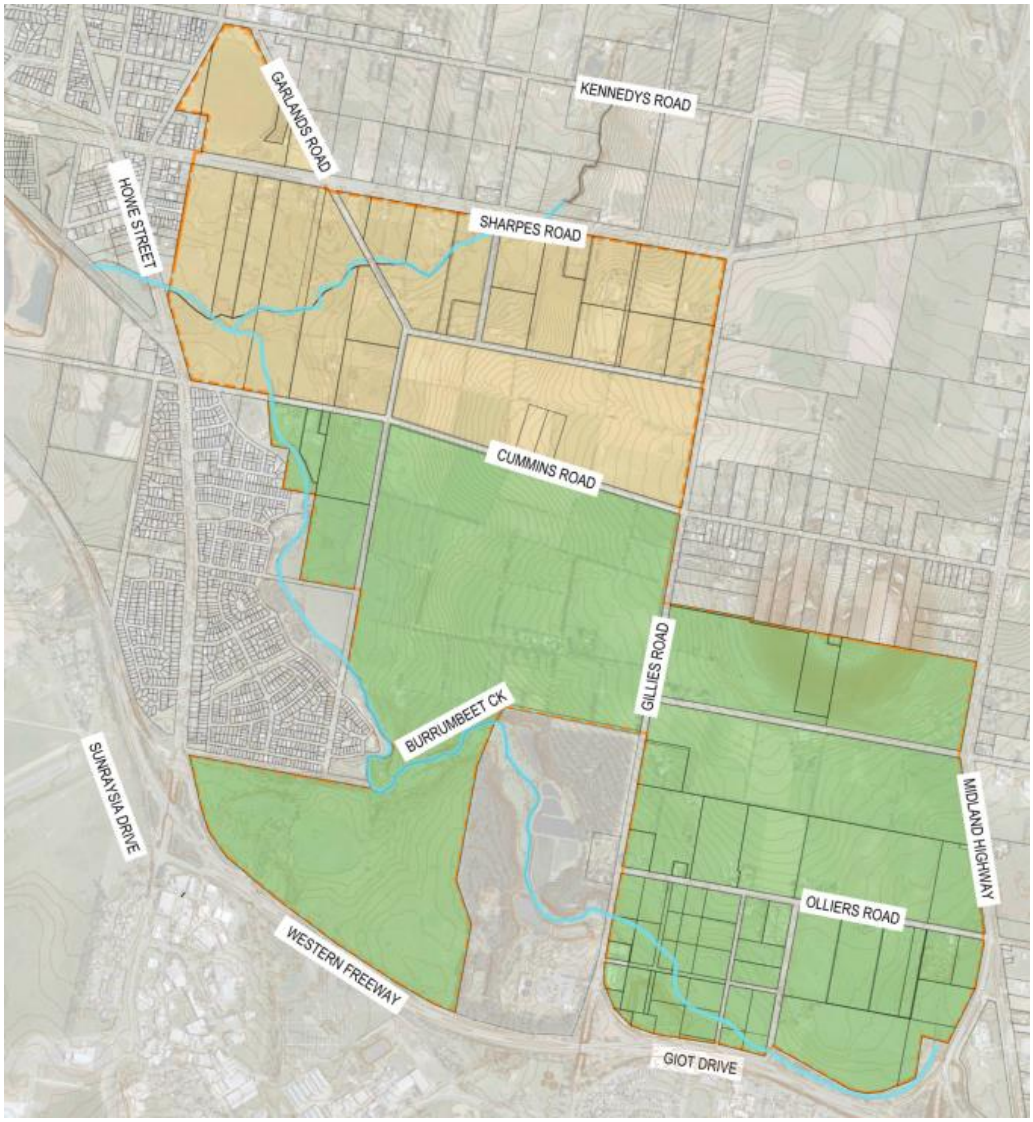
Ballarat North Precinct Structure Plan

Situational Analysis Report and Utility Servicing Assessment



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Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Independent Reviewer	Project Manager Final Approval
01	13/10/2023	First Issue	Calvin Yii	Josef Seter	Claire Bickerstaff	Josef Seter
02	19/06/2024	Client review	Matthew Payne	Josef Seter	Claire Bickerstaff	Josef Seter
03	03/07/2024	Final Issue	Matthew Payne	Josef Seter	Claire Bickerstaff	Josef Seter

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Executive Summary

The Ballarat North Precinct Structure Plan investigation area ('precinct') is 832 hectares in size located north of the Western Freeway and approximately 8km from the Ballarat Central Business District. The investigation area is split into the 'Core Area' and 'Expanded Area'. At the time of writing no decision has yet been made on whether the Expanded Area would be included in the final Precinct Structure Plan (PSP). Stantec has been engaged by the Victorian Planning Authority (VPA) to complete an assessment of utility services for this precinct as a whole.

This report includes a discussion on sustainability and innovation measures relating to infrastructure servicing, to inform the next phase of PSP preparation.

The scope of the report includes consideration of both the core and expanded areas.

Sewer

Central Highlands Water (CHW) provides and manages the sewer infrastructure within the precinct. There are a number of trunk outfall mains travelling within the site to the Ballarat North Water Reclamation Plant (WRP), however these existing mains have no capacity for future development. Planning is underway to upgrade the existing sewer network through the precinct. Legislative issues pertaining to the Environmental Protection Authority (EPA) will need to be taken into consideration as part of the Ballarat North WRP upgrade works.

Water

Properties within the precinct are currently serviced by existing 150mm diameter potable water mains that run north-south down Gillies Road and east along Olliers Road; however these existing assets do not have the capacity required to support future development. Additional water supply infrastructure is required to provide water with sufficient pressure to cater for any intensification of development. Planning is currently underway to deliver major water supply augmentations across northern Ballarat. CHW has advised that water saving measures will be required in all new developments, including options for use of recycled water through Class A 'third pipe', tanks, passive irrigation of street trees, impervious surfaces and 'leaky wetlands', with the aim of reducing demand which aligns with the objective of the "Ballarat City Integrated Water Management Plan (2018)".

