triggering the need for network augmentation works in the form of a new feeders | <ul style="list-style-type: none"> – Consider the feasibility of onsite electricity generation to reduce future electrical infrastructure required to service the KNGC – Collaborate with Powercor regarding the provision of innovative electrical servicing strategies such as electrical vehicles, microgrids and battery storage |
| Gas | <ul style="list-style-type: none"> – 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 KNGC will have a greater impact to managing the delivery of gas servicing than the aggregate development load | <ul style="list-style-type: none"> – Investigate opportunities to provide a 'gas-free' KNGC – Following the development of the KNGC Structure Plan, develop a staging plan for gas infrastructure in collaboration with APA Group (Networks) to ensure the efficient delivery of gas services |
| Telecommunications | <ul style="list-style-type: none"> – There are significant Telstra assets in all the roads within the growth corridor, there are also NBN assets present but will need to be extended out to the south and eastern borders of the KNGC – A smaller portion of the KNGC covered within the NBN's fixed line footprint while a larger area is within the fixed wireless footprint | <ul style="list-style-type: none"> – Following the development of the KNGC Structure Plan, develop a staging plan for telecommunications infrastructure in collaboration with telecommunications utility service providers to ensure the efficient delivery of telecommunications services |

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1. Introduction

1.1 Project

1.1.1 KNGC location

The Kialla North Growth Corridor (KNGC) is located within the City of Greater Shepparton. KNGC is on the eastern fringes of the Shepparton urban centre with approximately 459 hectares of land, and is bounded by Broken River to the north, River Road to the south, Doyles Road to the east and Archer Road and the existing Shepparton urban centre to the west. The location of the KNGC boundaries is illustrated in Appendix A.

1.1.2 Existing land use

The majority of the KNGC is currently zoned Urban Growth Zone (UGZ), which has been identified for future urban development and is surrounded with the predominant existing agricultural land use around the area. Illustrations of the relevant Victorian Planning Zones can be found in Appendix B.

An Urban Floodway Zone (UFZ) is situated at the top of the KNGC surrounding Broken River and extends south through the KNGC along the eastern and western KNGC boundaries. 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

Doyles Road and River Road are zoned Transport Zone 2 (TZ2) which identifies to be a principal road network. Archer road is zoned Transport Zone 3 (TZ3) which identifies as a significant municipal road.²

1.1.3 Project overview

Council has commenced planning for the KNGC, a strategic urban development project. This KNGC Precinct Structure Plan (PSP) will guide the future residential development over the next 30 years, which will consist of approximately 2,000 lots.

The VPA outlined the key objectives and opportunities for the development of the KNGC 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 KNGC, various studies have been commissioned to inform the preparation of the Kialla North Growth Corridor. This Utilities Servicing Assessment will provide key information regarding the current infrastructure capacity and future servicing requirements of the KNGC.

1.2 Purpose of this report

The focus of this assessment is to determine the condition and capacity of existing infrastructure servicing the KNGC redevelopment 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.

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

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 KNGC.

Table 3 *Utility Service Providers in the Kialla North 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 (GB CMA) |
| | Goulburn Murray Water |
| Telecommunication | NBN Co |
| | Optus / Uecomm |
| | Telstra |
| Water | Goulburn Valley Water |

1.3 Limitations and assumption

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.

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1.4 Methodology

GHD undertook an initial investigation into the utility infrastructure within the KNGC 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 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 |
| Optus/Uecomm | Digitised BYDA Data |
| Goulburn Valley Water | Spatial Data |
| Telstra | Georeferenced BYDA Data |

Using the estimated proposed development dwelling yields and residential land use predictions, 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 of the 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 Appendix F 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 Kialla Region is managed by a number of different authorities. Local councils are responsible for municipal drainage infrastructure including 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, as well as 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 KNGC is managed by the Goulburn Broken CMA. Council is responsible for the local drainage infrastructure.

2.3 Existing conditions

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 KNGC.

The Council only has 2 formal drainage assets in the KNGC in the form of a table drain and 2 D-table drains along Hoopers road. The Kialla North drain is located outside the growth corridor, this asset is owned by Goulburn Murray Water. There are currently a very limited number of existing drainage assets in the corridor.



Figure 1 Screenshot of stormwater drainage assets within the KNGC, gathered from GHD's GIS system

2.4 Flood overlays

A significant area of the KNGC is governed by a Land Subject to Inundation Overlay (LSIO), including split sections of the northern boundary in between Hoopers Road and Adams Road. The majority of the KNGC south of Hoopers Road is highlighted as 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.³The LSIO requires a permit for certain types of development and does not prohibit either use or development of the area.

Majority of the northern boundary of the KNGC is affected by a Floodway Overlay (FO), which identifies waterways, major flood paths, drainage depressions and high hazard areas that are prone to active flood flows in excess of 1 metre deep.⁴ This FO is associated with Broken River. See Appendix B for FO planning overlays.

Planning conditions that attach *generally* to developments within flood prone areas are summarised below:

- Development must not affect floodwater flow capacity: developers must ensure existing flood risks are not made worse by alterations to the flow characteristics of the overland flow path
- Development must not reduce floodwater storage capacity
- Developments in overland flow paths should ensure that building and garage floor level heights should be set a minimum of 300 mm and 150 mm respectively, above the maximum level that would be reached by floodwaters during a 100-year ARI flood event, the current flood protection standard
- Developments in floodplains should ensure that building and garage floor level heights should be set a minimum of 600 mm and 300 mm respectively, above the maximum level that would be reached by floodwaters during a 100-year ARI flood event, the current flood protection standard
- Development must not be allowed on properties where the depth and flow of floodwaters would create a hazard. This requirement is to ensure that people moving about on a property during a flood event are not endangered by deep or fast-flowing water.

Goulburn Broken CMA is the floodplain management authority and is a 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 LSIO, FO and UFZ overlays. The relevant LFDP for the KNGC is the Greater Shepparton Floodplain Development Plan produced in 2006, outlines planning conditions that relate specifically to developments in flood prone areas within the KNGC.

Council have additionally provided an updated model for flood behaviour in the KNGC due to the changes in flood levels as seen in Figure 2. The results look to limit the development area which can occur in the growth corridor.

2.5 Planned updates & redevelopment servicing

Goulburn Broken CMA has not advised that there are any planned upgrades to stormwater drainage infrastructure within the KNGC. Council is yet to respond to the questionnaire or provide a separately commissioned stormwater management and hydrological assessment for planned upgrades.

