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Shepparton South East Precinct Structure Plan

Utility Servicing Assessment Report

Greater Shepparton City Council

02 August 2022

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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 Shepparton South East Precinct.

Findings considered to be the most significant are summarised in Table 1 below. Key issues and opportunities for utility servicing within the Precinct 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 Greater Shepparton City Council (Council), and readers should refer to this for detailed stormwater assessment information – Council has limited stormwater drainage infrastructure within the Precinct, in the form of open drainage and pit & pipe infrastructure – A significant portion of the Precinct is affected by a Land Subject to Inundation Overlay, and planning conditions will attach to development in this area – Council will require underground pit and pipe infrastructure for new developments, and will only consider aboveground channel or swale drainage infrastructure where Council believes it is beneficial to the community
Water	– Goulburn Valley Water manages a limited number of existing urban/potable water assets within the Precinct – There is no recycled water network within the Precinct – The Precinct is partially outside of the current water district boundary, but GVW predicted increase in water demand within the precinct that will be shown in the upcoming Shepparton & Mooroopna network master plan – Goulburn Valley Water has not anticipated growth in the Precinct and therefore does not currently have a network servicing strategy for the Precinct – Redevelopment in the Precinct will likely trigger upsizing of existing water assets (both within and outside the Precinct), including trunk water mains, storage tanks and booster pump stations – Goulburn Valley Water offered to work with Council to deliver Integrated Water Management Solutions for the Precinct – The cost of trunk/distribution water infrastructure is attributable to Goulburn Valley Water, and the cost of reticulation mains will be attributable to the developer – Goulburn Murray Water manages a number of existing rural/irrigation water assets within the Precinct including water supply channels, pipelines and drainage assets – A large number of GMW customers are currently serviced by this infrastructure, and the Precinct's stormwater network currently outlets into various GMW drains – Where appropriate, GMW seeks the conversion of rural infrastructure to pipelines where they occur in residential areas – The responsibility for pipeline conversion is subject to a mutual agreement for payment and construction with GMW, developers and relevant parties
Sewer	– Goulburn Valley Water manages a limited number of existing sewer assets within the Precinct – The Precinct is outside of the current sewer district boundary, but GVW predicted increase in sewerage demand within the precinct that will be shown in the upcoming Shepparton network master plan – Redevelopment in the Precinct will likely trigger upsizing of existing sewer assets outside the Precinct to service the development, in particular trunk sewer mains, sewer pump station updates and new sewer pump stations – The cost of trunk/distribution sewer infrastructure is attributable to Goulburn Valley Water, and the cost of reticulation mains will be attributable to the developer

Infrastructure type	Key findings
Electricity	– Powercor manages the electrical distribution network in the Precinct, and all existing electrical assets within the Precinct – The Precinct is currently serviced with both high voltage and low voltage assets, both overhead and underground, and is supplied from the Shepparton Zone Substation – Powercor has estimated that the electrical demand in the Precinct will increase by 1 MVA due to the redevelopment – The existing 22kV electrical high voltage feeder servicing the Precinct will not have capacity to support the proposed redevelopment, and therefore a new overhead high voltage feeder will be required along main roads and interconnection roads – Powercor can accommodate local solar photovoltaic electricity generation, and would consider accommodating innovative electrical servicing strategies such as electric vehicles, microgrids and battery storage
Gas	– APA Group Networks manages the reticulation gas network surrounding the Precinct, and there is currently no reticulation gas network within the Precinct – The adjacent gas network is likely capable of supplying the Precinct, and will likely require mains extensions from the networks on Poplar and Channel Roads – The sequencing of development in the Precinct 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 Precinct – APA has not anticipated growth in the Precinct and therefore does not currently have a network servicing strategy for the Precinct
Telecommunications	– The Precinct is currently serviced by Telstra, Optus and NBN 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 and Optus assets within the Doyles Road and Poplar Avenue Road reserves, including an Optus asset carrying the internet from Melbourne to Sydney. – The Precinct is fully covered within the NBN's fixed line footprint – Optus advised that the proposed redevelopment within the Precinct would require an upgrade to Optus's mobile services – NBN advised that to service the entire Precinct redevelopment, a new distribution fibre network would be required, and it requires appropriate Precinct planning to deliver infrastructure in an efficient and coordinated manner

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 Precinct would facilitate efficient utility service delivery	– Undertake an assessment of the ultimate Precinct 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 – Liaise with utility service providers throughout the planning process to facilitate coordination of development staging and the delivery of utility services
Stormwater drainage	– A separate stormwater management and hydrological assessment has been commissioned by Greater Shepparton City Council (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	– The Precinct is partially outside of the current water district boundary. GVW anticipates an increase in water demand within the precinct which is included in the Shepparton Mooroopna Water Network Master Plan 2022/23 – Augmentation of the existing water network is likely required to service the Precinct redevelopment – There is no recycled water network within the Precinct – Rural water assets are present throughout the Precinct including channels, drains and pipelines. Channels and drains have large associated easements that could affect development.	– Work with Goulburn Valley Water to deliver an Integrated Water Management Solution for the Precinct – Investigate the provision of local / Precinct wide recycled water services – Following the development of the Precinct 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 Goulburn Murray Water to determine the extent of pipeline conversion required, and the responsibility/timing of these works
Sewer	– The Precinct is outside of the current sewer district boundary. GVW anticipates an increase in sewerage demand within this precinct which is included in the Shepparton Sewer Network master plan 2022/23 – Augmentation of the existing sewer network is likely required to service the Precinct redevelopment	– Work with Goulburn Valley Water to deliver an Integrated Water Management Solution for the Precinct – Investigate the provision of local / Precinct wide sewer mining / recycled water service – Following the development of the Precinct Structure Plan, develop a staging plan for sewer infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of sewer services
Electricity	– Electrical demand in the Precinct is estimated to increase by 1MVA, triggering the need for network augmentation works in the form of a new feeders – A new 22kV feeder will likely be required along major roads, including Doyles Road	– Consider the feasibility of onsite electricity generation in order to reduce the future electrical infrastructure required to service the Precinct – Collaborate with Powercor regarding the provision of innovative electrical servicing strategies such as electrical vehicles, microgrids and battery storage – Ensure an appropriate service corridor for a new 22kV electrical feeder is provided for on major roads including Doyles Road
Gas	– The adjacent gas network is likely capable of supplying the Precinct, and will likely require mains extensions from the networks on Poplar and Channel Roads – The sequencing of development in the Precinct will have a greater impact to managing the delivery of gas servicing than the aggregate development load	– Investigate opportunities to provide a ‘gas-free’ Precinct – Following the development of the Precinct Structure Plan, develop a staging plan for gas infrastructure in collaboration with APA Group (Networks) to ensure the efficient delivery of gas services

Infrastructure type	Key issue	Key opportunity
Telecommunications	– There are significant Telstra and Optus assets within the Doyles Road and Poplar Avenue Road reserves, including an Optus asset carrying the internet from Melbourne to Sydney. – If relocations are required to this asset, the fibre optic cable must be first duplicated to provide additional connection first. – The Precinct is fully covered within the NBN's fixed line footprint – Optus advised that the proposed redevelopment within the Precinct would require an upgrade to Optus's mobile services – NBN advised that to service the entire Precinct redevelopment, a new distribution fibre network would be required, and it requires appropriate Precinct planning to deliver infrastructure in an efficient and coordinated manner	– Undertake service locating of telecommunications infrastructure within the Doyles Road and Poplar Avenue road reserves to understand the location of assets within any future road reserve, and therefore the likelihood of significant infrastructure relocations being required – Following the development of the Precinct Structure Plan, develop a staging plan for telecommunications infrastructure in collaboration with telecommunications 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 Precinct location

The Shepparton South East Precinct (the Precinct) is located within the City of Greater Shepparton. The Precinct is approximately 396 hectares of land bounded by Doyles Road (Shepparton Alternative Route) to the east, Benalla Road (Midland Highway) to the north, the Broken River to the south and existing residential development to the west.

The Shepparton South East Precinct is the largest of five proposed major growth corridors in the Shepparton-Mooroopna urban area, and the Precinct boundaries are illustrated in Appendix A.

1.1.2 Existing land use

The majority of the Precinct is currently zoned Farming Zone (FZ1), which broadly provides and encourages the retention of productive agricultural land[1], and is consistent with the predominant existing agricultural land use in the Precinct. Illustrations of the relevant Victorian Planning Zones can be found in Appendix B.

Areas of the Precinct are currently zoned Public Use Zone Service and Utility (PUZ1), including the following:

– 20 metre wide buffer zone north of the existing Channel Road
– 20 metre wide buffer zone intersecting the Precinct east-west from McPhees Road to Doyles Road
– 10 metre wide buffer zone abutting the southern section of McPhees Road
– 20 meter wide buffer zone intersecting the Precinct from Poplar Avenue through the Precinct to Doyles Road

The PUZ1 recognises public land use for public utility and community services and facilities[2], and this is consistent with the existing land use in these areas as overland drainage channels.

An Urban Floodway Zone (UFZ) is situated surrounding Broken River and extends north through the Precinct along the western and southern Precinct boundaries. The purpose of the UFZ is to identify waterways, major flood paths, 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.[3]

Minor sections of the Precinct abutting Broken River are zoned Public Conservation and Resource Zone (PCRZ). This zone has the purpose of protecting and conserving the natural environment and natural processes for their historic, scientific, landscape, habitat, or cultural values.[4]

Doyles Road is zoned Road Zone 1 (RDZ1) which identifies significant existing roads or land that has been acquired for a significant proposed road.[5]

1.1.3 Project overview

Council in collaboration with the Victorian Planning Authority (the VPA) has commenced planning for the Shepparton South East Precinct, a strategic urban development project. This Precinct Structure Plan (PSP) planning will guide the future residential development over the next 30 years and provide for an equivalent population of approximately 6,000 people, with approximately 2,500 lots.

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

[2] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/36_01.pdf
[3] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/37_03.pdf
[4] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/36_03.pdf
[5] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/36_04.pdf

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.[6]

As part of its planning works for the Precinct, various studies have been commissioned to inform the preparation of the Shepparton South East Precinct Structure Plan (PSP). This Utilities Servicing Assessment will provide key information regarding the current infrastructure capacity and future servicing requirements of the Precinct.

1.2 Purpose of this report

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

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 Precinct.

Table 3 Utility Service Providers in the Shepparton South East Precinct

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)
Telecommunications	NBN Co
	Optus / Uecomm
	Telstra
Water	Goulburn Valley Water
	Goulburn Murray Water

[6] https://greatershepparton.com.au/bpi/planning/strategic-planning/current-strategic-projects/shepparton-south-east-precinct-structure-plan

1.3 Limitations and assumption

The location of existing services has been approximately determined based on Dial Before You Dig 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 Precinct area through a desktop study. This research involved using information obtained through a Dial Before You Dig (DBYD) enquiry.

Following the desktop investigation, GHD 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 DBYD Data
Shepparton City Council	Spatial Data
Powercor	Spatial Data
NBN Co	Digitised DBYD Data
Optus/Uecomm	Digitised DBYD Data
Goulburn Valley Water	Spatial Data
Goulburn Murray Water	Spatial Data
Telstra	Digitised DBYD 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.

GHD utilised the information provided by USPs to prepare Existing Typical Sections. Where plans indicating the location of future infrastructure were provided by USPs, these plans were included and referenced in the body of the report.

GHD reviewed the following reference background reports provided by Council and the VPA to identify information relevant to this assessment and identify any knowledge gaps.