Gas

There are existing gas assets within the precinct. However, from January 1st 2024, no new dwellings, apartment buildings and residential subdivisions requiring planning consent will be permitted to connect to gas. Therefore. this report assumes no further investment in gas infrastructure is required.

Electricity

Powercor has advised there is limited supply available to the precinct, but works are included in Powercor's 10-year plan to upgrade the existing infrastructure to cater for growth in the precinct.

Telecommunications

Limited information is provided; however, it is anticipated that communications providers will upgrade and expand networks in line with regional growth as development progresses.

Summary of Critical infrastructure upgrades immediately required:

- Burrumbeet Creek Sewer Pump Station.
- New water tank boosters and trunk water mains, and upgrades to existing water supply's pump station.
- New water main along all major roadways from White Swan treatment plant.
- Supply augmentations to maintain water pressure to Miners Rest.

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1. Introduction

Stantec has been engaged by the Victorian Planning Authority (VPA) to undertake a utility servicing situational analysis report of the provision of utility services infrastructure to the proposed Ballarat North PSP. We have reviewed information regarding the existing authority services infrastructure in and around the precinct as available direct from Authorities, Dial Before You Dig (DBYD), authority infrastructure planning maps and as visible from aerial, Streetview imagery and onsite inspections. Advice has been obtained from the relevant services authorities of their strategies for providing utility services to cater for the development of the precinct.

2. Precinct Description

The Ballarat North PSP investigation area is approximately 832ha in size and located 8km from the Ballarat Central Business District. It is bordered by the Western Freeway to the South, Creswick and Gillies Road to the East and Burrumbeet Creek Corridor to the West.

The investigation area is split into a Core and Expanded Area. At the time of writing no decision has yet been made on whether the Expanded Area would be included in the final Precinct Structure Plan (PSP).

It is estimated that the PSP will be completed in 2026, with the first tranche of planning permit approvals being issued during 2027, and initial construction/development occurring in 2028.

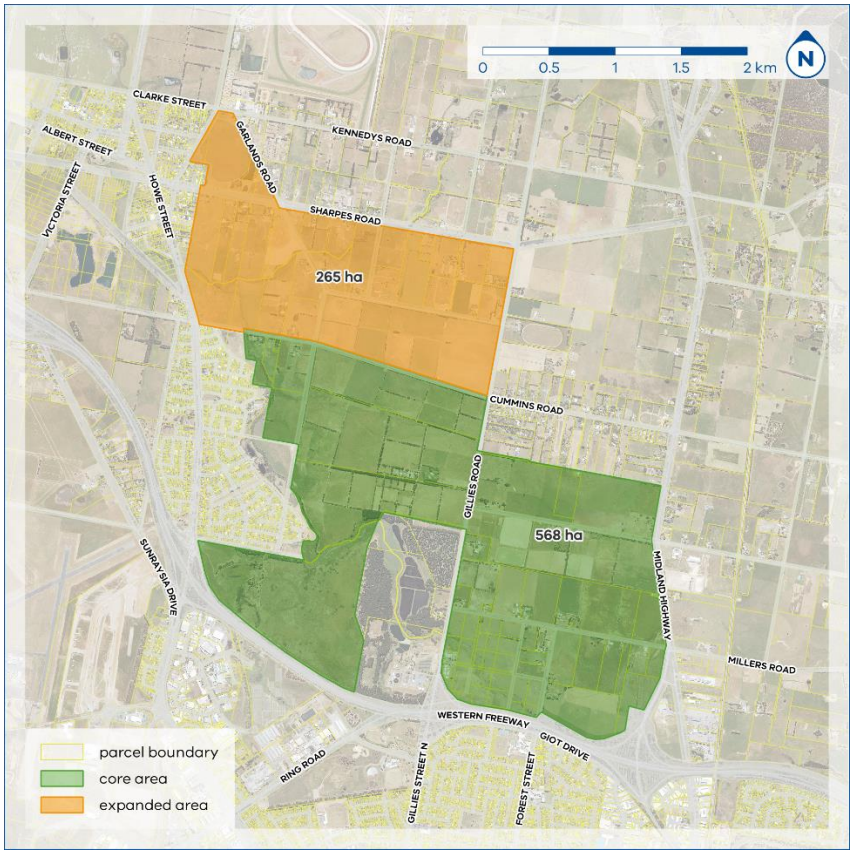

Figure 1 - Ballarat North - Core and Expanded Area PSP (Source: VPA)

The existing land within the precinct is generally characterised by agricultural land uses, with a small portion in the southeast characterised by industrial land uses.

The Ballarat North Water Reclamation Plant (WRP) abuts the south of the precinct and is located adjacent to the Western Freeway.

Figure 2 - Eastern boundary of wastewater facility

The Ballarat Airport is in close proximity, approximately 3km to the Southwest of the precinct.

The precinct is currently used for a range of uses, including rural residential, agricultural, and equestrian.

Figure 3 - Gillies Road east

The ‘core area’ of the precinct has been re-zoned to Urban Growth Zone (UGZ) as the first step of its transition from rural to urban land to be facilitated by the PSP process currently underway. The expanded area of this precinct remains zoned Farming Zone (FZ) as inclusion in the final precinct is still to be determined.

3. Methodology

Our methodology to complete this report was as follows:

- Review available reports and information provided by the VPA
- Complete Dial before you Dig requests.
- Undertake a site inspection to understand constraints of the area.
- Contact and meet Services Authorities and relevant infrastructure planners to establish common understanding of capacities, limitations of existing infrastructure and current and future capital works programs.
- We have either met with or have had correspondence with the following authorities:
    - Central Highlands Water (CHW)
    - Glenelg Hopkins Catchment Management Authority (GHCMA)
    - Powercor
    - Gas – Downer Group & Ausnet Services
    - National Broadband Network (NBN)
- Internal workshop on sustainability and resilience
- Collation of data – report and mapping
- Assessment and analysis of findings to inform recommendations on boundary

4. Overview

The plan package contained at Appendix A, and extracted in the series of figures listed in the relevant sections below, identifies all current services located within, and adjacent to the precinct. The source of this information is derived from a combination of Dial Before you Dig Information and direct requests from Authorities.