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

⁴ https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/44_03.pdf

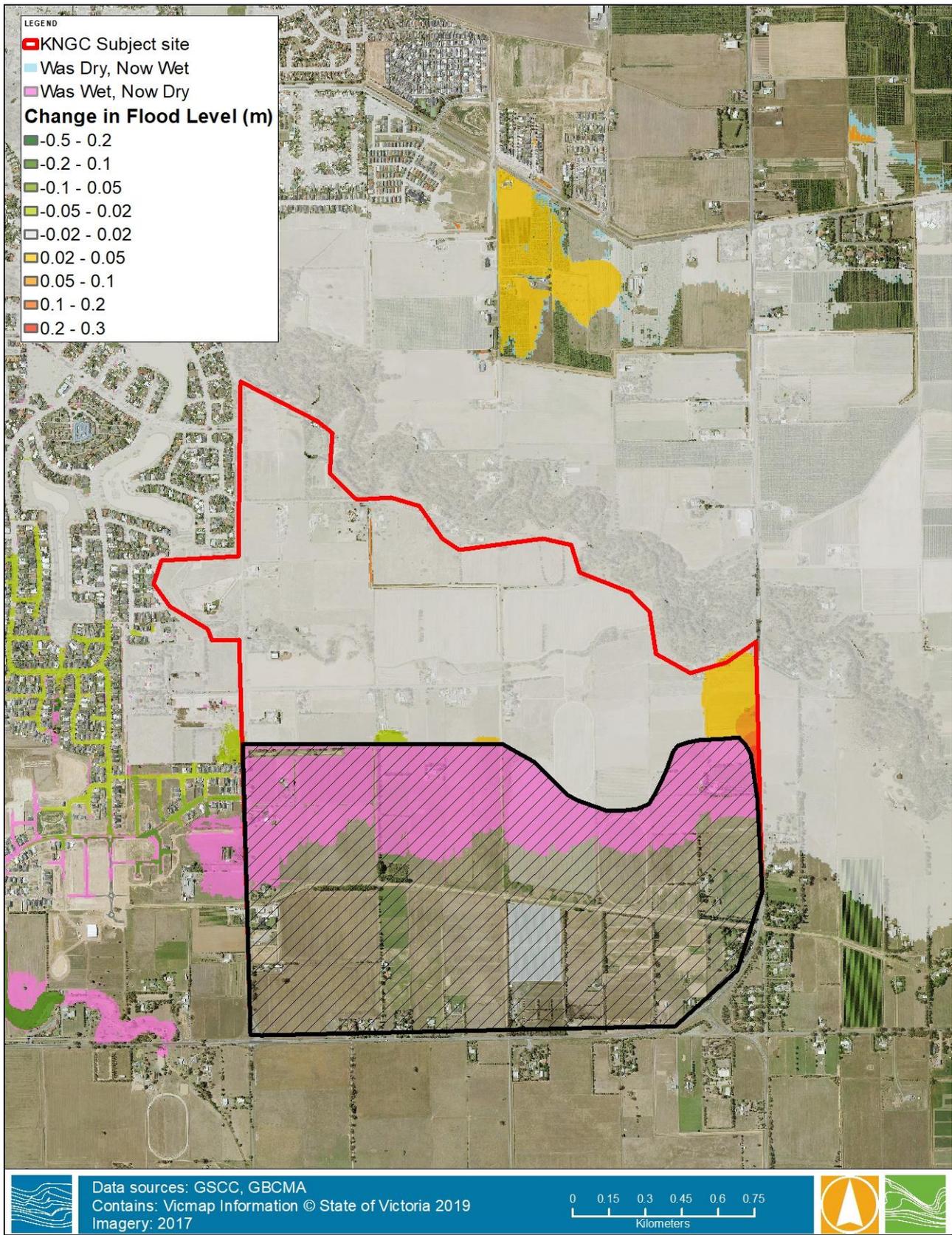


Figure 2 Flood Behaviour Model provided by the Greater Shepparton City Council

3. Water infrastructure

3.1 Overview of Victoria's regional water network

In regional Victoria, twelve urban water corporations provide water services across the state. Four rural water corporations provide rural water services including irrigation, stock and domestic, environmental and recreational purposes.⁵ Kialla is located in Victoria's Goulburn Valley area, 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.⁶

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 KNGC is Goulburn Valley Water (GVW), and the responsible authority for rural water supply is Goulburn Murray Water (GMW).

3.3 Existing conditions

Existing potable water assets are shown in Appendix C.

GVW manages a limited number of existing water assets within the KNGC including the following:

- A 100 mm diameter unplasticized polyvinyl chloride (uPVC) water main on Adams Road
- A 300 mm diameter microcellular polyvinyl chloride (mPVC) water main on Archer Road
- A water main on Doyles Road that is discontinued before reaching the KNGC

GVW advised that the condition of the existing water utility assets within the KNGC 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 KNGC as it has satisfactory capacity to supply the development.

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

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 KNGC 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. It does not appear that GVW has plans to provide recycled water to the KNGC.⁷ GVW has offered to work with Council to deliver Integrated Water Management solutions for the KNGC, however advises it will have limited impacts on the future water infrastructure required.

⁵ <https://www.water.vic.gov.au/water-industry-and-customers/know-your-water-corporation>

⁶ Our Region | gvwater.vic.gov.au

⁷ GHD has sought confirmation of this assumption by GVW

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 metres² 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 meters⁸ 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.
- The cost of trunk/distribution water infrastructure and the cost of reticulation mains is attributable to Goulburn Valley Water as it lies within the GVW service boundary.
- 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 (NCC) 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.⁹

⁸ GVW to confirm whether this is applicable to its servicing zone

⁹ <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 urban water corporations provide water services 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 KNGC.

4.3 Existing conditions

Existing potable sewer assets are shown in Appendix C.

GVW manages only 1 existing sewer asset within the KNGC:

- A 235 mm diameter mPVC sewer rising main runs parallel alongside Archer Road.

Existing properties within the KNGC are not currently serviced by GVW sewer infrastructure and rely on private septic systems for sewerage servicing.

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 KNGC, 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 water infrastructure:

- Lots of a size less than 4000 metres² 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.
- The cost of trunk/distribution water infrastructure and the cost of reticulation mains is attributable to Goulburn Valley Water as it lies within the GVW service boundary.
- 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 (NCC) 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.¹⁰

¹⁰ <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.

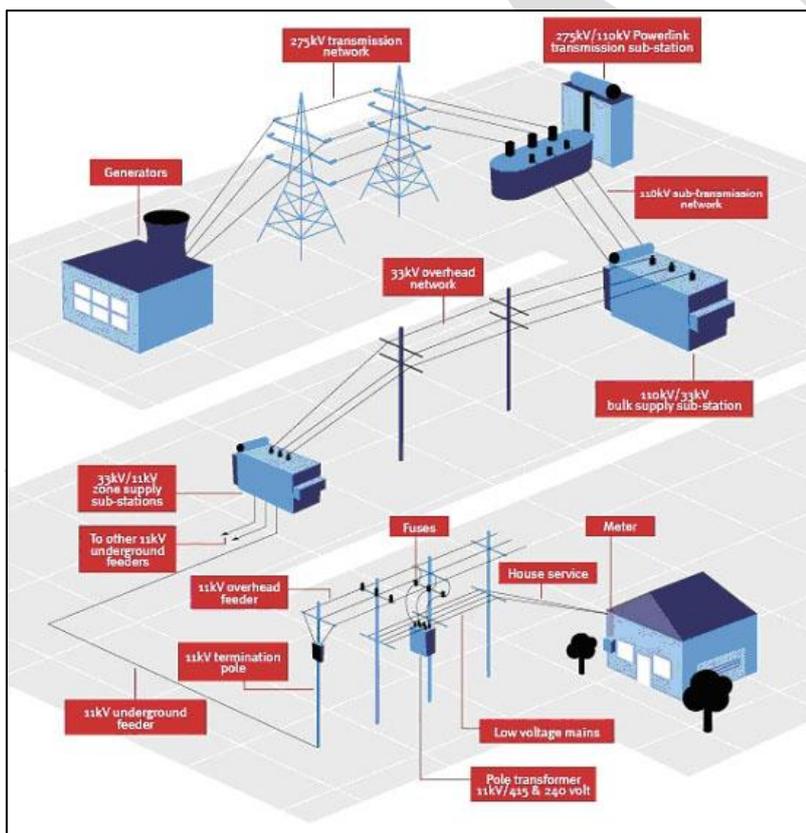


Figure 3 Typical Electricity Transmission and Distribution Network, Australian Energy Regulator 2015 'Consumer guide to Victorian electricity distribution pricing review' p5

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 KNGC is operated by Powercor and there are no transmission assets in the KNGC.