– Working Paper 4 – Cultural Heritage, Shepparton South East Growth Corridor Framework Plan, Tardis Enterprises Pty Ltd, August 2009 (the Tardis Report)
– Working Paper 10 – Engineering Infrastructure, Shepparton South East Growth Corridor Framework Plan, Hyder Consulting, August 2009 (the Hyder Report)
– Working Paper 2 – Environmental Values, Shepparton South East Growth Corridor Framework Plan, Ecology Partners Pty Ltd, August 2009 (the Ecology Partners Report)
– Transport Impact Assessment, Shepparton South East Growth Corridor Precinct Structure Plan, GTA Consultants, July 2021 (the GTA Report)

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

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 wider stormwater drainage network in the Shepparton Region is managed by a number of different authorities.

The urban stormwater drainage network caters for local catchment stormwater and is managed by local councils. Urban stormwater drainage infrastructure includes underground pipelines, pits, open swales, and table drains, as well as kerb and channel and retention structures.

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 all Victorian water ways and bodies in its region.

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 Precinct 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 Precinct.

Council has formal drainage infrastructure in the form of pit and pipe assets within the Precinct located on the boundary of existing urban development to the west, that outlets generally to a GMW drain along the western border of the Precinct. These drainage pipes range in size from 300 diameter to 1050 mm diameter. Council also has informal drainage infrastructure in the form of open drains along the north of the Precinct boundary to Zurcas Lane and running south along Doyles Road to an existing east west channel north of Poplar Avenue.

Council assets in Appendix C are limited to assets within the Precinct boundary. Council also provided the following screenshot of broader assets outside the boundary from its GIS system below in Figure 1. It can be inferred from this GIS information that although Council has very little infrastructure within the Precinct, Council manages significant, formal municipal drainage infrastructure within the Shepparton Town Centre to the west and surrounding existing commercial / industrial development to the north east of Precinct.

An existing Council drainage basin is located in a drainage reserve near Cherry Court on the western boundary of the Precinct.

GMW manages a system of open channels and drains in its function as a rural water supply authority. GMW assets are detailed in section 3.3.2. GMW advised that the Precinct currently drains into various GMW drains, and that the 2018 drainage strategy for the Precinct caters for all stormwater runoff within the Precinct to outfall into GMW's Shepparton No. 2 drain, or directly into the Broken River.

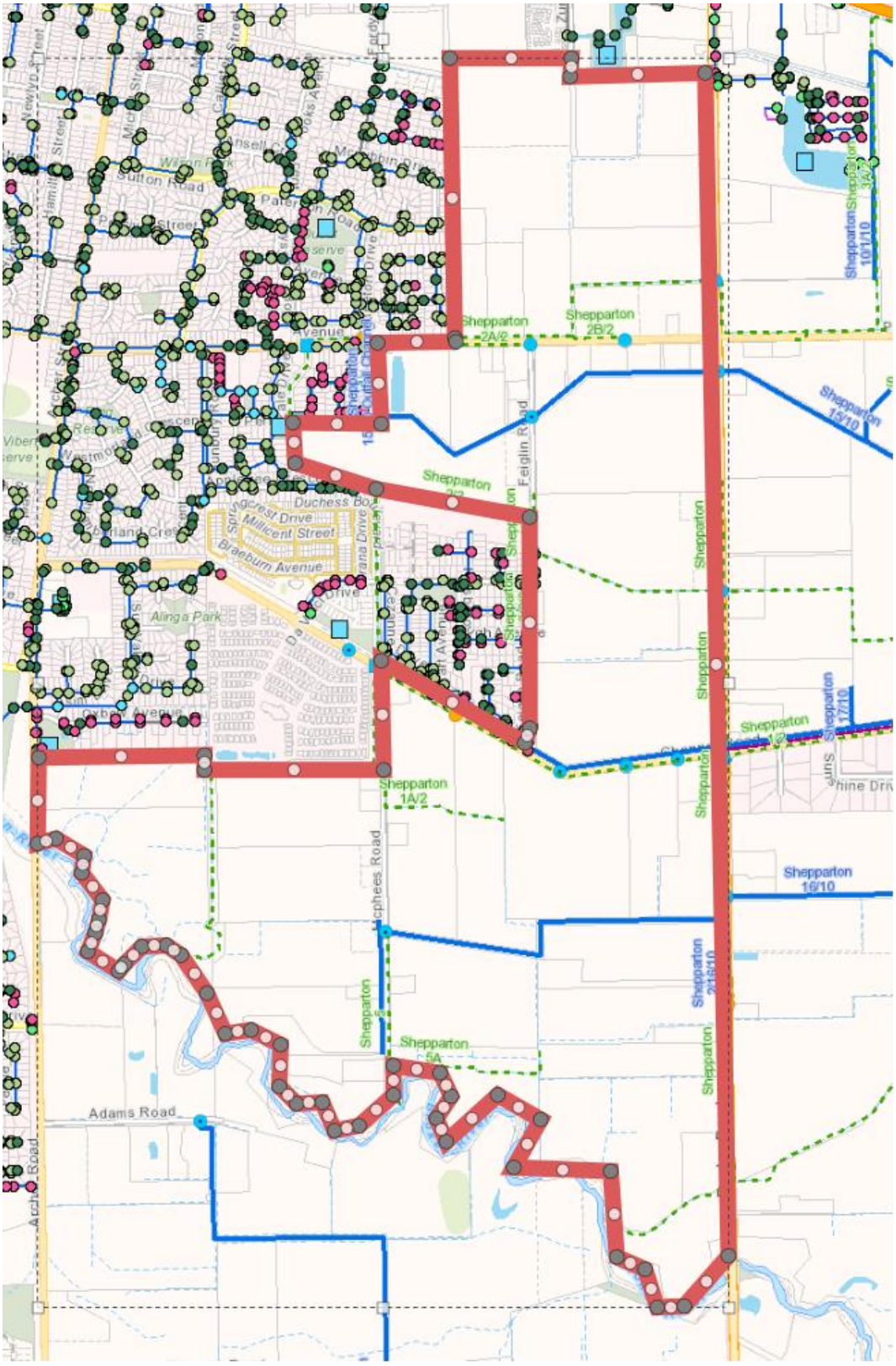

Figure 1 *Screenshot of Council's stormwater drainage assets within Council's GIS system, provided by Council December 2021*

Council advised that it currently requires the municipal pit and pipe stormwater drainage network to cater for a 1 in 5 year Average Recurrence Interval (ARI)[7] ARI storm event and considers the effects of climate change on their network service.

2.4 Flood overlays

A significant area of the Precinct is affected by a Land Subject to Inundation Overlay (LSIO), including a section of the western boundary near Poplar Avenue and south of the existing drainage basin near Cherry Court, and the majority of the Precinct south of Channel Road. 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. [8]The LSIO requires a permit for certain types of development and does not prohibit either use or development of the area.

A portion of the south east corner of the Precinct 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.[9] This FO is associated with the Broken River.

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 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 Precinct is the Greater Shepparton Floodplain Development Plan produced in 2006, that outlines planning conditions that attached *specifically* to developments in flood prone areas within the Precinct.

2.5 Planned updates & redevelopment servicing

Neither Council nor Goulburn Broken CMA advised that there are any planned upgrades to stormwater drainage infrastructure within the Precinct. Please refer to Council's separately commissioned stormwater management and hydrological assessment for planned upgrades to large flood plain, wider catchment or Broken River stormwater drainage infrastructure.

Council provided the following advice regarding its requirements for development within Precinct:

– Council requires developments within its municipality to follow the Infrastructure Design Manual (IDM) guidelines regarding stormwater drainage, retention, and discharge.
– The SEPSP and relevant DCP will provide additional specific guidance for developments in the Precinct.
– Council generally requires underground pit and pipe infrastructure for new developments (as opposed to aboveground channel or swale drainage infrastructure) but will consider alternative proposals where Council believes it is beneficial to the community and Council's ongoing operations and maintenance. An example is

[7] The storm event required in the design for Council's understand drainage systems is the 5-year ARI event, meaning it has a 20% chance of occurring in any given year.
[8] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/44_04.pdf
[9] https://planning-schemes.api.delwp.vic.gov.au/schemes/vpps/44_03.pdf

where a basin or rain garden could achieve an equally positive stormwater outcome to formalised drainage infrastructure.

– Council advises that past developments incorporating swale drainage systems in the road reserve have been unsuccessful at stormwater management, due to property owners misunderstanding the operations and maintenance requirements and infilling or landscaping the swale.
– Council expects that proposed stormwater drainage systems should generally cater for a 1 in 5 year ARI event but should also consider the effects of climate change.

The Goulburn Broken CMA provided the following limited advice regarding development within the Precinct:

– The Goulburn Broken CMA is interested in meeting the objectives as set out in the Planning Policy Clause 13.03-1S *Floodplain Management* and the protection of waterways.
– Proposed developments should not create adverse flood impacts to third-parties.

The Goulburn Broken CMA advised that Council has undertaken detailed flood modelling, and provided the following two recent flood study references:

– Shepparton and Mooroopna 1% AEP Flood Mapping Project (Water Technology, 2021) for areas south of Channel Road; and
– Shepparton East Overland Flood Study (WBM updated for Climate Change, 2020).

For detailed information regarding flood management and the impacts on development please refer to the above reports.

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.[10] Shepparton 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.[11]

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

3.2 Responsible authorities

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

3.3 Existing conditions

3.3.1 Potable water

Existing urban water assets are shown in Appendix C.

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

– A 200 mm diameter unplasticized polyvinyl chloride (uPVC) pipe on Poplar Avenue, a 100 mm diameter uPVC pipe on Feiglin Road
– A 150 mm diameter uPVC water main extends from the Doyles Road intersection to the east.
– A water main on Doyles Road that is predominantly 200 mm diameter north of Poplar Avenue, 150 mm diameter between Poplar Avenue and Channel Road, 100 mm diameter south of Channel Road and is mainly comprised of uPVC material. This main terminates on Doyles Road north of Broken River.
– A 300 mm diameter trunk water main is located on Channel Road, terminating east of the McPhees Road intersection.

GVW advised that the condition of water assets within the Precinct is unknown, and the majority of water infrastructure appears to have been constructed post 2000. The Hyder Report noted that urban water supply from the Shepparton water network is supplied from a Water Treatment Plant drawing raw water from the Goulburn River.[12] GVW has confirmed that all potable water in the Shepparton region is sourced from the Goulburn River.

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

3.3.2 Rural water

Existing rural water assets are shown in Appendix C.

GMW manages a number of existing assets in the Precinct, including water supply channels, pipelines and drainage assets. GMW provided a plan illustrating the locations and types of its water supply assets within the Precinct, and this has been provided for reference in Appendix F.

The Shepparton No. 10 channel, and Shepparton No. 10 pipeline are located on Channel Road intersecting the Precinct. The Shepparton No. 15/10 channel intersects the Precinct south of Poplar Avenue. A number of existing

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

[12] Working Paper 10 – Engineering Infrastructure, Shepparton South East Growth Corridor Framework Plan, Hyder Consulting, August 2009

drains including the Shepparton 1/6, 2/1/2, 6/2/2 and 5/2/2, are located within the Doyles Road road reserve at various locations through the Precinct. A number of existing drains including the Shepparton 2A/2, 2B/2, 2, 2/2, 3/2/2, 4/2/2, are located along the western Precinct boundary. A large number of GMW customers are currently serviced with rural water from this infrastructure, and the Precinct currently drains into various GMW drains.

GMW advised that its assets are typically protected either by easement or registered lease on title.