5. Sewerage

5.1 Existing infrastructure

Central Highlands Water (CHW) is the authority responsible for the provision of sewer services in the area.

There are several sewer mains within the precinct and around its perimeter, however none of the properties within the precinct are currently connected to sewer infrastructure. The existing sewer mains direct wastewater to the Ballarat North Water Reclamation Plant (WRP) for treatment. There are several sewer mains entering the WRP from the southern and western boundaries. The WRP is located at Western Highway/Gillies Road junction, directly south of the precinct area. The main purpose of the 825mm diameter trunk sewer main displayed on the sewer servicing plan is to transfer reticulated sewage from the Ballarat North area to the WRP.

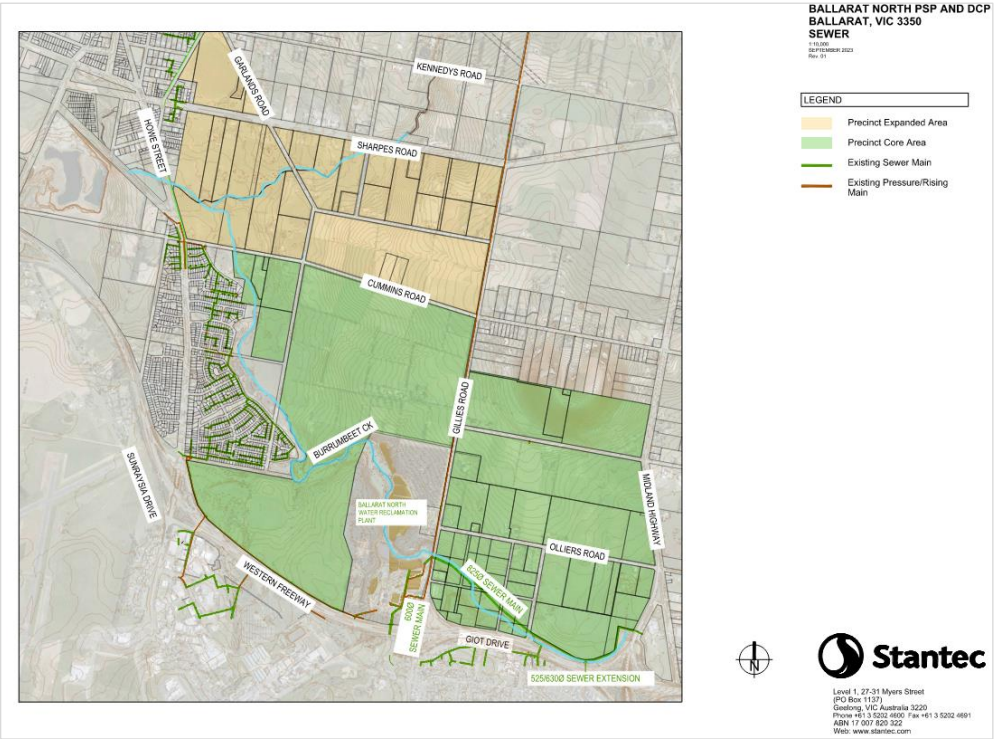

Figure 4 - Ballarat North Existing Sewer Assets

Central Highlands Water is currently constructing a new 525mm diameter trunk sewer main. The main purpose of this infrastructure is to provide a reticulated sewage service for the proposed Ballarat Show Grounds managed by the Ballarat Agricultural and Pastoral Society and the proposed (currently under construction) Level 3 Incident Control Centre and Depot Facility managed by the Department of Energy, Environment and Climate Action. This trunk sewer has been sized accordingly to accommodate the following approximate catchment boundary within the Core Area:

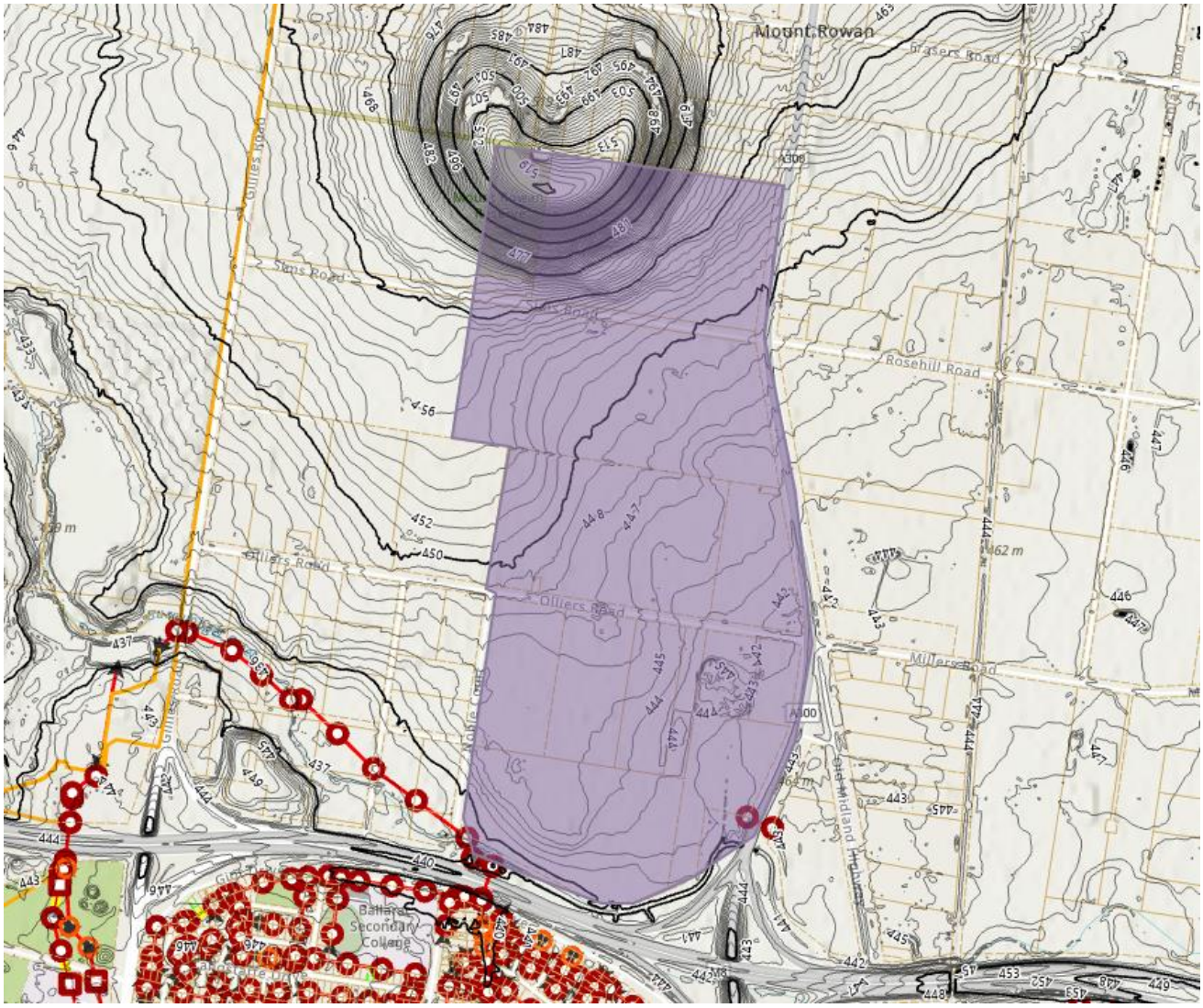

Figure 5 - Approximate sewer catchment plan for the proposed 525mm diameter trunk sewer main (currently under construction) – courtesy of CHW

5.2 Key Issues and Opportunities

It is anticipated that the sewer network required for the Ballarat North PSP investigation area will connect to the WRP. CHW has advised that there is currently no spare capacity for the Burrumbeet Creek SPS to facilitate development of the precinct, however CHW has commenced investigation to upgrade its capacity. The timing of this upgrade will be required ahead of any development in the precinct so is a critical path infrastructure item. This upgrade is identified as a (major) capital investment project in CHW's PR23 submission: Ballarat Sewer Growth Project – Northern Growth Area, and expected to be completed in 2028. This aligns with anticipated commencement of development in the Ballarat North PSP investigation area.

The topography of the precinct slopes from east to west in the eastern side of Gillies Road. Based on this topography, it is expected that development to the east side of Gillies Road can be served via a gravity fed system. This will require the construction of a 525mm diameter trunk sewer main spanning approximately 0.98km which will connect to the existing gravity sewer system. This 525mm diameter trunk sewer main is currently under construction by CHW. On completion of the 525mm diameter trunk sewer, the east side of Gillies Road can be serviced for development.

The Burrumbeet Creek sewer pump station is currently operating at its limit and therefore will require upgrades. Two additional pump stations will be required on the lower western side of the precinct as per CHW's advice. Planning is

currently underway to upgrade the existing sewer pump station on Cummins Road, Miners Rest network and Ballarat North WRP as part of Ballarat Sewer Growth Project and WWTP Burrumbeet Creek SPS upgrade, which is scheduled to occur between 2026-2028.

There is an Environmental Significance Overlay – Schedule 4: Wastewater Treatment Plan Buffer Area applicable to the WRP and land abutting the WRP (see Figure 6 below).

CHW has indicated they do not intend to change the extent of this overlay. CHW has noted it does not want incompatible uses within the buffer area and that where possible, such uses are minimised immediately east of the buffer. This will limit development options within the buffer area.

The draft Ballarat North PSP and subsequent use and development planning permit applications, including any proposed sensitive uses within or adjoining the applicable buffer area, shall be referred to the Environmental Protection Authority (EPA) by the Responsible Planning Authority for comment/advice.

Figure 6 - Extract of Environment Significance Overlay

6. Water

6.1 Existing Infrastructure

CHW is the authority responsible for the provision of water reticulation services.

Currently, the only water assets within the precinct are the 150mm diameter pipes that run north-south along Gilles Road and East along Olliers Road.

An existing 450mm diameter water main is located along the Western Highway, which is the logical point of connection for the precinct.