5.3 Existing conditions

Existing electrical assets are shown in Appendix C.

Powercor operates a number of existing electrical assets in the KNGC, in the form of substations, high voltage (HV) overhead and HV underground assets, including:

- Overhead HV assets and electrical poles on River Road, Hoopers Road, Doyles Road and Archer Road
- An underground HV cable extends down Archer Road from the intersection of Hoopers Road to the roundabout of Sanctuary Drive, however this is outside of the KNGC boundary, the HV underground cable transitions to an overhead HV pole when Archer Road enters the KNGC boundary.
- Overhead HV assets, electrical poles and substations extend into limited properties and it can be assumed that these assets service these private properties only.

Powercor advised that the existing electrical assets are in good condition. Therefore the existing infrastructure is proposed to be retained but will be augmented with larger conductors.

Confirmation from Powercor has been sought to confirm the source of the KNGC'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 KNGC. In the long-term future (10+ years), Powercor has estimated that the electrical demand in the KNGC 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 KNGC redevelopment, and the following bullet points summarise its indicative servicing strategy for the KNGC:

- 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 KNGC planning
- The infrastructure will be delivered as required to meet the proposed electrical demand
- Powercor advises that provision should be made in the KNGC 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 KNGC 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 if the proposed construction or development does not comply with Powercor's No Go Zone requirements

5.4.2 Cost allocation

Powercor's *Connection Policy*¹¹ 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*.¹²

- 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 real estate 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 by CitiPower will generally be funded by CitiPower. 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

¹¹ <https://media.powercor.com.au/wp-content/uploads/2021/06/25113814/Powercor-Connection-policy-1-1-July-2021.pdf>

¹² 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 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 KNGC and APA Group Networks (APA) operates and manages the natural gas distribution network servicing the KNGC on behalf of Australian Gas Networks (AGN). There are no gas transmission assets inside (or close to) the KNGC, and therefore APA VTS was not consulted in this assessment.

6.3 Existing conditions

Existing gas assets are shown in Appendix C.

There is currently one distribution gas infrastructure within the KNGC, in the form of a 200 mm diameter Steel Transmission Pipeline in Archer Road on the western border of the KNGC. No infrastructure is to be built within 3m of the pipeline

The gas assets are shown in the screenshot in Figure 4, highlighting the location of the transmission pipeline and other assets outside the boundary of the KNGC.

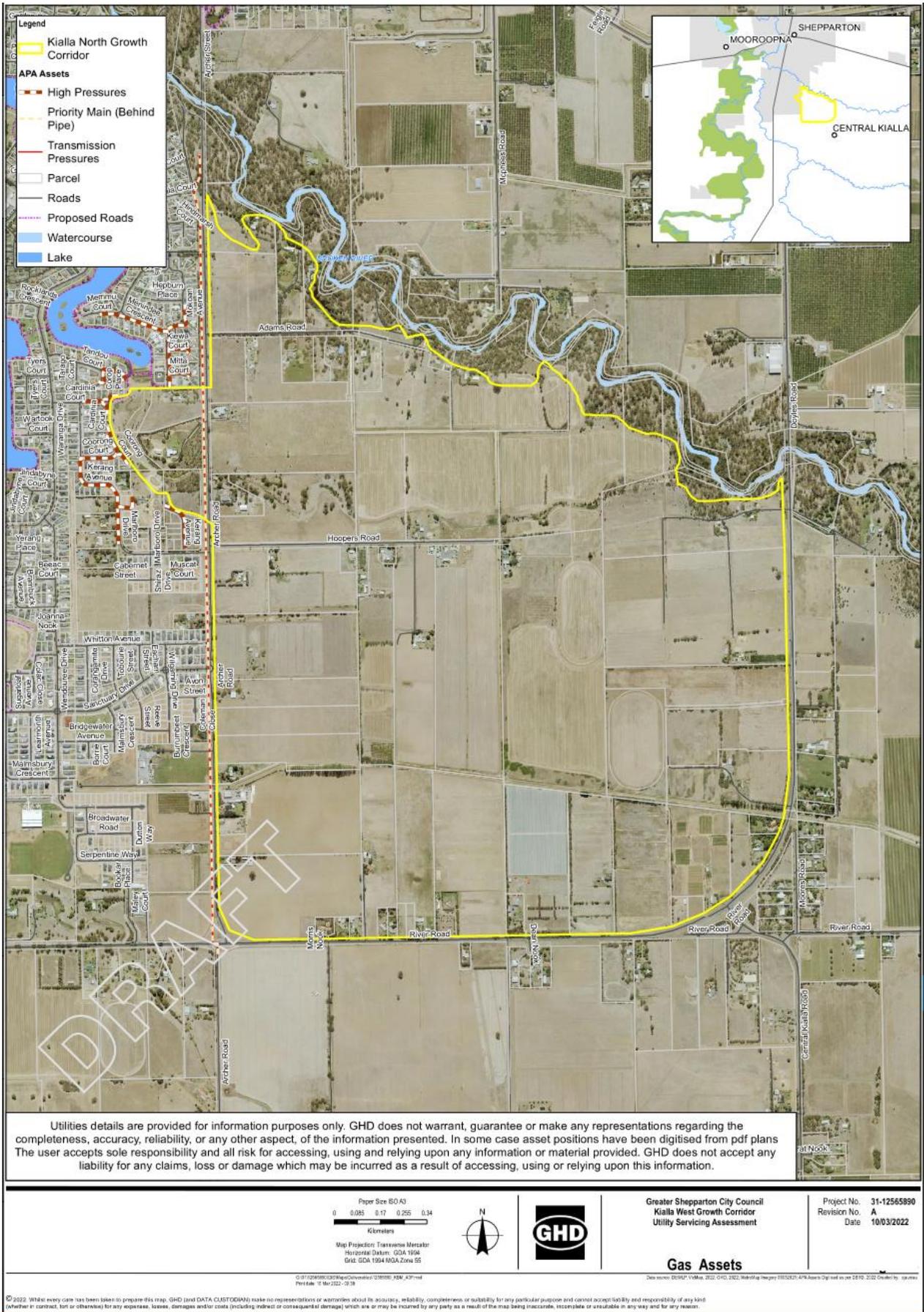


Figure 4 Gas assets within the KNGC, gathered from GHD's GIS system

6.4 Planned upgrades & redevelopment scenarios

The current trunk infrastructure surrounding the KNGC site does not have the capacity to service the forecast load of the development. APA have advised that a program of upstream network augmentation will be required to satisfy the supply to the KNGC. Staging of development will have a great impact on APA's method to servicing the area as well as what upstream augmentation is required, therefore a staging plan will be required for APA. It is currently anticipated that the existing trunk infrastructure will be required to be duplicated upstream and additionally extended in order to supply the KNGC.

APA provided advice on how it (or the delivery of gas infrastructure) could facilitate a sustainable approach to utility servicing in the KNGC. 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 KNGC 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:

- The preferred offset from the title boundary is 3 meters
- Sensitive uses such as schools, medical centres, childcare facilities, churches, community centres, aged care facilities and high density development should not be built within the 103m buffer of 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. 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 Tested (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*¹³ 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 (RSPs) 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 (SIP) 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. RSPs typically pass this cost to the customer.

7.2 Responsible authorities

The KNGC is serviced by multiple telecommunication authorities including the NBN, Telstra and Optus / Uecomm (Optus).