3.4 Planned upgrades & redevelopment servicing

GVW advised that the Precinct is partially outside of the current water district boundary. GVW has anticipated growth in water demand within this precinct, which is included in the Shepparton & Mooroopna Water Network Master Plan 2022/23.

The master plan will detail new and upgraded infrastructure required to service the precinct to the year 2042/43.

In regard 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 currently has no projects or strategies to deliver recycled water to the Precinct or surrounding area and confirmed that it is not aware of any desire for a recycled water network within the Precinct. GVW has offered to work with Council to deliver Integrated Water Management solutions for the Precinct, however, advises it will have limited impacts on the future water infrastructure required. Due to the quality of recycled water, uses would be limited and as such, would have limited impact on the potable water demand and associated potable water infrastructure required to service future development within the Precinct.

GMW advised that it has only routine maintenance and adjustment works to its assets within the Precinct, including regular maintenance in the medium term (3-9 years) and possible failure related structure replacements in the long term (10+ years). Upgrade works to its infrastructure within the Precinct would be triggered by asset failures 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 [in] 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.*
>
> *As the land in the Precinct develops, it will transform into an 'urban' area rather than a 'rural' area. GMW would be more than willing to discuss the opportunity to transfer a number of drains within the Precinct to Council."*

GMW also notes that, as its open drain and channel infrastructure within the Precinct follows the naturally low lying land, there are no obvious opportunities for this infrastructure to be rationalised or decommissioned.

3.4.1 General redevelopment requirements

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

- Lots of a size less than 0.4ha should be provided with a reticulated water supply service.
- Lots of a size between 0.4ha and 2.0ha should be provided with reticulated water supply services.
- Lots of a size between 2.0ha and 4.0ha will generally require the provision of reticulated water supply services depending on: the number of lots in a subdivision; the nature of surrounding lots; the potential for future development under present land zonings; the distance to the nearest reticulated water supply system.
- Works associated with the provision of reticulated water supply and associated construction works to service the development are to be in accordance with GVW's current codes and standards for reticulated water supply.
- For both residential and industrial / commercial multiple unit developers, developers should install common water supply infrastructure to AS/NZS 3500 Acceptable Solutions, or AS/NZS 3500 Performance Requirements, with the Owners Corporation owning, operating, and maintaining the works.
- All dwellings on a development should be within 130 meters[13] 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.

The following requirements are generally applicable to development areas where existing rural water infrastructure is present[14]:

- No works are to be constructed on GMW easements, freeholds, or reserves without approval.
- A 30 metre setback is required from GMW open channels and drains, measured from the inside top edge of the channel / drain back.
- A 5 metre building setback is required from a GMW pipeline easement boundary.
- If access to a property is required over any GMW asset, a Private Works Licence for the works is required.
- Future developers must reach agreement with GMW in regard to the piping of existing irrigation cannels. If there are a number of developers within the precinct, a mutual arrangement for payment and construction of the pipeline conversion will need to be agreed upon by all relevant parties and GMW.

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.

[13] GVW to confirm whether this is applicable to its servicing zone
[14] Letter to the Victorian Planning Authority, "Amendment C117 to the Greater Shepparton Planning Scheme Shepparton South East Precinct Structure Plan – Agency Consultation", 11 October 2018.

- 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 (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.[15]

[15] 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 Precinct.

4.3 Existing conditions

Existing sewer assets are shown in Appendix C.

GVW manages a limited number of existing sewer assets within the Precinct including the following:

– A 200 mm diameter orientated polyvinyl chloride (OPVC) sewer rising main intersects the Precinct running north south between Cherry Court and Duchess Boulevard.
– A 50 mm diameter uPVC private sewer main is located on Channel Road bisecting the Precinct.

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

4.4 Planned upgrades & redevelopment scenarios

GVW advised that the Precinct is outside of the current sewer district boundary. GVW has anticipated growth in sewerage demand within this precinct, which included in the Shepparton Sewer Network Master Plan 2022/23.

The master plan will detail new and upgraded infrastructure required to service the precinct to the year 2042/43

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 metres^2 should be provided with a reticulated sewer supply service.
– Reticulated sewerage services will generally be provided to subdivisions with proposed lots between 0.4 and 1.0ha depending on: the number of lots in a subdivision; the nature of surrounding lots; the potential for further development under present land zonings; the distance to the nearest sewer with the capacity and depth to service the development; and land capability assessment.
– Works associated with the provision of reticulated sewerage and associated construction works to service the development are to be in accordance with GVW's current codes and standards for reticulated sewerage.
– 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
    - GVW's current codes and standards for reticulated sewerage 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 must 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.[16]

[16] 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.

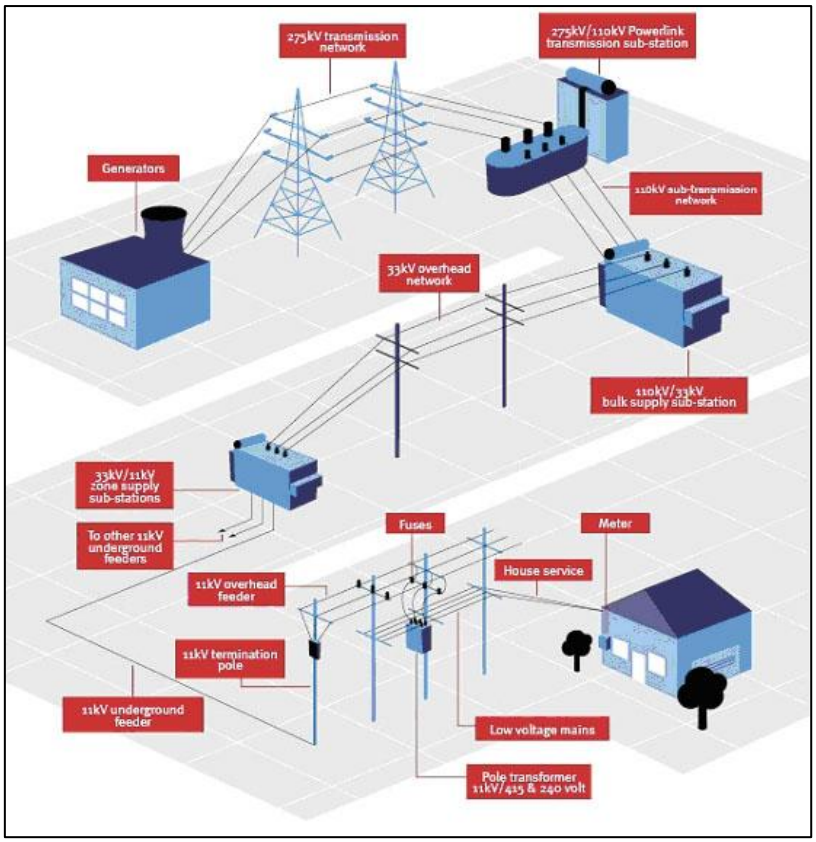

Figure 2 ***Typical Electricity Transmission and Distribution Network, Australian Energy Regulator 2015 'Consumer guide to Victorian electricity distribution pricing review' p5***

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

5.3 Existing conditions

Existing electrical assets are shown in Appendix C.

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

- Overhead HV assets and electrical poles on Poplar Avenue, Feiglin Road, Doyles Road, Channel Road and McPhee Road, with local substations along all these alignments.
- An underground HV cable extends down Doyles Road from the northern Precinct boundary before transitioning to an overhead cable.
- A limited number of LV cables in both overhead and underground assets are located on Poplar Avenue, Feiglin Road, Doyles Road, Channel Road and McPhee Road to service individual properties.
- Overhead HV assets, electrical poles, substations, and low voltage above ground and underground lines extent into limited properties and it can be assumed that these assets service these private properties only.

Powercor advised that the Precinct is currently supplied from the Shepparton Zone Substation and there are no current capacity issues from this supply source.

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

5.4 Planned upgrades

Powercor advised that increases in future load would trigger planned electrical network works. In the long term future (10+ years), Powercor has estimated that the electrical demand in the Precinct will increase by 1 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 as the electrical demand increases.

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

- The existing 22 kilovolt (kV) electrical HV feeder servicing the Precinct will not have capacity to support the proposed redevelopment. It currently has a capacity of 15MVA, and experiences demand of 5MVA. Upgrade works to this asset will be triggered when the electrical load is 75% of the feeder's capacity.
- A new overhead HV feeder will be required along main roads and interconnection roads. This new overhead feeder will supply not only the Precinct, but also the surrounding area.
- 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 Precinct planning
- The infrastructure will be delivered as required to meet the proposed electrical demand
- Powercor advises that provision should be made in the Precinct planning stages for overhead HV electrical assets in the existing/proposed road reserves with appropriate clearance to vegetation and noted that an additional overhead 22kV feeder would be required on Doyles Road specifically.

Powercor does not foresee integrated approaches with other utility services in the future servicing strategy of the Shepparton South East Precinct.

Powercor noted that, in order to provide a sustainable approach to servicing the Precinct, it can accommodate local solar photovoltaic (PV) generation. It also noted that it would consider accommodating innovative electrical servicing strategies for the Precinct 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*[17] 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.*[18]

– 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 because 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

[17] https://media.powercor.com.au/wp-content/uploads/2021/06/25113814/Powercor-Connection-policy-1-1-July-2021.pdf
[18] 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 Precinct and APA Group Networks (APA) operates and manages the natural gas distribution network servicing the Precinct on behalf of Australian Gas Networks (AGN). There are no gas transmission assets inside (or close to) the Precinct, and therefore APA VTS was not consulted in this assessment.

6.3 Existing conditions

Existing gas assets are shown in Appendix C.

APA advises that there is currently no reticulation gas network within the Precinct. There is very limited distribution gas infrastructure within the Precinct, in the form of a 125 mm diameter polyethylene (PE) high pressure gas pipe terminating in Channel Road near the intersection of Feiglin Road. A 125 mm diameter high pressure terminates outside the Precinct boundary on Popular Road to the west of the Precinct.

APA provided the following marked up screenshot in Figure 3, highlighting additional information about the supply location for the existing gas network. It advised that the DRS is a pressure regulating asset that supplies distribution level pressure into the reticulation network, with the main supply pipes located on Poplar Avenue and Channel Road.