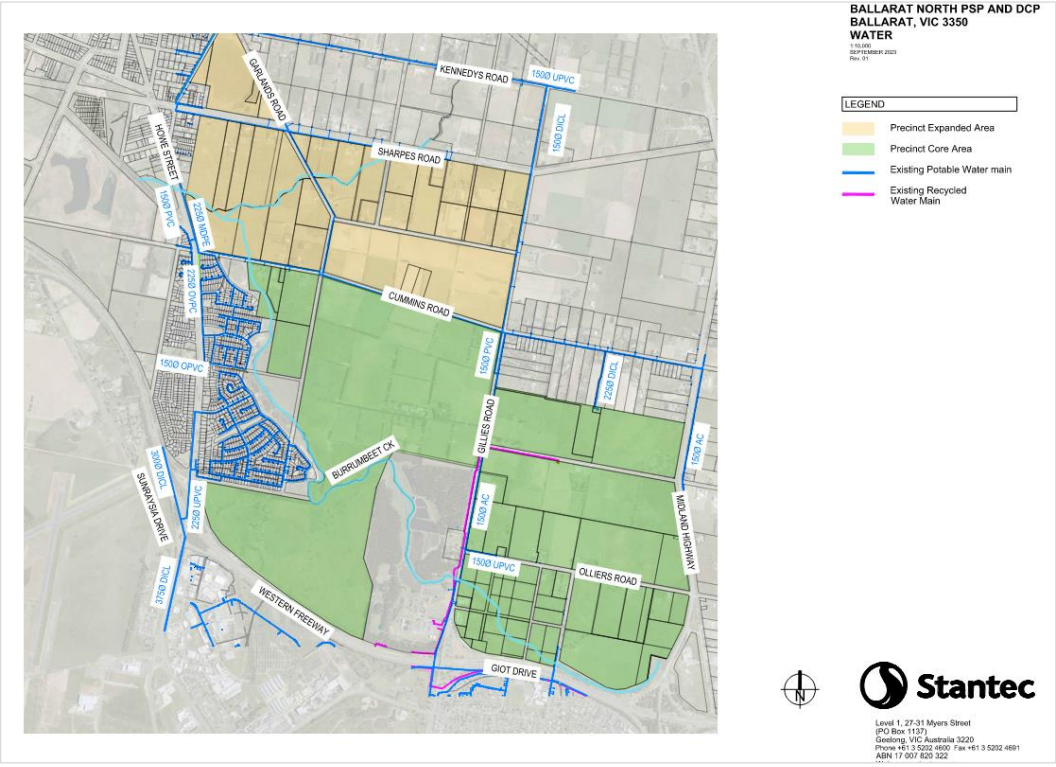

Figure 7- Ballarat North Existing Water Assets

6.2 Key Issues and Opportunities

CHW has advised new tank boosters and trunk water mains, as well as upgrades to the existing pump station, will be required to cater for growth within the precinct. Water supply to the precinct will be delivered from the Northern Tank Zones fed via the Ballarat North pump station.

It is expected that extensive new water mains infrastructure is required along all major roadways within the precinct to accommodate the new growth. Without the extension of the new water mains including the 1100mm, 1000mm and 900mm mains from the White Swan Water Treatment Plant, development cannot be accommodated in the Ballarat North PSP investigation area.

CHW has advised that supplying the new precinct will compromise the service to the nearby Miners Rest area. Planning is currently underway to deliver major water supply augmentations across northern Ballarat to maintain service standards for existing customers in the Ballarat West urban growth area and to service the Northern Growth Area (Ballarat North PSP investigation area) as part of the Ballarat Water Growth Project.

CHW has also indicated a desire to mandate water saving measures in all new developments to achieve the objective of the “Ballarat City Integrated Water Management Plan (2018)” that sets a potable water use target of 124 l/p/day. This plan sets out recommendations for future water management with the aim of reducing potable water demand and increase the availability of potable water. These measures include, but not limited to, “Class A third pipe” alternative water being reticulated to all residential properties for approved uses such as toilet flushing, “fit for purpose” alternative water being used for non-residential purposes and use of rainwater tanks including public spaces and to a lot level. Other measures that should be considered will include passive irrigation of street trees, impervious surfaces and leaky wetlands.

7. Gas

7.1 Existing infrastructure

APA Group Transmission is responsible for high-pressure gas transmission assets and energy supplier AusNet Gas is the authority responsible for the provision of gas reticulation services in the area.

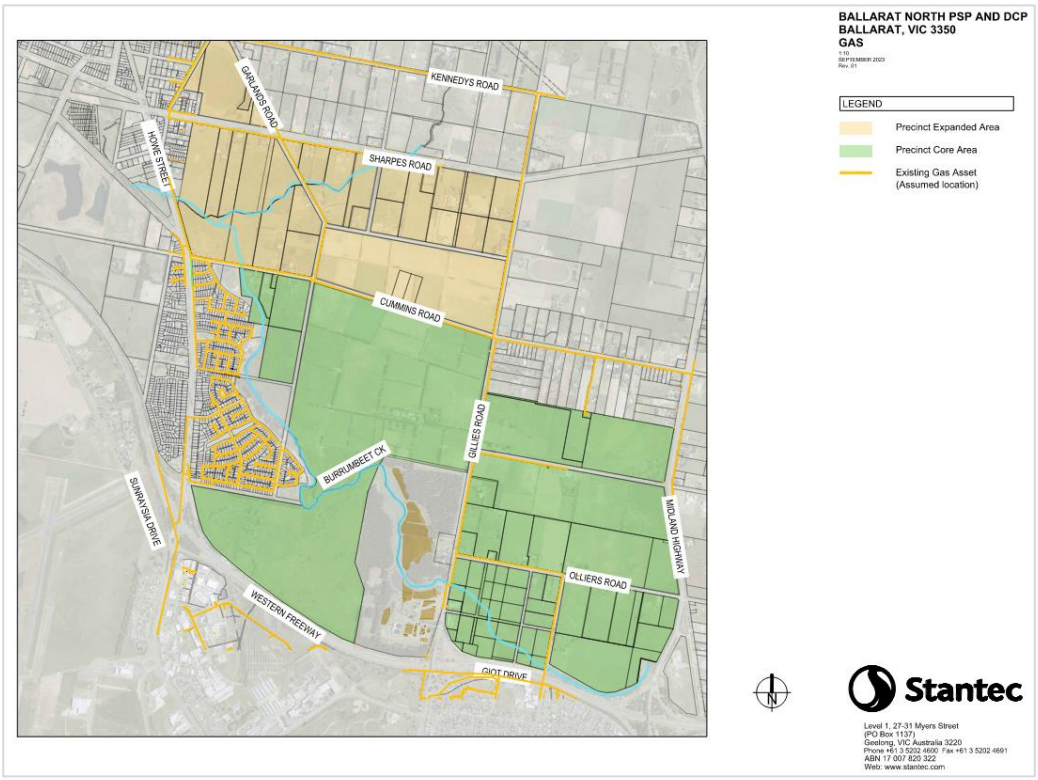

Figure 8 - Ballarat North Existing Gas Assets

AusNet has advised that the Ballarat High Pressure Gas Network does have capacity supply constraints.

The Transmission Pipeline that supports the High Pressure Network is limited to its current operating pressure which during winter peak the operating pressure deteriorate. At this point in time, AusNet have advised they do not have any plans to augment the Pipeline at this stage.

In addition, AusNet have advised they currently do not have any additional plans to cross the Ballarat Outer Ring Main.

There are local gas mains within the precinct, within private property.

Figure 9 - Gas infrastructure 120 Gillies Road

7.2 Key Issues and Opportunities

On Friday 28 July 2023 the Hon Lily D'Ambrosio MP issued a media release regarding the use of gas in new homes/developments from January 2024 (refer to Appendix B – Media Release New Homes to go all electric from 2024). New residential subdivisions and homes will not be permitted to connect to the gas network.

Therefore, there are no implications for the gas network or connections required to the precinct.

Minimising impacts to existing infrastructure will need to be considered at detailed design phase.