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 KNGC: Archer Road Hoopers Road and Adams Road. Doyles Road and River roads have major assets as well on the border of the KNGC

7.3.2 Optus infrastructure

There appears to be no Optus assets in the area from the BYDA information obtained, however Optus are yet to formally confirm this.

¹³ <https://www.infrastructure.gov.au/department/media/publications/telecommunications-new-developments>

7.3.3 NBN infrastructure

A smaller portion of the KNGC covered within the NBN's fixed line footprint while a larger area is within the fixed wireless footprint. Its network in the KNGC current consists of:

- NBN conduits through Adams Road and Archer Road all within the KNGC
- NBN pit on Hoopers Road extending to a private property on the road

7.4 Planned upgrades & redevelopment scenarios

7.4.1 Telstra infrastructure

Telstra's advice regarding any 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 Optus infrastructure

Optus has not yet provided a formal response for this report in relation the planned upgrades and redevelopment scenarios

7.4.3 NBN infrastructure

NBN has not yet provided a formal response for this report in relation the planned upgrades and redevelopment scenarios

7.4.4 General redevelopment requirements

Optus generally requires a 3 month lead time for asset relocations and this time frame is inclusive of a permit notification period (6 weeks).

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.

7.4.5 Cost allocation

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

7.4.5.1 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 |

7.4.5.2 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 a new distribution fibre network will be required for the redeveloped KNGC 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 existing built-up areas which are issued for further development, this includes the KNGC.

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 sections have been provided in Appendix F.

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

- Doyles Road
- River Road
- Hoopers Road
- Archer Road

The typical sections highlight the approximate 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 confirmed on site.

9. Summary

This assessment provided a high-level review of the infrastructure requirements and impacts of the proposed KNGC 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 | <ul style="list-style-type: none"> – Council has limited stormwater drainage infrastructure within the KNGC; infrastructure present is in the form of table drain and D-Table drains only on Hoopers Rd. – A significant portion of the KNGC is affected by a Land Subject to Inundation Overlay, and planning conditions will affect development in this area – Recent flood modelling results limit development area within the growth corridor and certain areas will need to be filled in to raise ground levels above water for the possibility of development – As per Goulburn Broken Catchment Management Authority (GB CMA) guidelines, a minimum 50m distance from Goulburn River and a 30m distance from any other water ways will be considered as a buffer zone. |
| Water | <ul style="list-style-type: none"> – Goulburn Valley Water manages a limited number of existing water assets within the KNGC – There is no recycled water network within the KNGC – Goulburn Valley Water will carry out upgrades and expansions on an ‘as needed’ basis so therefore there are currently no short, medium or long term planned upgrades. – Redevelopment in the KNGC will likely trigger upsizing of existing water assets (both within and outside the KNGC), including trunk water mains, storage tanks and booster pump stations – The cost of trunk/distribution water infrastructure and the cost of reticulation mains is attributable to Goulburn Valley Water as it lies within the GVW service boundary. |
| Sewer | <ul style="list-style-type: none"> – Goulburn Valley Water manages a limited number of existing sewer assets within the KNGC – The KNGC is outside of the current sewer district boundary, and existing properties are serviced by private septic systems – Goulburn Valley Water will carry out upgrades and expansions on an ‘as needed’ basis so therefore there are currently no short, medium or long term planned upgrades. – Redevelopment in the KNGC will likely trigger upsizing of existing sewer assets outside the KNGC to service the development, in particular trunk sewer mains, sewer pump station updates and new sewer pump stations |
| Electricity | <ul style="list-style-type: none"> – Powercor manages the electrical distribution network in the KNGC, and all existing electrical assets within the KNGC – The KNGC is currently serviced with only high voltage assets, both overhead and underground – Powercor has estimated that the electrical demand in the KNGC will increase by 3 MVA in the short term due to the redevelopment – The existing electrical high voltage feeder servicing the KNGC 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 |

| Infrastructure type | Key findings |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gas | <ul style="list-style-type: none"> – APA Group Networks manages the reticulation gas network surrounding the KNGC, and there is currently no reticulation gas network within the KNGC – No infrastructure is to be built within 3m of the steel transmission pipeline on the western boundary of the KNGC – The current trunk infrastructure in the vicinity does not have the capacity to service the predicted load of the development – A program of upstream network augmentation will be required to supply the KNGC – The sequencing of development in the KNGC will have a greater impact to managing the delivery of gas servicing than the aggregate development load – APA requires a staging plan to appropriately plan for gas delivery in the KNGC |
| Telecommunications | <ul style="list-style-type: none"> – The KNGC is currently serviced by Telstra, Optus and NBN telecommunications infrastructure – Developers can choose any telecommunications carrier they wish, and NBN is the default statutory infrastructure provider obliged to provide broadband infrastructure – There are significant Telstra assets in all the roads within the growth corridor, NBN assets are more predominant on the north-west border of the KNGC and will need to be extended out to River Road, Doyles Road and parts of Archer Road and Hoopers Road – A smaller portion of the KNGC covered within the NBN's fixed line footprint while a larger area is within the fixed wireless footprint <p><i>Note: As of issue date of this draft report, responses have not been received from NBN and Optus authorities.</i></p> |

9.2 Key issues and opportunities

Table 9 Key issues and opportunities

| Infrastructure type | Key issue | Key opportunity |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General | <ul style="list-style-type: none"> – Utility service providers require detailed information, including location of dwellings, lot sizes and alignment of new roads, to provide detailed future infrastructure information – Multiple utility services providers advised that appropriate development staging within the KNGC would facilitate efficient utility service delivery | <ul style="list-style-type: none"> – Undertake an assessment of the ultimate KNGC 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 | <ul style="list-style-type: none"> – A significant portion of the KNGC is affected by a Land Subject to Inundation Overlay, and planning conditions will affect development in this area – Recent flood modelling results limit development area within the growth corridor – As per GB CMA guidelines, a minimum 50m distance from Goulburn River and a 30m distance from any other water ways will be considered as a buffer zone. | <ul style="list-style-type: none"> – Evaluate the findings of this assessment against the new findings from the Council in the form of the questionnaire. Additionally, if a separate stormwater management and hydrological assessment is provided, as it was for Kialla West Growth Corridor, this would further assist the next steps for development planning. |

| Infrastructure type | Key issue | Key opportunity |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water | <ul style="list-style-type: none"> – Augmentation of the existing water network is likely required to service the KNGC redevelopment – There is no recycled water network within the KNGC – Water supply pressure and extension of services to new customers | <ul style="list-style-type: none"> – Work with Goulburn Valley Water to deliver an Integrated Water Management Solution for the KNGC – Investigate the provision of local / KNGC wide recycled water services – Following the development of the KNGC Structure Plan, develop a staging plan for water infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of water services – Ensure correct augmentation and construction on the assets are carried out to satisfy the demands of the KNGC |
| Sewer | <ul style="list-style-type: none"> – Augmentation of the existing sewer network is likely required to service the KNGC redevelopment – 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. | <ul style="list-style-type: none"> – Investigate the provision of local / KNGC wide sewer mining / recycled water service – Following the development of the KNGC 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 KNGC |
| Electricity | <ul style="list-style-type: none"> – Electrical demand in the KNGC is estimated to increase by 3MVA, triggering the need for network augmentation works in the form of a new feeders | <ul style="list-style-type: none"> – Consider the feasibility of onsite electricity generation to reduce future electrical infrastructure required to service the KNGC – Collaborate with Powercor regarding the provision of innovative electrical servicing strategies such as electrical vehicles, microgrids and battery storage |
| Gas | <ul style="list-style-type: none"> – 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 KNGC will have a greater impact to managing the delivery of gas servicing than the aggregate development load | <ul style="list-style-type: none"> – Investigate opportunities to provide a 'gas-free' KNGC – Following the development of the KNGC Structure Plan, develop a staging plan for gas infrastructure in collaboration with APA Group (Networks) to ensure the efficient delivery of gas services |
| Telecommunications | <ul style="list-style-type: none"> – There are significant Telstra assets in all the roads within the growth corridor, there are also NBN assets present but will need to be extended out to the south and eastern borders of the KNGC – A smaller portion of the KNGC covered within the NBN's fixed line footprint while a larger area is within the fixed wireless footprint | <ul style="list-style-type: none"> – Following the development of the KNGC Structure Plan, develop a staging plan for telecommunications infrastructure in collaboration with telecommunications utility service providers to ensure the efficient delivery of telecommunications services |