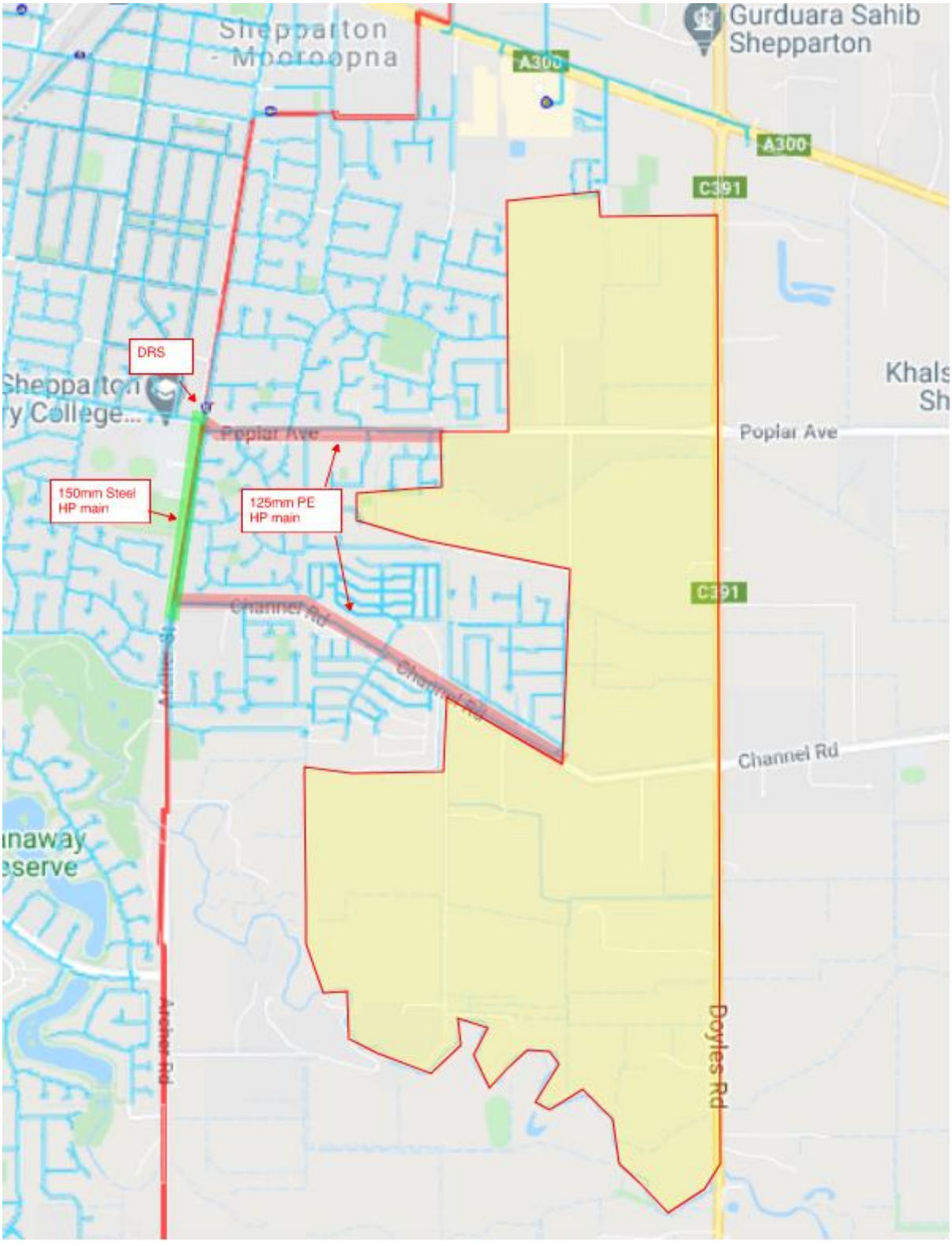

Figure 3 ***Marked up screenshot by APA highlighting the supply routes of APA's local gas distribution network, APA December 2021***

6.4 Planned upgrades & redevelopment scenarios

APA advised that it likely the adjacent gas network can supply the Precinct. The existing reticulation network will need to be extended via mains extension as required by development.

APA has not forecast detailed growth scenarios in the Precinct as it advises that sequencing of development has a greater impact to managing the delivery of gas service than the aggregate development load. An example of this is

that if works commence at the furthest location away from the larger capacity supply mains (e.g. in Doyles Road), a duplication of existing gas assets may be required to service the development. The requirement for network augmentation is difficult to determine, and APA advised it would be influenced by how the Precinct develops and the origin point of development for the Precinct. The 'whole of Precinct' demand is the main consideration for APA's servicing strategy, and APA requires a staging plan to provide a Precinct servicing strategy.

The delivery of gas infrastructure would likely not require any additional land take, as all the foreseeable gas infrastructure required will likely be delivered within the road reserves.

APA provided advice on how it (or the delivery of gas infrastructure) could facilitate a sustainable approach to utility servicing in the Precinct. APA advise that the gas asset owner (AGN) is investigating the introduction of solely hydrogen and hydrogen blended networks where the precinct and location was suitable. In order to power the hydrogen electrolysers required to service hydrogen networks, AGN will look to use 'green electricity' for this purpose. APA advised that AGN should be contacted for further details. Two examples of where AGN is using the existing gas network to deliver blended hydrogen gas are: Hydrogen Park South Australia[19] and Hydrogen Park Gladstone[20]. The former is predominantly a residential precinct, and the latter is a commercial / industrial precinct.

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.

[19] https://www.australiangasnetworks.com.au/hyp-sa
[20] https://www.australiangasnetworks.com.au/hyp-gladstone

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*[21] 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 Precinct 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 Precinct: Doyles Road, Poplar Avenue, Feiglin Road, Channel Road.

The following is a summary of key telecommunications information inferred from Telstra's DBYD plans:

– Telstra's infrastructure appears to be a combination of direct buried cables, and underground cables in conduits

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

– Poplar Avenue, Feiglin Road and Channel Road appear to have only minor Telstra assets, whilst Doyles Road shows significant Telstra infrastructure in the form of multiple nested conduits and a significant number of footway access chambers (maintenance pits)

7.3.2 Optus infrastructure

The following is a summary of key telecommunications information inferred from Optus's DBYD plans:

– Optus infrastructure is located on Poplar Avenue to the east of Doyles Road, and Doyles Road to the north of Poplar Avenue
– Optus's DBYD response states that these are underground fibre optic telecommunications assets, and that the assets are of national significance. Optus advised that this asset forms part of the Melbourne to Sydney internet infrastructure and that cables are direct buried approximately 2 metres deep.
– Optus's assets are within the Telstra owned network and Optus owned network

Optus advised that its existing telecommunications in the Precinct are fully operational and are in good condition.

7.3.3 NBN infrastructure

NBN advised that the Precinct is fully covered within its fixed line footprint. Its network in the Precinct current consists of:

– Approximately 7.8 kilometres of NBN conduits through Doyles Road, Channel Road, McPhees Road, and smaller inner roads within the Precinct boundary
– Approximately 32 NBN owned pits located within the above roads
– Approximately 4.5 kilometres of distribution fibre network (DFN) and local fibre network (LFN) cables passing through Channel Rd and Doyles Rd within the Precinct.

7.4 Planned upgrades & redevelopment scenarios

7.4.1 Telstra infrastructure

Telstra provided the following advice regarding its planned upgrade works in the Precinct:

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

Telstra noted the following key items regarding its servicing strategy for redevelopment in the Precinct:

– Telstra's trunk network infrastructure may require an upgrade. The nature of this upgrade will be determined one further development details are understood.
– Telstra's servicing strategy for the Precinct 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 advised that it deploys network infrastructure with consideration to climate change, environmental factors, heritage impacts, forecasted service demand and specific customer service requirements. Telstra will plan and design network infrastructure to minimise impacts on climate change and heritage issues and continues to implement sustainable work practices which minimise carbon emissions. Telstra advised that it will endeavour to support Council's net zero carbon objectives by delivering 'state of the art' telecommunications technology.

7.4.2 Optus infrastructure

Optus advised that it currently has planned upgrades in the medium term (3-9 years) within the Precinct, however declined to advise the nature of upgrade works. Optus noted that these planned works were triggered by network capacity upgrades, and did not have information regarding capital expenditure, land take requirements or funding models.

Optus notes that the proposed redevelopment within the Precinct would require an upgrade to Optus's mobile services, and that its telecommunications servicing strategy for the Precinct is unknown at this stage.

Optus highlighted that any future proposed works would account for new generation telecommunications technologies but did not give any further indication as to what these might be.

Optus advised that if relocations are required to its nationally significant fibre optic infrastructure, the fibre optic cable must first be duplicated to provide additional connection first. Developers are advised that excavations are not permitted within 5 metres on either side of the existing infrastructure.

7.4.3 NBN infrastructure

NBN currently has no planned upgrade works in the Precinct. 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, indicating that there is possibly some existing capacity within the existing network.
– The typical service area module size services approximately 4000 service locations (SLs). If the NBN were to plan and design for an additional 2500 service locations (the approximately growth in residential lots within the Precinct), it would add over 50% growth in this service area module. As a result, the NBN would likely require a new service area module for the Precinct, which would require a new distribution fibre network from a local fibre access node site.
– NBN advises that planning for telecommunications infrastructure early in the Precinct planning process can avoid inefficient/poor planning, where the existing capacity in the existing cables is utilised for small scale Precinct development, noting that the fully developed Precinct will require its own distribution fibre network constructed.

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 Precinct.

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 Precinct 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 precinct.

8. Typical road cross sections

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

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

– Doyles Road
– Poplar Avenue
– Channel Road

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 confirmed on site.

9. Sustainability and precinct development

Sustainability is a key consideration for the supporting infrastructure and services in the Precinct. GHD undertook an assessment regarding sustainability in precinct development, with a particular focus on the regional experience to provide useful and practical recommendations regarding a sustainable approach to servicing the Precinct. The assessment focussed on the following opportunities for the Precinct to address:

– Resilience by utilising low carbon energy
– Climate change adaption
– Urban cooling
– Zero net emissions pathway to year 2050
– Identify local and state policies and requirements regarding sustainability and energy

GHD presented this assessment in a workshop format attended by Council and the VPA, and facilitated a discussion centred around understanding the strategic principles, sustainability policies and contextual objectives for sustainable infrastructure within the Precinct.

A summary of the workshop presentation detailing the sustainability opportunities for the Precinct can be found in the below section 9.1. The workshop concluded with an interactive activity designed to elicit the Stakeholders' key objectives and drivers regarding sustainable precinct development in the Precinct and involved ranking various sustainability initiatives from most value to least value, and more importance to least importance. The summary of this activity can be found in Appendix D.

9.1 Sustainability workshop summary

The Shepparton South East Precinct Sustainability workshop was facilitated by GHD and attended by key team members and interested technical teams from the Victorian Planning Authority and Greater Shepparton City Council.

The purpose of the Shepparton South East Precinct Sustainability workshop broadly was as follows:

– Identify and discuss the Sustainability Drivers of the Utility Assessment and wider Structure Plan
– Develop method to transition from sustainable drivers / ambition to delivery and implementation
– Consider structure for implementing sustainability in new precincts
– Review existing case studies and benchmarks of sustainable strategy development
– Review existing sustainability rating tools
– Benchmark best practice targets and guidelines to identify key strategies to consider
– Undertake exercise of prioritisation of different considerations

The broad agenda of this workshop was as follows:

1. Introduction
    a. Sustainability Drivers
    b. Sustainability Frameworks
2. Existing Frameworks
    a. City of Melbourne
    b. City of Greater Geelong
    c. Green Building Council of Australia
    d. Greater Shepparton City Council
    e. Sustainability Rating Tools
3. Sustainability Strategy
    a. Target/Concept Setting
    b. Design Exercise

9.1.1 Sustainability frameworks

GHD undertook desktop research regarding a variety of existing sustainability frameworks to inform this assessment. The key information for each referenced sustainability framework is provided below.

9.1.1.1 City of Melbourne – Plan Melbourne

Plan Melbourne is structured around:

– 9 Principles – to guide policies and actions
  - A distinctive Melbourne
  - A globally connected and competitive city
  - A city of centres linked to regional Victoria
  - Environmental resilience and sustainability
  - Living locally – 20-minute neighbourhoods
  - Social and economic participation
  - Strong and healthy communities
  - Infrastructure investment that supports balanced city growth
  - Leadership and partnership
– 7 Outcomes – to state the ambitions of the plan
  - Melbourne Is A Productive City That Attracts Investment, Supports Innovation And Creates Jobs
  - Melbourne Provides Housing Choice In Locations Close To Jobs And Services
  - Melbourne Has An Integrated Transport System That Connects People To Jobs And Services And Goods To Market
  - Melbourne Is A Distinctive And Liveable City With Quality Design And Amenity
  - Melbourne Is A City Of Inclusive, Vibrant And Healthy Neighbourhoods
  - Melbourne Is A Sustainable And Resilient City
  - Regional Victoria Is Productive, Sustainable And Supports Jobs And Economic Growth
– 32 Directions – to outline how the Outcomes will be achieved
– 90 Policies – to detail how Directions will be turned into actions

As an example, the objectives and actions for Plan Melbourne's Outcome 6: Melbourne is a sustainable and resilient city are summarised below in Table 8.