8. Electricity

8.1 Existing Infrastructure

Powercor is the authority responsible for the provision of electricity services to the area. Analysis of plans obtained from DBYD and a site visit confirms that high voltage overhead wires are present within an easement along Cummins and Sims Road.

Figure 10 - Cummins Road (looking towards intersection with Gillies Road)

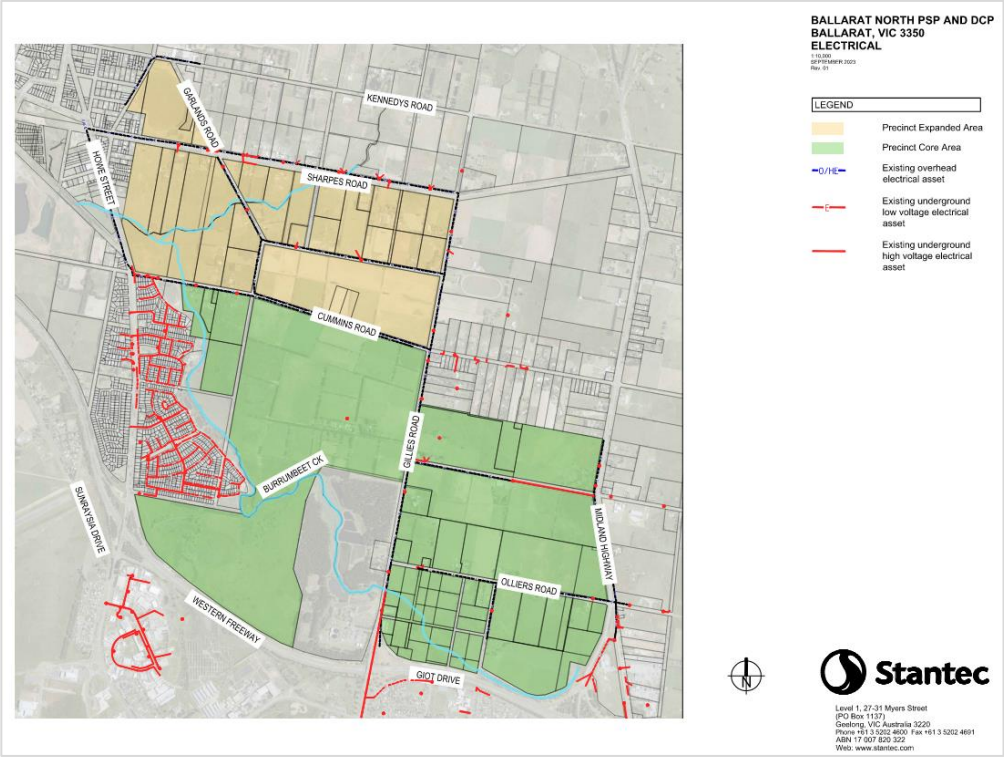

Figure 11 - Ballarat North Existing Electrical Assets

8.2 Key Issues and Opportunities

Powercor has advised there is limited supply available to the precinct, however no significant augmentation works would be required in early phases if the growth front was to start from the western part of the PSP rather than the east.

There is planning in place to develop the Powercor owned land along York Street in the east of Ballarat with a new zone substation. Internal approval is expected to take place in the next 3 months. This will ultimately add more capacity to the network and would enable a rearrangement to service the precinct when approved.

Powercor is also considering the construction of a new zone substation in Ballarat West once the new Ballarat East zone substation is completed and constraints start to occur again. It is expected that at least one new 22kV feeder would be required to support the supply of electricity.

9. Telecommunications

9.1 Existing infrastructure

Telstra and NBN are the principal authorities providing telecommunications services within the area. Limited information has been provided with regard to the existing network capacity. Multiple attempts to discuss current servicing has been unsuccessful with NBN at this stage.

The NBN has been provided to sections of the precinct, and services are available in areas east of Gilles Road as well as south of Burrumbeet Creek. It is expected that NBN rollout will have been completed by the time urbanisation of this region occurs.

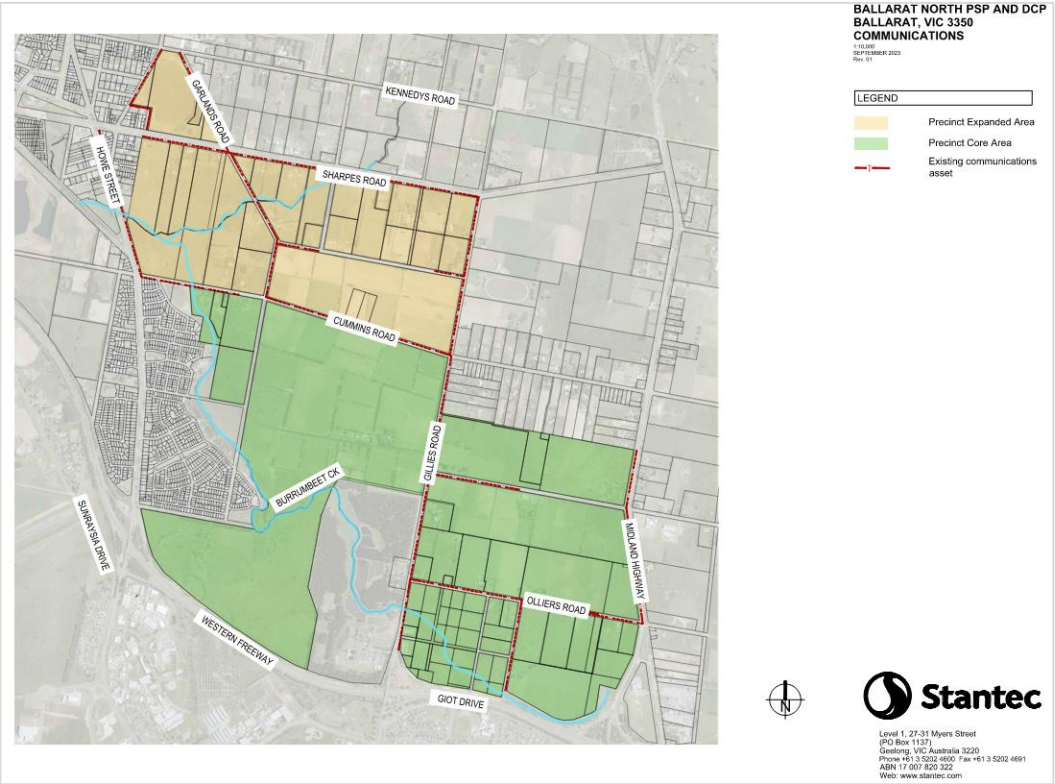

Figure 12 - Ballarat North Existing Communications Assets

9.2 Key issues and opportunities

NBN typically provide limited information until such time as development is within the statutory planning phase. Generally, telecommunications can be provided as development occurs and it is not a key determinant or constraint of staging.