Appendices

Appendix A

Locality Plan

Appendix B

Planning Zones and Overlays

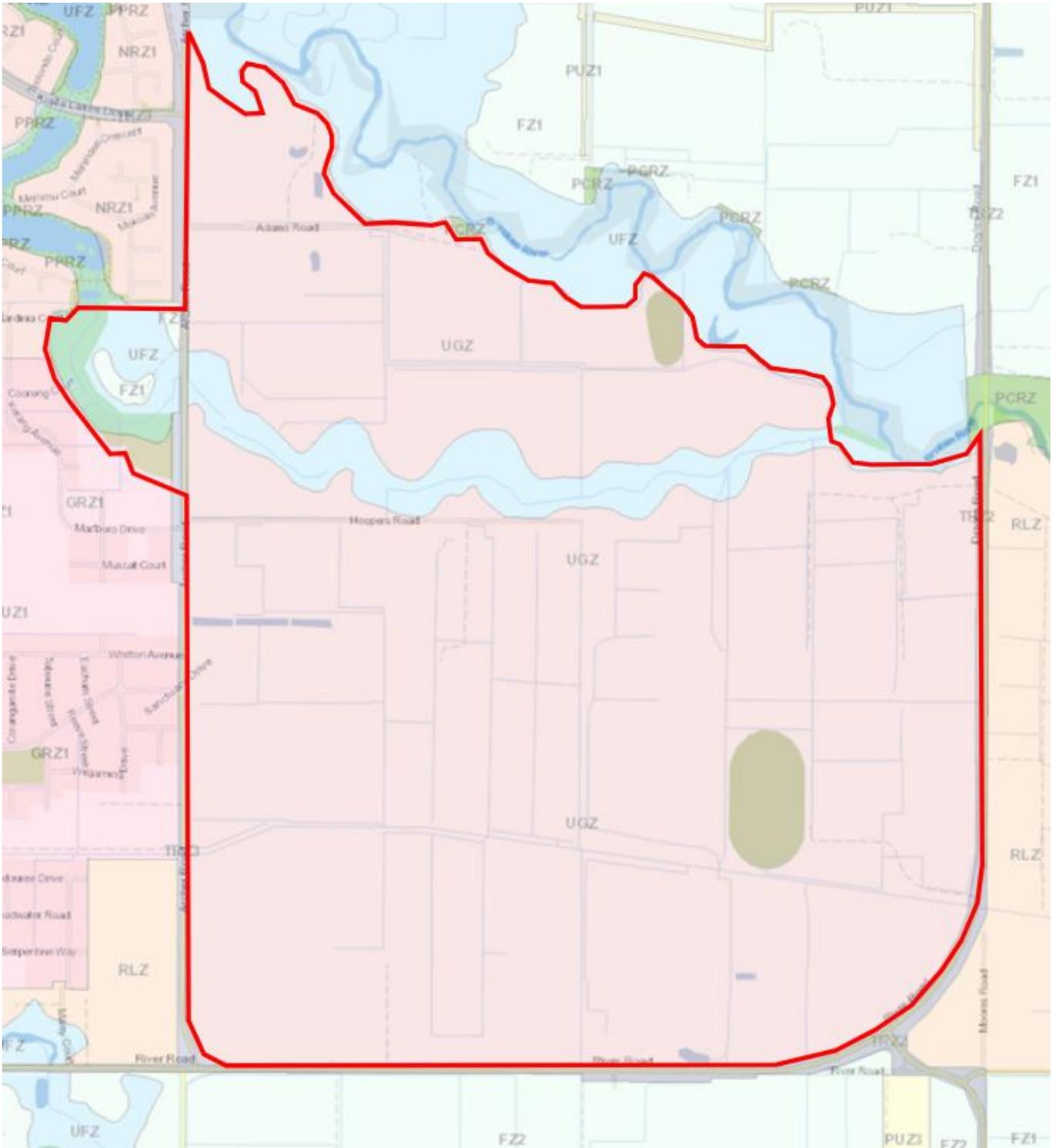


Figure 6 Planning Zones in the Kialla North KNGC, VicPlan April 2022, available at < <https://mapshare.vic.gov.au/vicplan/>>