Table 8 Plan Melbourne "Outcome 6" summary table

Objective	Action
Transition to a low-carbon city to enable Victoria to achieve its target of net zero greenhouse gas emissions \	Improve energy, water, and waste performance of buildings through environmentally sustainable development and energy efficiency upgrades Facilitate the uptake of renewable energy technologies
Reduce the likelihood and consequences of natural hazard events and adapt to climate change	Mitigate exposure to natural hazards and adapt to the impacts of climate change Require climate change risks to be considered in infrastructure planning
Integrate urban development and water cycle management to support a resilient and liveable city	Reduce pressure on water supplies by making the best use of all water sources Improve alignment between urban water management and planning by adopting an integrated water management approach Protect water, drainage, and sewerage assets

Objective	Action
Make Melbourne cooler and greener	Support a cooler Melbourne by greening urban areas, buildings, transport corridors and open spaces to create an urban forest Strengthen the integrated metropolitan open space network
Protect and restore natural habitats	Create a network of green spaces that support biodiversity conservation and opportunities to connect with nature Protect and enhance the health of urban waterways Protect the coastlines and waters of Port Phillip Bay and Western Port
Improve air quality and reduce the impact of excessive noise	Reduce air pollution emissions and minimise exposure to air pollution and excessive noise
Reduce waste and improve waste management and resource recovery	Improve the economic recovery of waste and reduce reliance on landfill Improve waste and resource recovery systems to meet the logistical challenges of medium- and higher-density developments Protect waste management and resource recovery facilities from urban encroachment and assess opportunities for new waste facilities

9.1.1.2 Council Alliance for a Sustainable Built Environment (CASBE)

The Sustainable Design Assessment in the Planning Process (SDAPP) framework was developed by Victorian councils to provide a streamlined and consistent methodology for requesting, receiving, and assessing built environment sustainability outcomes through the planning process.

The SDAPP framework:

– Recognises the role of local governments as a statutory authority for planning matters
– Provides a framework for consideration of sustainable design elements of planning applications
– Offers a consistent method for identifying opportunities for improved environmental building performance
– Ensures that sustainability is considered at the very early design phase. This is the best time to maximise opportunities for good orientation and other initiatives that create liveable, comfortable, efficient buildings.
– The Built Environment Sustainability Scorecard (BESS) is the recommended sustainability assessment tool under SDAPP.

9.1.1.3 City of Greater Bendigo

The City of Greater Bendigo uses an ESD assessment to consider a proposal against industry recognised key environmental standards. Developments will ideally aim to achieve ‘best practice’ rather than just the minimum standard. A Sustainable Design Assessment should be carried out against the 10 Key Sustainable Building categories:

1. Indoor Environment Quality
2. Energy Efficiency
   2.1 Sun-shading
3. Water Efficiency
4. Stormwater Management
   4.1 Site Permeability
5. Building Materials
6. Transport
7. Waste Management
8. Urban Ecology

8.1 Green Roofs, Walls, and Facades

9. Innovation
10. Construction and Building Management

9.1.1.4 City of Greater Geelong

The City of Greater Geelong uses sustainable management plans to determine where environmentally sustainable design has been carefully considered and planned in your large-scale development.

The plan must:

– Demonstrate how the 10 key sustainable design categories have been addressed
– Identify relevant sustainability targets and performance standards
– Document how targets and performance standards will be achieved

The 10 key sustainable building categories to improve the ESD credentials of developments are:

1. Indoor environment quality
2. Energy efficiency
3. Water efficiency
4. Stormwater management
5. Building materials
6. Transport
7. Waste management
8. Urban ecology
9. Innovation
10. Construction and building management

9.1.1.5 Greater Shepparton City Council

Council's Sustainability Framework Vision is to "improve Council's environmental sustainability performance by imbedding environmental sustainability considerations into Council's decision-making processes and operational activities".

GHD reviewed Council's Sustainability Framework and has provided a summary table below outlining Council's key objectives, aspirational environmental outcomes, and key actions to deliver these environmental outcomes in a practical way.

Table 9 Greater Shepparton City Council's Sustainability Framework

Objective	Aspirational environmental outcome	Action
Protecting and enhancing our natural assets		
2.1 Protect and enhance remnant native vegetation and to maximise the biodiversity values of Council owned and managed land.	The total area of high habitat and conservation value native vegetation in the municipality is increased. The connectivity between patches of native vegetation is increased. The amount and quality of native vegetation in urban areas is increased. The presence of key threatened species in the municipality is increased. The habitat available for key threatened species to utilise in the urban areas is increased. The presence of introduced pest species is decreased. The diversity and cover of weed species is decreased.	Develop (and implement) a strategic biodiversity connectivity protection and establishment program to target regionally and State threatened, FFG listed, and/or EPBC listed species and communities. Adequately maintain walking/shared paths at community access sites on an ongoing basis so that community complaints (outside of intervention level) are less than fifteen per annum.
2.2 Regulate land use, development, and amenity to achieve best practice land and biodiversity outcomes.	The total area of high habitat and conservation value native vegetation in the municipality is increased. The presence of key threatened species in the municipality is increased	
2.3 Partner with, support and empower our community to increase the biodiversity values of private and public land.	The area of native vegetation enhanced or protected per year is increased. Connectivity between patches of native vegetation is increased. The number of people and community groups attending Landcare or other planting efforts is increased. The number of National Tree Day activity participants (schools, community members and groups) is increased. The number of corporations (SPC Ardmona, Campbell's etc.) attending planting efforts is increased.	
2.4 Advocate and collaborate with government agencies and key stakeholders to protect and enhance the municipality's biodiversity assets.	The area of land managed for conservation is increased. The area of native vegetation in the municipality is increased. The presence of key locally threatened species in the municipality is increased. The presence of introduced pest species is decreased. The number of Council involved partnership programs is increased. The number of successful funding applications is increased	
Healthy, productive, and sustainable water resources		
2.1 Reduce Council's water consumption and maximise water reuse	Council's potable water consumption per head of population is reduced. Council's non-potable water consumption per head of population is reduced. The number of Council owned or managed buildings and facilities with rainwater storage tanks is increased.	Review the Greater Shepparton Stormwater Management Plan Identify new potable and non-potable water reduction targets in the reviewed SWUP.

Objective	Aspirational environmental outcome	Action
2.2 Utilise Council's water management responsibilities to improve water quality across the municipality.	Potential water contamination from Council owned and managed septic systems is minimised. Pollutants and contaminants that flow into our waterways from urban stormwater runoff are reduced.	
2.3 Ensure that Council is prepared for flood events.	Flood monitoring stations are maintained. Floodplain management plans are reviewed as necessary.	
2.4 Utilise Council's planning and regulation powers to achieve healthy, productive, and sustainable water resources.	Community potable and non-potable water consumption is minimised at new residential and commercial buildings. Pollutants and contaminants that flow into our waterways from urban stormwater runoff are reduced. Potential water contamination from Council owned and managed septic systems is minimised.	
2.5 Partner with, support and empower our community to achieve healthy, productive, and sustainable water resources.	Reduce community potable and non-potable water consumption. Pollutants and contaminants that flow into our waterways from urban stormwater runoff are reduced.	
2.6 Advocate and collaborate with government agencies to improve water quality, promote efficient water use, and improve flood mitigation management across the municipality.	The number of Council involved partnership programs is increased. The number of successful funding applications is increased. Flood monitoring stations are maintained. Floodplain management plans are reviewed as necessary.	
Climate change and energy efficiency		
3.1 Reduce Council's greenhouse gas emissions and the financial costs of Council's energy use.	Greenhouse gas emissions from Council priority facilities and plant are reduced. The number of Council owned or managed buildings/facilities using renewable energy sources is increased. The number of climate change adaption measures implemented at Council priority facilities is increased. Whole of life costs are incorporated in project planning (including Sustainability and Environment checklists, Integrated Project Management (IPM), InterPlan etc.).	Identify and establish community greenhouse gas emission benchmarks to report against. Promote solar PV panels to increase community use.
3.2 Ensure that Council is prepared for the impacts and opportunities presented by climate change.	Greenhouse gas emissions from Council priority facilities and plant are reduced. The number of climate change mitigation measures implemented at Council priority facilities is increased. The average star rating for new Council buildings is increased.	
3.3 Encourage and attract innovative renewable and alternative energy industries/businesses development within our municipality.	Innovative renewable or alternative energy industries or businesses move to, or establish their operations in Greater Shepparton.	

Objective	Aspirational environmental outcome	Action
3.4 Increase the energy efficiency of existing and new residential and commercial buildings across the municipality.	Community greenhouse gas emissions are reduced. The number of new residential and commercial buildings that go beyond the minimum star rating requirements is increased.	
3.5 Support our businesses, industries, and residents to live more efficiently and sustainably.	Community greenhouse gas emissions are reduced. Council support for community groups is increased. Council support for community events is increased.	
3.6 Partner with Government agencies and regional stakeholders to support the establishment of sustainable agricultural practices.	The knowledge and capacity of our regions farmers, farm advisers and agribusiness industries to respond to the opportunities and impacts of climate change is increased	
Waste and resource efficiency		
4.1 Minimise Council's consumption of resources.	The volume of Council generated waste going to landfill is reduced. The purchasing of recognised recycled and/or environmentally preferable products by Council is increased.	Achieve environmental sustainability procurement targets annually (including the application of a 10% Establish Council generated waste benchmarks
4.2 Provide (as far as practicable) best practice waste management services to the Greater Shepparton community	Council achieves the State Government's municipal waste targets. The volume of waste going to landfill is reduced.	
4.3 Lead by example to demonstrate that our local environment is valued by voluntarily cleaning up a specific location.	The environmental value of a reach of the Goulburn River (as part of the RiverConnect Adopt-a-Reach Project) is directly improved from Council staff volunteer activities.	
4.4 Reduce the incidence of rubbish dumping and the prevalence of litter along roadsides and other areas of public land.	Occurrences of rubbish dumping across the municipality are reduced. Littering behaviours of the Greater Shepparton community are improved.	
4.5 Increase the recovery of resources and minimise the quantity of waste going to landfill.	Council achieves the State Government's municipal waste targets. The volume of industry generated waste going to landfill is reduced.	
4.6 Our community discards waste responsibly by utilising Council's waste management services and facilities.	Occurrences of rubbish dumping across the municipality are reduced. Littering behaviours of the Greater Shepparton community are improved.	
4.7 Maximise collaboration opportunities with Government agencies, stakeholders, and other Local Governments.	The number of Council involved partnership programs is increased. The number of successful funding applications is increased.	