10. Flooding

10.1 Current Flooding Risks

Key access routes between Mount Rowan and Ballarat experience regular to frequent flooding. According to the Burrumbeet Creek Flood Investigation[1] Gillies St is subject to inundation during flood events of 20% AEP and greater, and the Midland Hwy is subject to inundation during flood events of 2% AEP or greater.

Inundation of the Burrumbeet Creek floodplain during frequent (20% AEP) flood events occurs in the area of the Olliers Road and Midland Hwy intersection. During less frequent and rarer (10% AEP or greater) flood events inundation of the Burrumbeet Creek floodplain also occurs between Noble Court and Gillies St and south of Cummins Road to Darcy Drive.

The extent of the Burrumbeet Creek catchment is illustrated in Figure 13.

[1] Burrumbeet Flood Investigation Summary Report, Water Technology, December 2013 [Report 001]

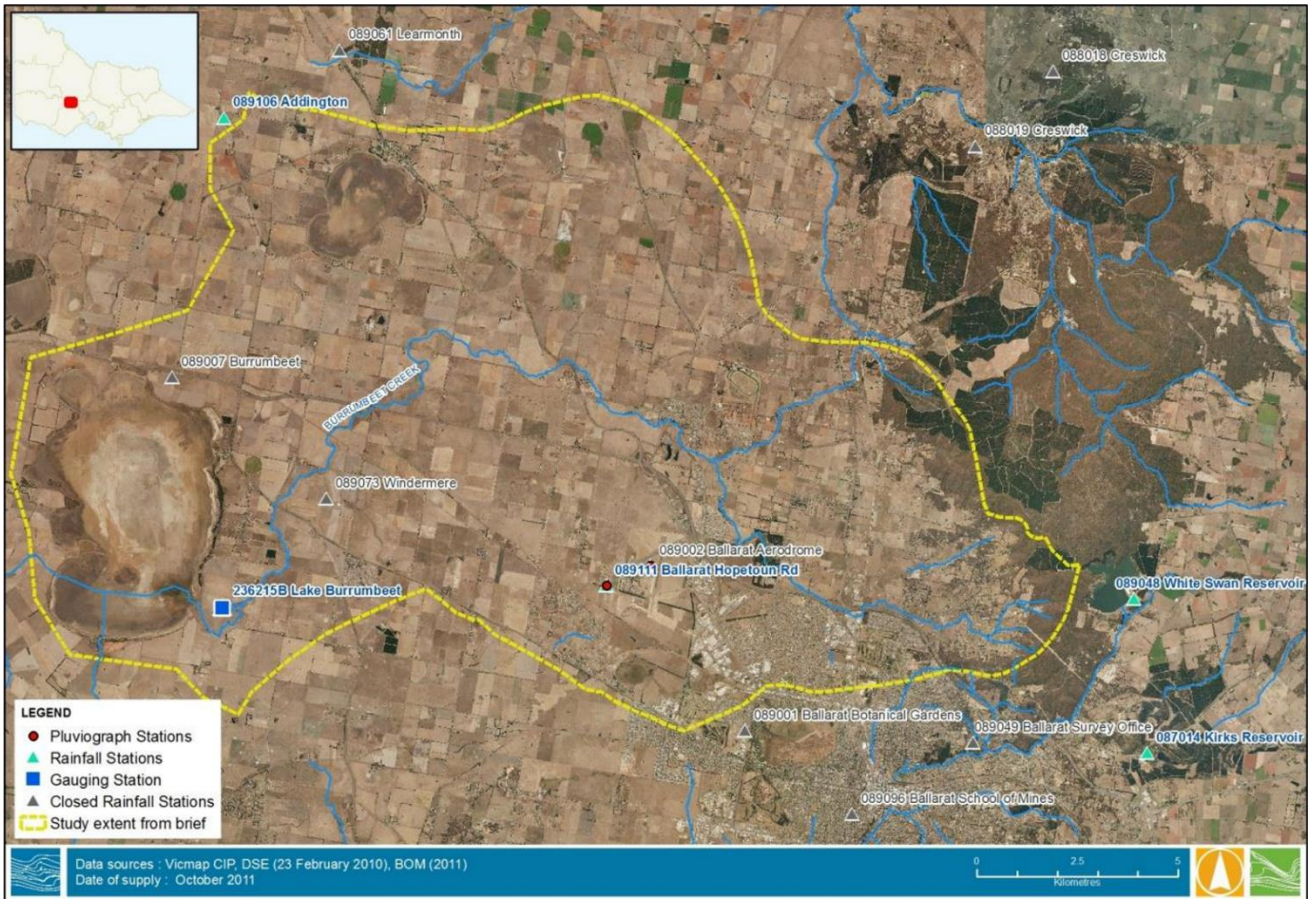

Figure 13 – Burrumbeet Creek Catchment

The floodplain of the Burrumbeet Creek between the Midland Hwy and Victoria Street is characterised by a number of hydraulic constraints as follows;

1. Burrumbeet Creek Diversion Channel adjacent to Western Freeway northern offramp
2. Gillies St & Central Highlands Water Northern Sewage Treatment Plant
3. Ballarat – Maryborough Road
4. Victoria Street, Miners Rest

As the longitudinal grade of the Burrumbeet Creek is relatively flat the effect of the hydraulic constraints is to cause floodwater to spread out upstream (Refer Fig. 14) as inflows exceed the localised hydraulic capacity.