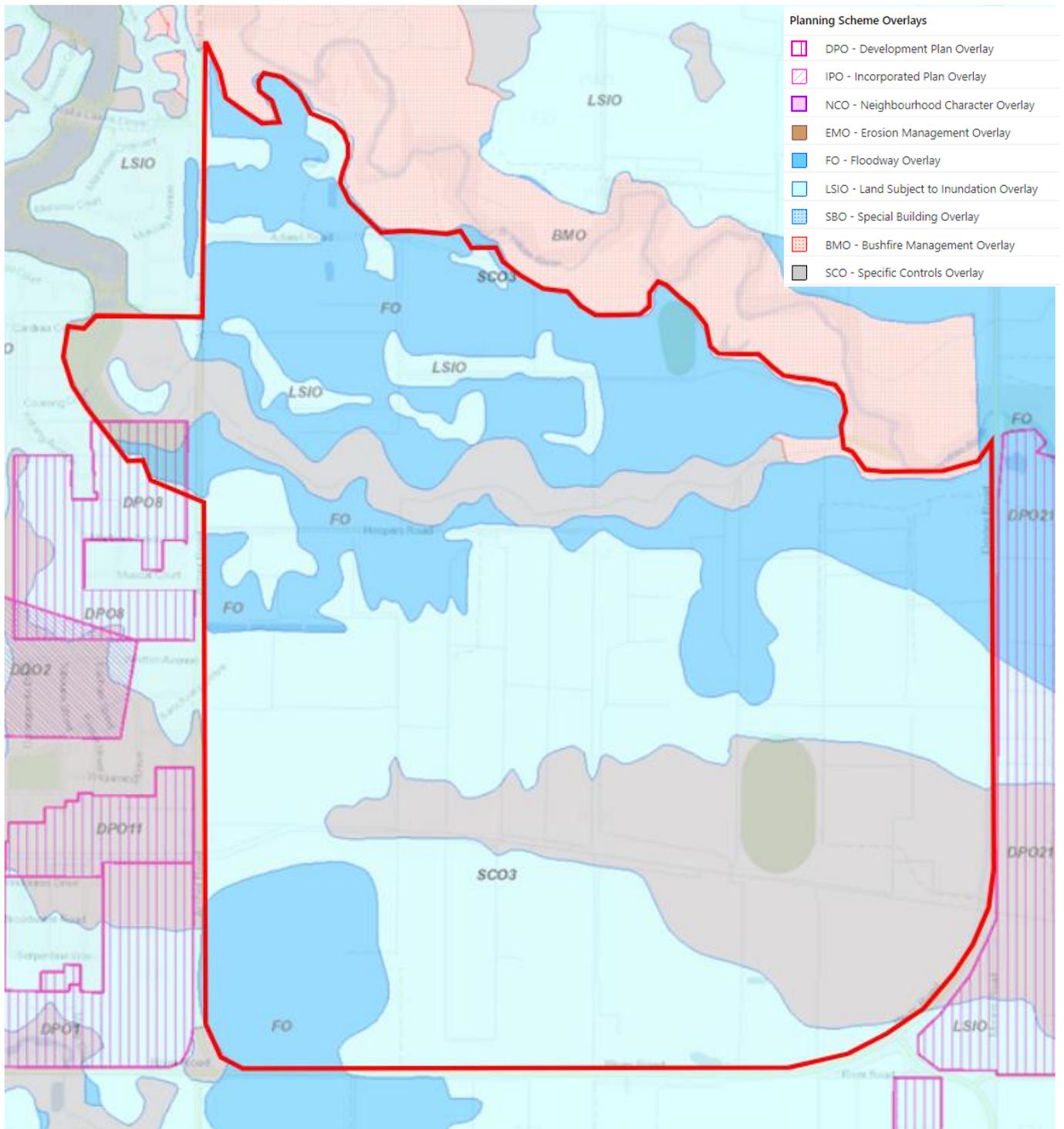


Figure 7 Planning Overlays in the Kialla North KNGC, VicPlan April 2022, available at <<https://mapshare.vic.gov.au/vicplan/>>

Appendix C

Existing Infrastructure Plans



Figure 8 Screenshot of stormwater drainage assets within the KNGC, gathered from GHD's GIS system

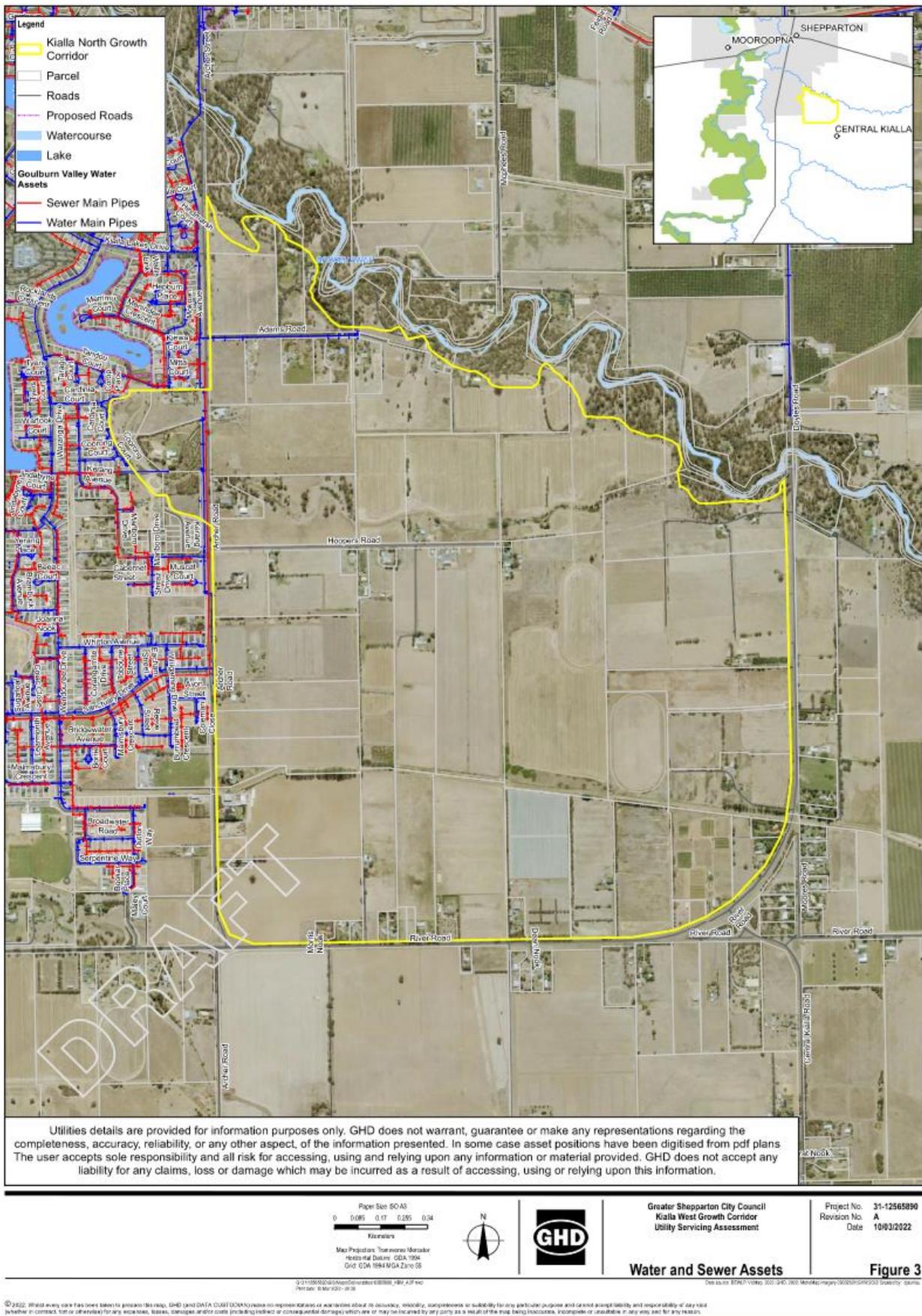


Figure 9 Screenshot of water and sewer assets within the KNGC, gathered from GHD's GIS system



Figure 10 Screenshot of electricity assets within the KNGC, gathered from GHD's GIS system