Objective	Aspirational environmental outcome	Action
Sustainable planning, development, and transport		
5.1 Pursue best practice in sustainable development, planning, and transport.	Council is prepared for the impacts of “peak oil” and “energy descent”. The Infrastructure Design Manual (IDM) is utilised to achieve best practice environmental sustainability development outcomes across the City of Greater Shepparton	Council supports the carpooling incentive program for the next four years. 100% of new developments contain adequate infrastructure to meet community non-motorised and public transport needs (where necessary).
5.2 Reduce the environmental impacts of Council staff travel requirements.	Environmental impacts are minimised from Council’s fleet purchases. The number of staff who commute via walking or cycling is increased. The number of staff who commute via car-pooling is increased	
5.3 Reduce the municipality’s dependence on personal, fossil fuel powered transportation.	Non-fossil fuel and public transport community infrastructure is improved. The number of residents who partake in (or commute via) walking or cycling activities is increased. The number of residents who commute via car-pooling is increased.	
5.4 Embed Environmentally Sensitive Design (ESD) principles into all development, planning and transport activities within the City of Greater Shepparton.	Relevant statements/overlays are incorporated into the Municipal Strategic Statement (MSS) of the Greater Shepparton Planning Scheme.	
5.5 Partner with, support and empower our community to reduce vehicle use and achieve sustainable development and lifestyles across the municipality.	The number of residents who partake in (or commute via) walking or cycling activities is increased. The number of residents who commute via car-pooling is increased. The number of people growing home-grown food or using community hub and Kidstown facilities to grow food is increased.	
5.6 Lobby Governments and collaborate with other key stakeholders to increase sustainable development outcomes and minimise vehicle use.	The number of Council involved partnership programs is increased. The number of successful funding applications is increased.	
Council governance and operations		
6.1 Provide open and transparent reporting on environmental sustainability performance.	Annual reports are produced on Council’s environmental sustainability activities and achievements. Environmental sustainability benchmarks are established to report against.	The Sustainable Working Group develop and implement an annual action plan for environmental sustainability behaviour and cultural change activities. Commence quarterly environmental sustainability reporting to Executive.
6.2 Ensure that Council has the culture, resources, and staff to deliver our environmental sustainability objectives.	Council supports and commits to resource the implementation of the Environmental Sustainability Strategy four-year action plan. Environmental sustainability outcomes from Council operations and activities are improved.	

Objective	Aspirational environmental outcome	Action
	Council supports the Sustainable Working Group to implement Environmental Sustainability Strategy actions addressing organisational culture and behaviour change	
6.3 Council officers have the skills, knowledge, and capacity to achieve Council's environmental sustainability objectives.	Environmental sustainability (procurement, ECO-buy etc.) training is available to relevant staff. Relevant training and professional development opportunities identified during annual Sustainability and Environment Team staff PES (Performance Evaluation System) appraisals are budgeted and approved.	
6.4 Ensure that environmental sustainability implications are considered in project planning and decision-making activities.	Council reports, projects, and procurement activities include environmental sustainability considerations.	
6.5 Ensure that Council utilises the most effective and practical planning and regulation powers.	Council enforcement and compliance staff are knowledgeable about whom is in the best position to achieve the best outcomes under the relevant legislation to improve community compliance into the future.	
6.6 Our community is well informed and knowledgeable about Councils environmental sustainability activities and achievements.	The community is knowledgeable about Council's environmental sustainability activities and achievements. Council receives an improved environmental sustainability performance rating score in the bi-annual Auspoll Community Survey.	
6.7 Our community is well informed and knowledgeable about environmental sustainability issues in our municipality	The community has an increased understanding of the importance of Council's environmental sustainability activities and achievements. Council receives an improved environmental sustainability importance rating score in the bi-annual Auspoll Community Survey.	
6.8 Promote and/or support the environmental protection and enhancement activities currently occurring in the municipality.	Council support for community members and/or groups to undertake environmental protection and enhancement activities are increased.	
6.9 Stakeholders are informed and engaged in the implementation of this Strategy.	Council supports the formation of the Greater Shepparton Environmental Sustainability Stakeholder Advisory Committee.	
6.10 Advocate and collaborate with government agencies and stakeholders to improve environmental management outcomes.	The quality of state of our environment data for the City of Greater Shepparton is improved. The number of Council involved partnership programs is increased. The number of successful funding applications is increased	

9.1.1.6 Sustainability rating tool: Green Building Council of Australia

The Green Building Council of Australia details key 5 actions to achieve climate positive precincts:

1. Embed climate positive pathways into all stages of planning.
2. Commit to fossil fuel-free precincts (i.e., no natural gas), and ensure policy and planning processes support this ambition.
3. Remove the barriers to low carbon precinct energy solutions.
4. Drive lower upfront carbon in materials and construction activity.
5. Commit to delivering low carbon buildings in all precincts.

9.1.2 Sustainability strategy for the Precinct

The following Table 10 provides examples of national and international sustainability rating tools that could be utilised for the Precinct's sustainability framework.

Table 10 Sustainability rating tools

Sustainability rating tool	Description
greenstar	Most used framework within Australia with well understood methodology with many certified projects across Australia.
INTERNATIONAL WELL BUILDING INSTITUTE™	WELL attempts to drastically reduce a buildings carbon footprint as well as attempting to improve the health and wellbeing of its occupants.
LEED LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN	Widely used framework across North America and is an internationally recognized green building certification system
BREEAM®	World's first sustainability assessment method for buildings which aims to empower and encourage sustainable practises in the built environment. Developed in the UK
LIVING BUILDING CHALLENGE	The Living Building Challenge visualizes the ideal for the built environment. It has onerous requirement on design and operation.
AUSTRALIAN PASSIVE HOUSE ASSOCIATION	Passive House is a holistic construction certification standard that works to determine the most suitable building geometry based on usage and location.
ONE PLANET LIVING	Using ecological and carbon footprinting to account for environmental impacts, One Planet Living recognises that finding a way to live happily and healthily within the means of our one planet and avoid catastrophic climate change requires us to go beyond incremental improvements

The following Figure 4 summarises the drivers, themes, and pillars of the potential Precinct Sustainability Strategy. The following Figure 5 details the key Sustainability Strategy themes and references appropriate example rating tools to drive each theme.

Drivers

Resilience by utilising low carbon energy
- Climate change adaption
- Urban cooling
- Zero net emissions pathway to year 2050

Themes

- Protecting and enhancing our natural assets (land and biodiversity)
- Healthy, productive and sustainable water resources
- Using our resources wisely - climate change and energy efficiency
- Using our resources wisely - waste and resource efficiency
- Sustainable planning, development and transport
- Council governance and operations

Pillars

- Environmental
- Social
- Governance

Figure 4 *The Shepparton South East Precinct Sustainability Strategy*

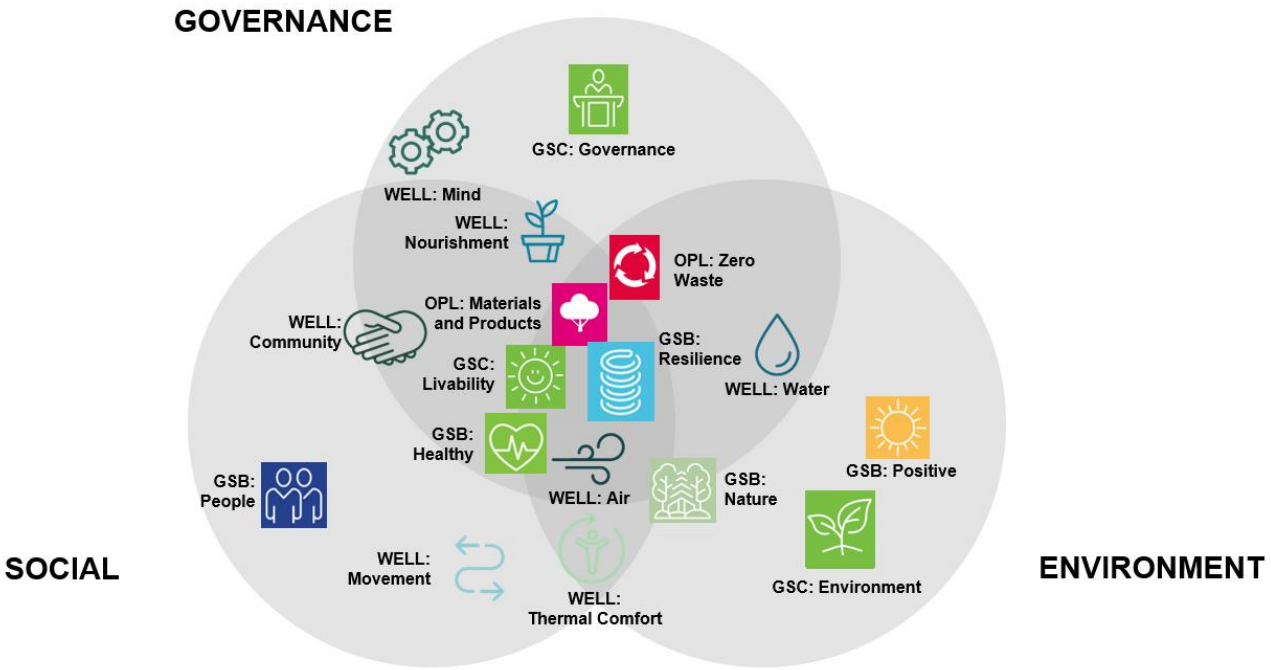

Figure 5 *The Shepparton South East Precinct Sustainability Themes*

Key actions that Council could look to implement, to drive the key themes of the Precinct Sustainability Framework are detailed in Table 11.

Table 11 Precinct Sustainability Framework key actions

Organisation / Framework	Theme	Action
Green Star Communities	**Governance**	**Adaption and Resilience** – Develop a site-specific Climate Adaptation Plan (CAP) and demonstrate that solutions/recommendations have or will be captured in the design of the site and any future buildings. – Develop a Community Resilience Plan, incl. information about risks, emergency contacts, emergency shelter locations, information for occupants to develop their own emergency plan, communication channels, disaster prevention guidelines, and supporting checklists. **Sustainability Awareness** – Develop a Users' Guide describing the sustainability of the site. – Develop a physical sustainability information centre or exploration trail around the site to educate the site's visitors about the sustainability initiatives. **Community Participation** – Create a community led program or service that is operated by community members. Example programs could be something like a community program used to facilitate and encourage use of local food gardens, or a community learning program used to encourage improved community safety behaviours.
Green Star Communities	**Livability**	**Active Lifestyle** – The project must provide cycling and walking paths throughout the development. It must provide facilities along major and minor routes, connections to destinations or other networks, and solutions to all crossings, intersections, obstacles, and parking **Recreational Facilities** – Requires all buildings to have easy access to a local park (400m radius) and at least one public sports facility (800m). – Requires 2.83 Ha of open space within the site per 1000 occupants **Understand Culture, Heritage, and Identity** – Research and interpret the culture and heritage of the site in the design of the site masterplan and prepare interpretation initiatives. **Local Food Production** – Design layout to allow for a community garden with agricultural space at 100sqm per 1000 residential occupants. **Design for Safety** – Site's design process to include a crime risk assessment and the site design to include Crime Prevention through Environmental Design (CPTED) considerations: • Natural surveillance • Natural access control
Green Star Communities	**Environment**	**Integrated Water Cycle** – Design and construct public open spaces to only utilise water from an alternative water source. – Design and demonstrate that the post-development peak event stormwater discharge does not exceed the pre-development peak event discharge (in accordance with ARI).