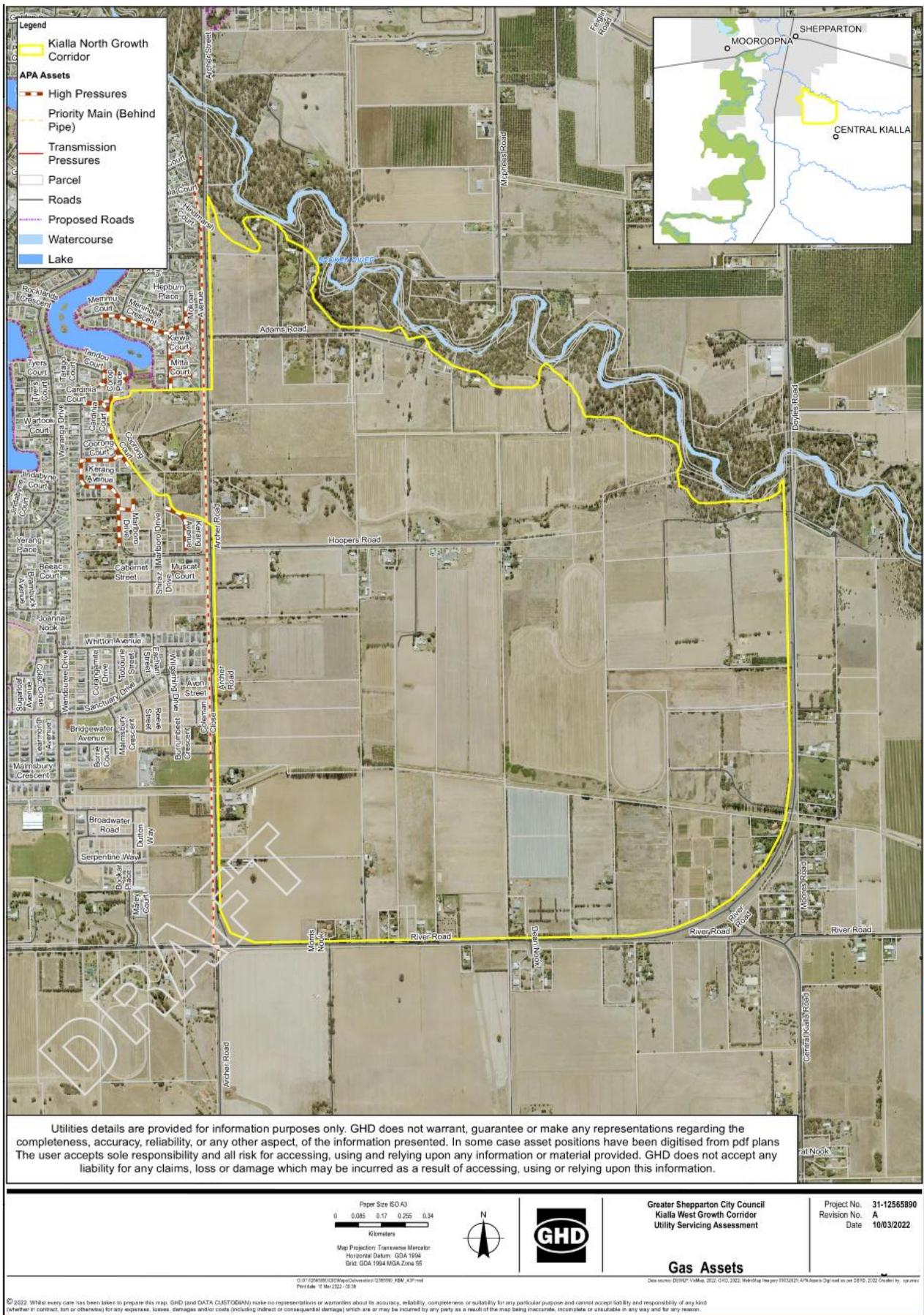
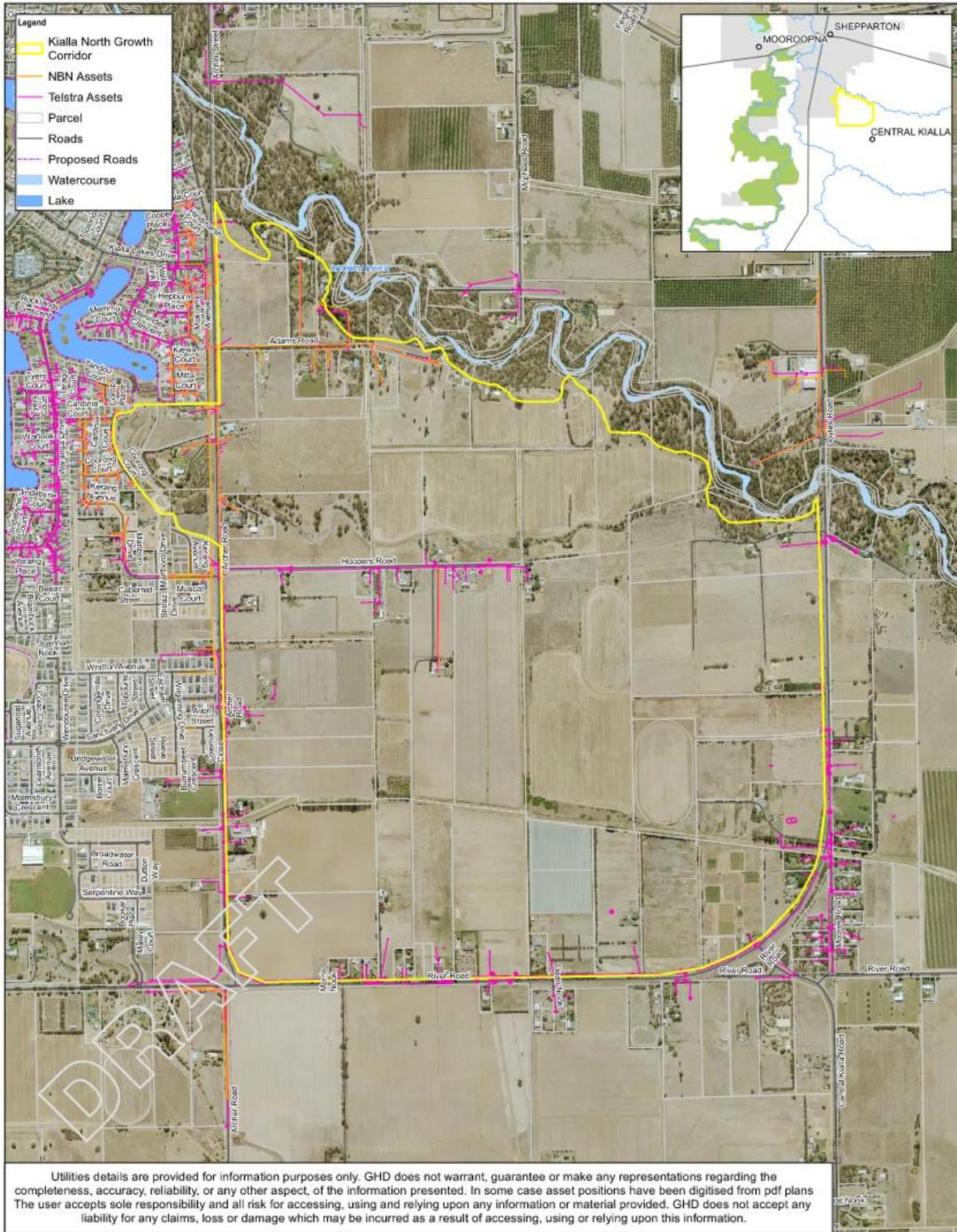


Figure 11 Screenshot of gas assets within the KNGC, gathered from GHD's GIS system



| | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Paper Size ISO A3 0 0.985 0.17 0.225 0.34 Kilometers Map Projection: Transverse Mercator Horizontal Datum: GDA 1984 Grid: GDA 1984 MGA Zone 56 | | | Greater Shepparton City Council Kialla West Growth Corridor Utility Servicing Assessment | Project No: 31-12565890 Revision No: A Date: 10/03/2022 |
| Telecommunication Assets | | | Figure 4 | |

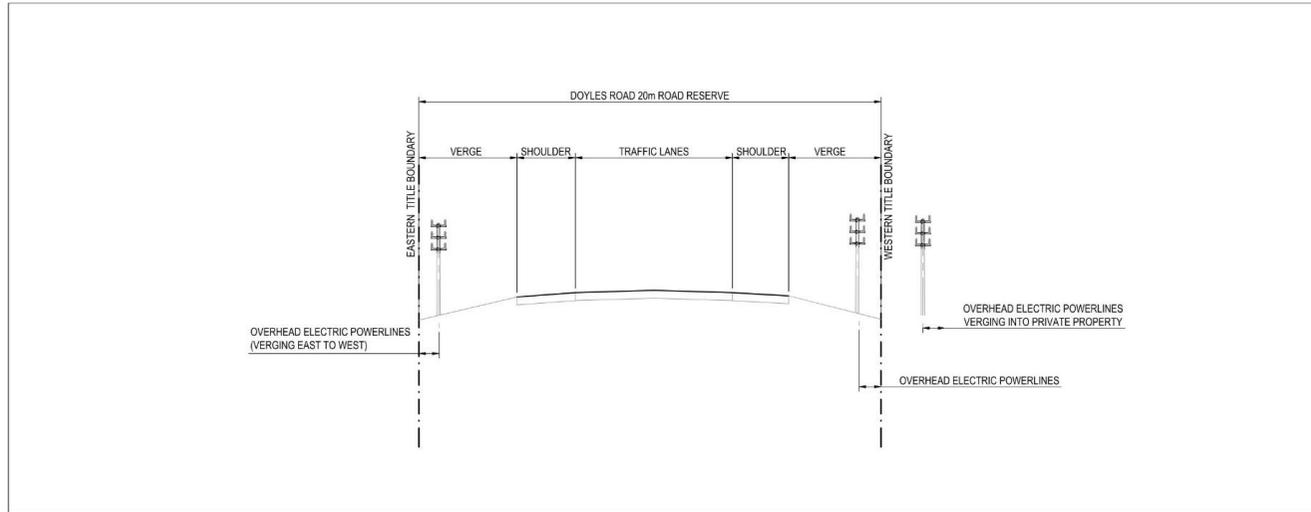
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Figure 12 Screenshot of telecommunication assets within the KNGC, gathered from GHD's GIS system

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Appendix D

Typical road cross sections



DOYLES ROAD (20m ROAD RESERVE)
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
4. DOYLES ROAD DOES NOT HAVE ANY UNDERGROUND UTILITIES WITHIN THE KIALLA NORTH GROWTH CORRIDOR

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 |
|----------|-------------|----------------|----------|------|
| Author | E.HERAS | Drafting Check | | |
| Designer | E.HERAS | Design Check | | |



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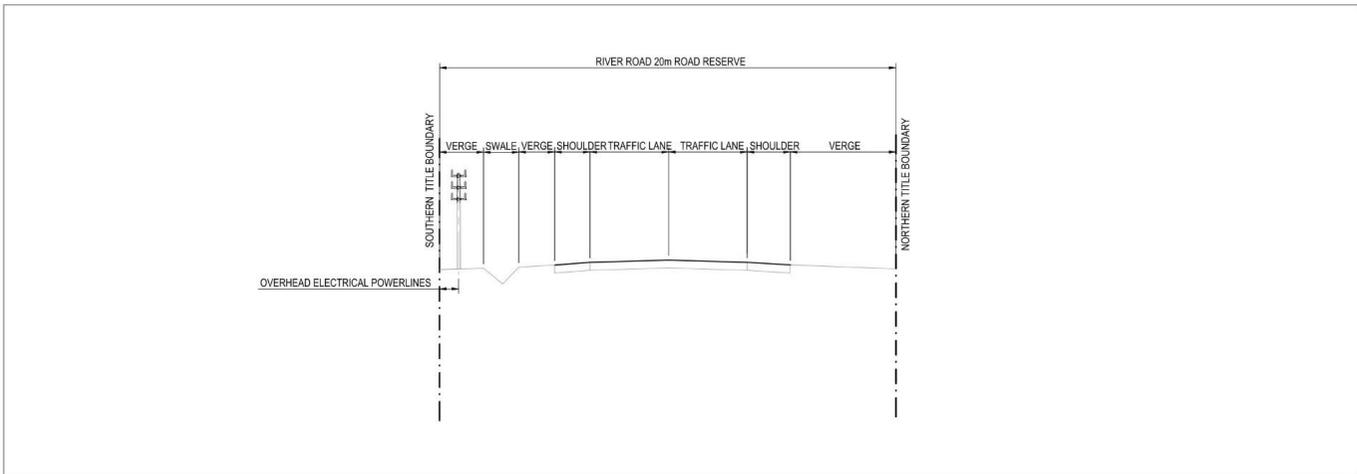


Project No.
12565890

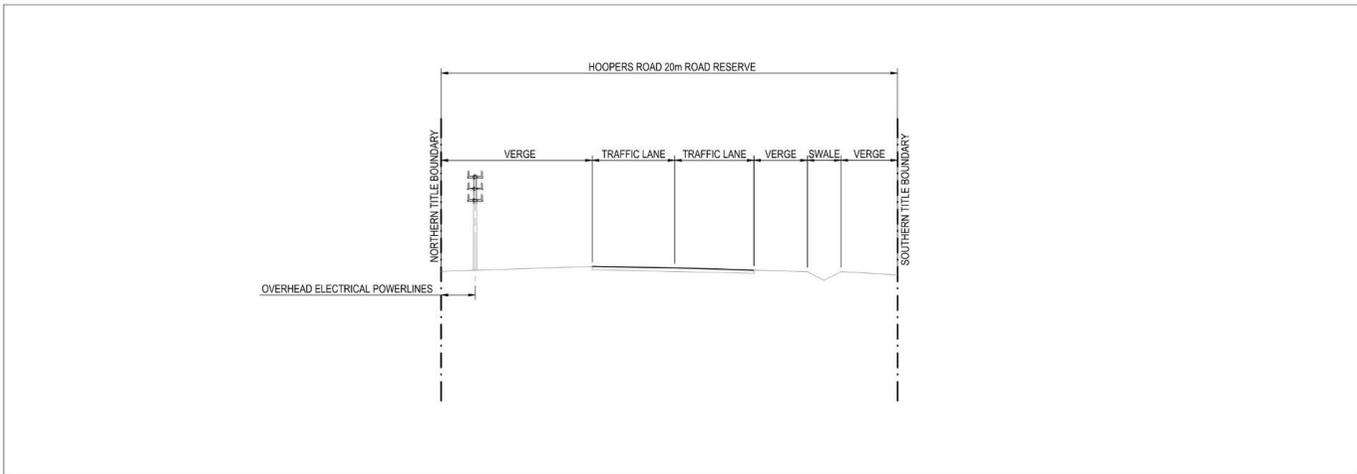
| | |
|---------|--------------------------------------------------------------|
| Client | GREATER SHEPPARTON CITY COUNCIL |
| Project | KIALLA NORTH GROWTH CORRIDOR UTILITY SERVICING ASSESSMENT |
| Status | FOR INFORMATION |

| | |
|---------------|--------------------------------|
| Drawing Title | TYPICAL SECTION DOYLES ROAD |
| Drawing No. | 12565890-C002 |
| Rev | 1 |

Size
A1



RIVER ROAD (20m ROAD RESERVE)
SCALE 1:100



HOOPERS ROAD (20m ROAD RESERVE)
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
 4. NEITHER OF THE ROADS HAVE ANY UNDERGROUND UTILITIES

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 |
|----------|-------------|----------------|----------|------|
| Author | E.HERAS | Drafting Check | | |
| Designer | E.HERAS | Design Check | | |

Plot Date: 7 July 2022 - 10:23 AM Printed By: Emma Horne

File Name: C:\Users\heras\Desktop\My Files\My Projects\Kialla North Civil Load Typical Sections\12565890-KN-C001-C003.dwg



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Project No. 12565890

Client: GREATER SHEPPARTON CITY COUNCIL
Project: KIALLA NORTH GROWTH CORRIDOR UTILITY SERVICING ASSESSMENT

Status: FOR INFORMATION

Drawing Title: TYPICAL SECTION RIVER ROAD AND HOOPERS ROAD

Status Code

Drawing No. 12565890-C003

Size: A1

Rev: 1



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