Organisation / Framework	Theme	Action
		– Design and build site to ensure sustainable surface water management. Placement of stormwater treatment measures that target litter, gross pollutants, and coarse sediments (Enviropods, Jellyfish Unit, Rainwater tank etc). **Greenhouse Gas Strategy** – Specify LED site lighting – On-site renewable energy accounts for up to 20% of the total annual electrical and thermal energy demand. – District heating and cooling to be considered. **Sustainable Sites** – Aim for 75% or more of the project site was previously developed land **Ecological Value** – Requires a biodiversity management plan to be developed and implemented, and the plan to demonstrate a net improvement of biodiversity to up to 20% **Waste Management** – Site includes at least 3 initiatives to reduce waste to landfill, including public and residential recycling schemes, composting/green waste schemes or hazardous material collections. **Heat Island Effect** – Site landscaping and EnviroPro's light coloured roofing and hardscaping to contribute to at least 50% of the site area. Can include buildings if the buildings can commit to light coloured roofing. **Light Pollution** – 95% by number of all existing public lighting luminaries within the project site boundary have an upward light output ratio less than 5%.
Green Star Buildings	**Healthy**	**Clean Air** – Outdoor air must be provided to each space in the nominated area at a rate greater than the minimum required by AS 1668.2:2012 by 100%. – Ventilation systems must be capable of providing enough outdoor air to maintain carbon dioxide (CO2) levels at, or less than 700ppm within each space in the nominated area, at all times during the design occupancy period. **Light Quality** – Walls within the field of view of occupants in regularly occupied spaces must have an average surface reflectance value of 0.70 and an average surface illuminance of at least 50% of the horizontal illuminance levels required for task. • At least 40% of the regularly occupied areas across the building must receive at least 160 lux due to daylight during 80% of the nominated hours with no less than 20% on any floor or tenancy (whichever is smaller). **Acoustic Comfort** – Internal ambient noise levels in the nominated areas must be no less than 5 dB below the lower range value and no greater than the upper range value relevant to the activity type in each space as recommended in AS/NZS 2107. **Connection to Nature** – 5% of the building's floor area/ or site area (whichever is greater) is allocated to nature in which occupants can directly engage with – At least 60% of primary spaces occupied for more than two hours must have a clear line of sight to an internal or external view towards an area that is landscaped, or contains a water feature, or is an atrium.

Organisation / Framework	Theme	Action
Green Star Buildings	**Resilient**	**Climate Change Resilience** – A climate change risk and adaptation assessment must be performed using the information from Intergovernmental Panel on Climate Change Fifth Assessment Report Representative Concentration Pathway 8.5. The assessment must: • Be performed using two timescales that are relevant to the projects anticipated lifespan: one medium-termed timescale between 2040 to 2050; and one long-term timescale between 2070 to 2090. • Align with the Australian Standard AS 5334:2013 Climate change adaptation for settlements and infrastructure. **Heat Resilience** – At least 75% of the whole site area comprises of one or a combination of strategies that reduce the heat island effect, including one or more of the following: • Vegetation • Green roofs • Unshaded hard-scaping elements with a three-year SRI of minimum 34 or an initial SRI of minimum 39 • Hardscaping elements shaded by overhanging vegetation • Water bodies and/or water courses **Grid Resilience** – Buildings meet one or more of the following: • Have active generation and storage systems that have the capacity to reduce its electricity peak demand by 10% of the annual peak electricity demand for buildings for at least a one-hour period. • Have the infrastructure to deliver an appropriate demand response strategy that shows how at least 10% of the annual peak electricity demand for buildings are being shed without affecting occupant amenity for at least 4 hours. • Reduce electricity consumption of buildings through passive design of their façades, ventilation systems or by reducing their occupiable area.
Green Star Buildings	**Positive**	**Upfront Carbon Emissions** – Buildings must have at least 20% less upfront carbon emissions than those of a reference building*. **Energy Use** – Buildings must have at least 30% less energy use than that of a reference building*. **Energy Source** – 100% of the electricity used for buildings comes from renewable electricity (can be offsite using a Power Purchasing Agreement (PPA)). **Water Use** – Buildings must use 45% less potable water compared to a reference building. • For exceptional performance, buildings must use 75% less. **Life Cycle Impacts** – The project demonstrates a 30% reduction in life cycle impacts when compared to standard practice.

Organisation / Framework	Theme	Action
Green Star Buildings	**People**	**Indigenous Inclusion** – Aboriginal and Torres Strait Islander people, culture and heritage must be celebrated through building design, by undertaking one or both of the following: • Having a key member of the Project Team who is part of the organisational RAP Working Group, meeting least 90% of the RAP targets on the project, and publicly reporting all implemented actions related to the RAP on the Project's website. • Incorporating principles from the Australian Indigenous Design Charter, including at a minimum the following: • Indigenous Led: Ensure Aboriginal and Torres Strait Islander representation in the creation of the design • Community Specific: Ensure respect for the diversity of Aboriginal and Torres Strait Islander culture by following community specific cultural protocols • Impact of Design: Always consider the reception and implications of all designs so that they are respectful to Indigenous culture • Shared Knowledge: Develop and implement respectful methods for all levels of engagement and sharing of Indigenous knowledge (collaboration, co-creation, procurement). **Design for Inclusion** – The project team must consult with distinct and relevant community types to develop a needs analysis, undertaken early in the design process and including a balanced cross-section of representation of the target group. The consultation process must generate a report that is then used to influence the design of the project.
Green Star Buildings	**Nature**	**Impacts to Nature** – Design and construction of buildings conserves existing natural soil, hydrological flows, and vegetation elements. If deemed necessary by an Ecologist, at least 50% of existing site with high biodiversity value is retained. **Biodiversity Enhancement** – External landscape in the building (horizontal or vertical) must be provided at a ratio of the larger of 15% of the site area or 1:500 of the gross floor area (GFA). – Landscaped areas include critically endangered and/or endangered plant species native to the bioregion. No invasive species are allowed, as per the Australian Weeds Strategy 2017 to 2027. – Greater than 60% of plants must be indigenous and the site must include at least one significant (nesting) tree or equivalent habitat provision per 500m² of landscaped area. **Nature Connectivity** – Species connectivity must be encouraged through the site and to adjacent sites. If the project sits within a blue or green grid strategy it must contribute to the goals of the strategy. • Connectivity through landscaping must be contiguous with existing, restored, and new habitats. The conservation area must make up at least 25% of the total external area within the building's site boundary (minimum 182m²). • Design features such as a canopy bridge, wildlife tunnels, green roofs, amphibian tunnels and green infrastructure must be used to connect nature on site to adjacent natural areas, which are either existing, restored, or new. **Waterway Protection** – Buildings must demonstrate an annual average flow reduction (ML/yr) of 40% compared to pre-development levels and meet specified pollutants targets.

Organisation / Framework	Theme	Action
		• For exceptional performance, buildings must demonstrate an annual average flow reduction of 80%.
One Planet Living	**Materials & Products**	**Using materials from sustainable sources** – Prioritise materials and products with a low environmental impact across their lifecycle, and promote those which have positive social and environmental impacts, such as sustainable timber, which stores carbon – Consider the end-of-life of products and appliances. – Avoid high impact and polluting materials and products – for example, those containing substances such as PVC. – Develop a sustainable materials strategy – Materials and products are not toxic to humans or wildlife at any stage in their lifecycle **Promoting products which help people reduce consumption** – Whole of life impact assessment of materials to be undertaken to inform material selection. – Sharing resources in order to reduce consumption of natural materials – A circular economy is supported with upcycling, reuse and recycling prioritised
One Planet Living	**Zero Waste**	**Reducing consumption, re-using and recycling to achieve zero waste and zero pollution** – 90% recycling or composting rates – Zero construction waste to landfill Zero operational waste to landfill pathways – Food waste to be used to support local gardening and farming initiatives – Find innovative uses for other waste, such as for building insulation or construction – Foster a culture of sharing, upcycling, reuse and enable closed-loop recycling of products. – Provide good reuse and recycling infrastructure for paper, plastic, glass, electrical goods, and food, etc. – Educate and promote the waste hierarchy
WELL Community Standard	**Air**	**Pollution Source Separation** – Reduce the population exposure of pollutants within the project by creating a buffer between transportation pollution sources and sensitive and active populations – 100% of development is more than 90 m from roads with a speed limit greater than 65 km/hr. **Parking Restrictions** – Encourage active transportation and discourage vehicle use by restricting on and off-street parking – Frontages that face the pedestrian circulation network are free of parking facilities – At least 5% of on-street parking spaces are designated for carpool or shared-use vehicles **Low Emission Vehicles** – Reduce the emissions by promoting low or no-emission vehicles – At least two electric vehicle charging stations are present at all parking lots **Local Food Production** – Design layout to allow for a community garden with agricultural space at 100sqm per 1000 residential occupants. **Air Quality Education**

Organisation / Framework	Theme	Action
		– Inform community members about ambient air quality in order to encourage them to modify their activities based on conditions – Daily air quality data is measured in real time, or forecasted one day ahead
WELL Community Standard	**Water**	**Drinking Water Access** – Encourage public drinking water consumption and reduce the consumption of less-healthy beverage alternatives. – Drinking water fountains are available with at least one fountain per 800 m radius. – All newly installed drinking water fountains are designed for water bottle–refilling. **Stormwater Management** – Curtail the release of untreated storm runoff water into the natural water system. – Strategies across the entire project for preventing the off-site discharge of untreated water from rainfall events up to and including the ninety-fifth percentile storm event that incorporates one or more of the following: • Rain gardens, bioretention and infiltration planters • Porous pavements • Vegetated swales and bioswales • Green roofs • Trees and tree boxes • Pocket wetlands • Reforestation/revegetation using native plants • Protection and enhancement of riparian buffers and floodplains • Rainwater harvesting **Overflow Water Management** – Curtail the release of untreated sewage into the natural water system during rainstorms – New sanitary sewage and stormwater are consistently conveyed through separate pipes – Combined sewer systems have sufficient treatment and retention capabilities to avoid any overflow events
WELL Community Standard	**Nourishment**	**Healthy Food Procurement** – Increase the offering of healthier food and beverage choices by developing policy. Typical healthy procurement policies may include nutritional standards that limit the number of calories, salt or sugar in food and beverage offerings, require the provision of fruits and vegetables or prohibit the purchase of certain foods and beverages. Some policies also support the local economy by setting additional local purchasing or sustainability requirements. **Nutrition Education** – Enhance individual nutrition knowledge and promote water consumption through educational opportunities – Provide the following educational opportunities: • Monthly nutrition education classes. • Monthly cooking demonstrations. • Monthly gardening or agriculture classes

Organisation / Framework	Theme	Action
		• Signage that identifies location of drinking water fountains **Urban Agriculture** – Encourage the integration of urban agriculture – Provide accessible urban agriculture space of at least 1 m2 per dwelling unit allocated within an 800 m walk distance of all dwelling units **Food Security** – Address food insecurity among local populations and to promote community resiliency – Organise an annual food drive or programming event with targeted healthy food donations
WELL Community Standard	**Movement**	**Enhanced Pedestrian Environments** – Improve pedestrian infrastructure and encourage physical activity through evidence-based safety countermeasures – Demonstrate that the transportation network includes design strategies that address each of the following categories: • Separation of pedestrians and other roadway users. • Visibility of pedestrians. • Management of vehicular speed. **Bicycle Share** – Provide a comprehensive bicycle share program and promote use of community bike share. **Physical Activity Spaces** – Provide diverse physical activity opportunities in indoor and outdoor spaces within 800m walk distance of all residential buildings.
WELL Community Standard	**Thermal Comfort**	**Urban Heat Island Mitigation** – Diminish the build-up of heat in development by reducing the amount absorbed and retained by buildings and hardscape – 75% of all non-occupiable or non-mechanical rooftops (excluding areas with photovoltaic installations) meet one or more of the following: • Uses a green roof system that includes at least a 2-inch covering of hardy groundcover • Low-sloped roofs (slope ≤ 2:12) have a three-year aged solar reflectance index (SRI) of 64, or an initial SRI of 82. • Steep-sloped roofs (slope > 2:12) have a three-year aged SRI of 32, or an initial SRI of 39. – For 50% or more of pedestrian-accessible street segments in the project and for 50% of roadways in the project, one or more of the following is met: • Sidewalks provide shade with trees or with architectural devices or structures that have a three-year aged solar reflectance (SR) value of at least 0.28, or an initial SR of at least 0.33 at installation. • Roads use paving materials with a three-year aged solar reflectance (SR) value of at least 0.28, or initial SR of at least 0.33 at installation. – 25% or more of all parking (measured by number of spaces) meets one of the following requirements: • Constructed of cool pavement such as asphalt modified with high albedo materials or coloured pavements. • Grass covered with soil enclosed in a lattice structure providing lateral containment. • Constructed of vegetated or non-vegetated permeable pavements.

Organisation / Framework	Theme	Action
		• Covered by another floor of parking, a building, a roof, or other coverings **Urban Vegetation and Green Spaces** – Promote heat mitigation strategies relying on tree and/or vegetation that reflect local climate conditions in both sparse and crowded areas – One of the following requirements is met using trees and landscaping appropriate to the climate: • 25% or more of paved surfaces area as measured across the entirety of the project boundary including roads, pedestrian-accessible street segments and parking lots are covered within 15 years of construction by tree canopy. • 25% or more of road length as measured across the entirety of the project boundary with more than one lane in each direction separated by a line of trees. – A combination of the following requirements is met for all playgrounds, sports fields, courtyards and public squares or plazas: • 10% or more of the area is covered with vegetation. For trees, use the area of the canopy footprint. For climbing plants, use the area of the plant against the wall or trellis. • 10% or more of existing walls and other infrastructure are adapted to support vines or other types of green wall vegetation
WELL Community Standard	**Mind**	**Restorative Green Spaces** – Support the provision of access to green spaces with restorative qualities designed to promote mental recovery and mental health – At least 75% of dwelling units are within 300 m of public use green spaces that total a minimum size of 0.5 hectare or greater. Green spaces should contain minimum 70% plantings, including tree canopies, verdant foliage, or other visually stimulating plantings, such as bushes, flower beds and/or grass. **Restorative Blue Spaces** – Support the provision of access to blue spaces with restorative qualities designed to promote mental recovery and mental health – At least one public use blue space is located within the project boundary or within 400 m walk distance of the project boundary. **Restorative Built Spaces** – Support the provision of access to built spaces with restorative qualities designed to promote mental recovery and mental health – At least two of the following spaces are available within a 400 m walk distance of the project boundary: • Museum or art gallery space. • House of worship. • Meditation or prayer space. • Historical site. • Promenade. • Plaza.
WELL Community Standard	**Community**	**Celebration of Place** – Honour local history, cultural practices, institutions, and identity of the project area – The following aspects are included in the project plan: • Incorporation of native flora into landscape design throughout the project area.

Organisation / Framework	Theme	Action
		• Installation of public art throughout the project area, including both temporary and permanent installations. At least 20% of new building frontages is dedicated to public art. • Adoption of vernacular design strategies that honour local architecture and material supply. • Designation of sites that celebrate local culture or history. • Education of residents and visitors about design and operation elements of the project. **Community Confidence** – Improve community safety, health, and vitality by integrating CPTED principles into the project master plan – Incorporate at least three of the following requirements of the CPTED framework: • Natural surveillance—spatial design and placement of physical elements to increase visibility within and around a space. • Natural access management—landscape and wayfinding elements that help define and guide community members throughout space. • Space delineation—physical and environmental attributes that help define space and express a positive sense of ownership. • Activity support—planning and placing community social activities in public spaces. • Physical maintenance—general upkeep plan for buildings and public spaces that includes activities such as landscaping and trash maintenance

9.2 Recommendations

GHD recommends that Council develop a ‘Sustainability Strategy’ for development in the Precinct. The assessment and workshop undertaken in this Report form ‘Stage 1’ of developing an effective sustainability strategy.

GHD suggests that Council proceed with Stage 2 and undertake strategy development. This involves identifying, assessing, and developing strategies and actions to meet the agreed objectives and targets. Council should agree the overall priorities and approach for incorporation of sustainable objectives and targets into the Precinct Sustainability Strategy.

10. Summary

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

10.1 Key findings

Key findings of this assessment are outlined in Table 12 below.

Table 12 Key findings

Infrastructure type	Key findings
Stormwater drainage	– A separate stormwater management and hydrological assessment has been commissioned by Greater Shepparton City Council (Council), and readers should refer to this for detailed stormwater assessment information – Council has limited stormwater drainage infrastructure within the Precinct, in the form of open drainage and pit & pipe infrastructure – A significant portion of the Precinct is affected by a Land Subject to Inundation Overlay, and planning conditions will attach to development in this area – Council will require underground pit and pipe infrastructure for new developments, and will only consider aboveground channel or swale drainage infrastructure where Council believes it is beneficial to the community
Water	– Goulburn Valley Water manages a limited number of existing urban/potable water assets within the Precinct – There is no recycled water network within the Precinct – The Precinct is partially outside of the current water district boundary, and there are currently no planned upgrades to the water network in the Precinct – Goulburn Valley Water has not anticipated growth in the Precinct and therefore does not currently have a network servicing strategy for the Precinct – Redevelopment in the Precinct will likely trigger upsizing of existing water assets (both within and outside the Precinct), including trunk water mains, storage tanks and booster pump stations – Goulburn Valley Water offered to work with Council to deliver Integrated Water Management Solutions for the Precinct – The cost of trunk/distribution water infrastructure is attributable to Goulburn Valley Water, and the cost of reticulation mains will be attributable to the developer – Goulburn Murray Water manages a number of existing rural/irrigation water assets within the Precinct including water supply channels, pipelines and drainage assets – A large number of GMW customers are currently serviced by this infrastructure, and the Precinct's stormwater network currently outlets into various GMW drains – Where appropriate, GMW seeks the conversion of rural infrastructure to pipelines where they occur in residential areas – The responsibility for pipeline conversion is subject to a mutual agreement for payment and construction with GMW, developers and relevant parties
Sewer	– Goulburn Valley Water manages a limited number of existing sewer assets within the Precinct – The Precinct is outside of the current sewer district boundary, and existing properties are serviced by private septic systems – Goulburn Valley Water has not anticipated growth in the Precinct and therefore does not currently have a network servicing strategy for the Precinct – Redevelopment in the Precinct will likely trigger upsizing of existing sewer assets outside the Precinct to service the development, in particular trunk sewer mains, sewer pump station updates and new sewer pump stations – The cost of trunk/distribution sewer infrastructure is attributable to Goulburn Valley Water, and the cost of reticulation mains will be attributable to the developer

Infrastructure type	Key findings
Electricity	– Powercor manages the electrical distribution network in the Precinct, and all existing electrical assets within the Precinct – The Precinct is currently serviced with both high voltage and low voltage assets, both overhead and underground, and is supplied from the Shepparton Zone Substation – Powercor has estimated that the electrical demand in the Precinct will increase by 1 MVA due to the redevelopment – The existing 22kV electrical high voltage feeder servicing the Precinct will not have capacity to support the proposed redevelopment, and therefore a new overhead high voltage feeder will be required along main roads and interconnection roads – Powercor can accommodate local solar photovoltaic electricity generation, and would consider accommodating innovative electrical servicing strategies such as electric vehicles, microgrids and battery storage
Gas	– APA Group Networks manages the reticulation gas network surrounding the Precinct, and there is currently no reticulation gas network within the Precinct – The adjacent gas network is likely capable of supplying the Precinct, and will likely require mains extensions from the networks on Poplar and Channel Roads – The sequencing of development in the Precinct 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 Precinct – APA has not anticipated growth in the Precinct and therefore does not currently have a network servicing strategy for the Precinct
Telecommunications	– The Precinct is currently serviced by Telstra, Optus and NBN 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 and Optus assets within the Doyles Road and Poplar Avenue Road reserves – The Precinct is fully covered within the NBN's fixed line footprint – Optus advised that the proposed redevelopment within the Precinct would require an upgrade to Optus's mobile services – NBN advised that to service the entire Precinct redevelopment, a new distribution fibre network would be required, and it requires appropriate Precinct planning to deliver infrastructure in an efficient and coordinated manner

10.2 Key issues and opportunities

Table 13 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 Precinct would facilitate efficient utility service delivery	– Undertake an assessment of the ultimate Precinct 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 – Liaise with utility service providers throughout the planning process to facilitate coordination of development staging and the delivery of utility services

Infrastructure type	Key issue	Key opportunity
Stormwater drainage	– A separate stormwater management and hydrological assessment has been commissioned by Greater Shepparton City Council (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	– The Precinct is partially outside of the current water district boundary, and there are currently no planned upgrades to the water network in the Precinct – Augmentation of the existing water network is likely required to service the Precinct redevelopment – There is no recycled water network within the Precinct – Rural water assets are present throughout the Precinct including channels, drains and pipelines. Channels and drains have large associated easements that could affect development.	– Work with Goulburn Valley Water to deliver an Integrated Water Management Solution for the Precinct – Investigate the provision of local / Precinct wide recycled water services – Following the development of the Precinct 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 Goulburn Murray Water to determine the extent of pipeline conversion required, and the responsibility/timing of these works
Sewer	– The Precinct is outside of the current sewer district boundary, and existing properties are serviced by private septic systems – Augmentation of the existing sewer network is likely required to service the Precinct redevelopment	– Work with Goulburn Valley Water to deliver an Integrated Water Management Solution for the Precinct – Investigate the provision of local / Precinct wide sewer mining / recycled water service – Following the development of the Precinct Structure Plan, develop a staging plan for sewer infrastructure in collaboration with Goulburn Valley Water to ensure the efficient delivery of sewer services
Electricity	– Electrical demand in the Precinct is estimated to increase by 1MVA, triggering the need for network augmentation works in the form of a new feeders – A new 22kV feeder will likely be required along major roads, including Doyles Road	– Consider the feasibility of onsite electricity generation in order to reduce the future electrical infrastructure required to service the Precinct – Collaborate with Powercor regarding the provision of innovative electrical servicing strategies such as electrical vehicles, microgrids and battery storage – Ensure an appropriate service corridor for a new 22kV electrical feeder is provided for on major roads including Doyles Road
Gas	– The adjacent gas network is likely capable of supplying the Precinct, and will likely require mains extensions from the networks on Poplar and Channel Roads – The sequencing of development in the Precinct will have a greater impact to managing the delivery of gas servicing than the aggregate development load	– Investigate opportunities to provide a ‘gas-free’ Precinct – Following the development of the Precinct Structure Plan, develop a staging plan for gas infrastructure in collaboration with APA Group (Networks) to ensure the efficient delivery of gas services

Infrastructure type	Key issue	Key opportunity
Telecommunications	– There are significant Telstra and Optus assets within the Doyles Road and Poplar Avenue Road reserves, including an Optus asset carrying the internet from Melbourne to Sydney. – If relocations are required to this asset, the fibre optic cable must be first duplicated to provide additional connection first. – The Precinct is fully covered within the NBN's fixed line footprint – Optus advised that the proposed redevelopment within the Precinct would require an upgrade to Optus's mobile services – NBN advised that to service the entire Precinct redevelopment, a new distribution fibre network would be required, and it requires appropriate Precinct planning to deliver infrastructure in an efficient and coordinated manner	– Undertake service locating of telecommunications infrastructure within the Doyles Road and Poplar Avenue road reserves to understand the location of assets within any future road reserve, and therefore the likelihood of significant infrastructure relocations being required – Following the development of the Precinct 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

Refer to separately attached appendices

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