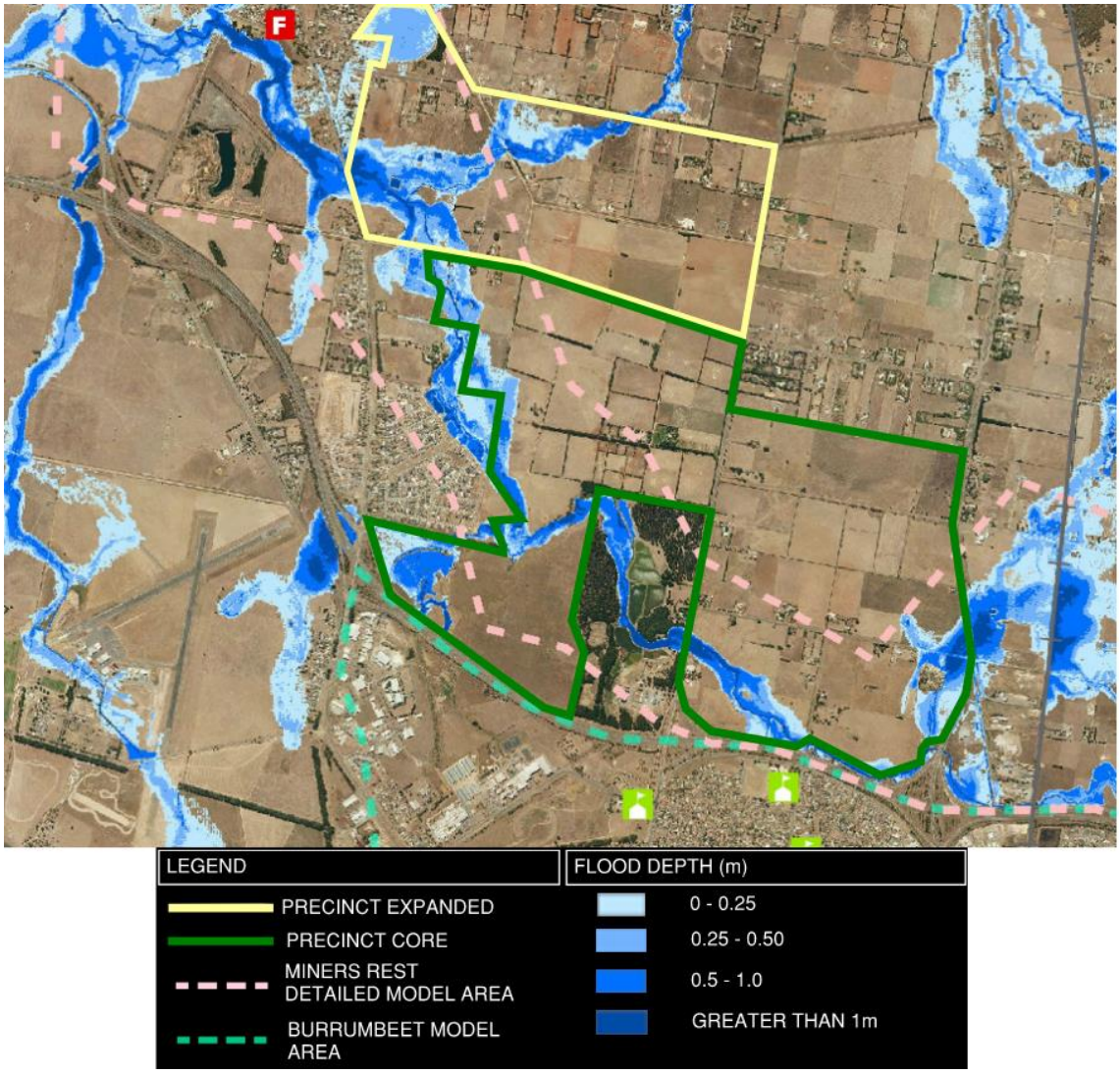

Figure 14 – 1% AEP Flood Extent (Burrumbeet Creek Flood Investigation)

According to [Report 001] inundation tends to peak between three (3) and (5) hours from the onset of rainfall regardless of the AEP of the flood event.

Miners Rest is an existing urban centre approximately 10.5 kilometres northwest of the Ballarat CBD and immediately downstream of the proposed area of rezoning as illustrated in Figure 15. At present under existing climatic conditions portions of Miners are subject to inundation by flood events with an AEP of 20% or lower[2].

[2] Table 8-10 Burrumbeet Flood Investigation Summary Report, Water Technology, Dec 2013.

10.2 Key issues and opportunities

10.2.1 Key issues

The precinct is upstream of Miners Rest in relation to the Burrumbeet Creek and its tributaries, which flow through Miners Rest. The proposed precinct will result in additional runoff upstream of Miners Rest. Further to Section 10.1, it is expected that additional runoff volume has the potential to increase the frequency and area of inundation at the hydraulic constraint locations as outlined, including Miners Rest. Therefore, it is recommended that the management of runoff from the proposed precinct consider the volume of runoff as well as the rate of discharge to the Burrumbeet Creek to ensure that existing areas of flood risk are not adversely affected.

An aerial photograph of the flooding experienced in Miners Rest in January 2011 is shown in Figure 15.

Figure 15 – Aerial Photograph of Miners Rest 14th January 2011

10.2.2 Opportunities

The additional runoff from the precinct can also be considered an asset. Integrated Water Management, inclusive of Water Sensitive Urban Design and appropriate strategic planning and engineering design could enable the additional runoff to be treated and stored for later use in down cycle uses such as irrigation, industrial use and potable water substitution via third pipe systems.

Treated water from the Central Highlands Water Northern Sewage Treatment Plant is currently pumped to Lake Wendouree where it is used to irrigate the Ballarat Botanic Gardens, and further investigation into complementary or integrated systems utilising the additional runoff from the precinct should be explored. Diversion of runoff for down cycle uses would also assist in the management of flooding risk to Miners Rest.

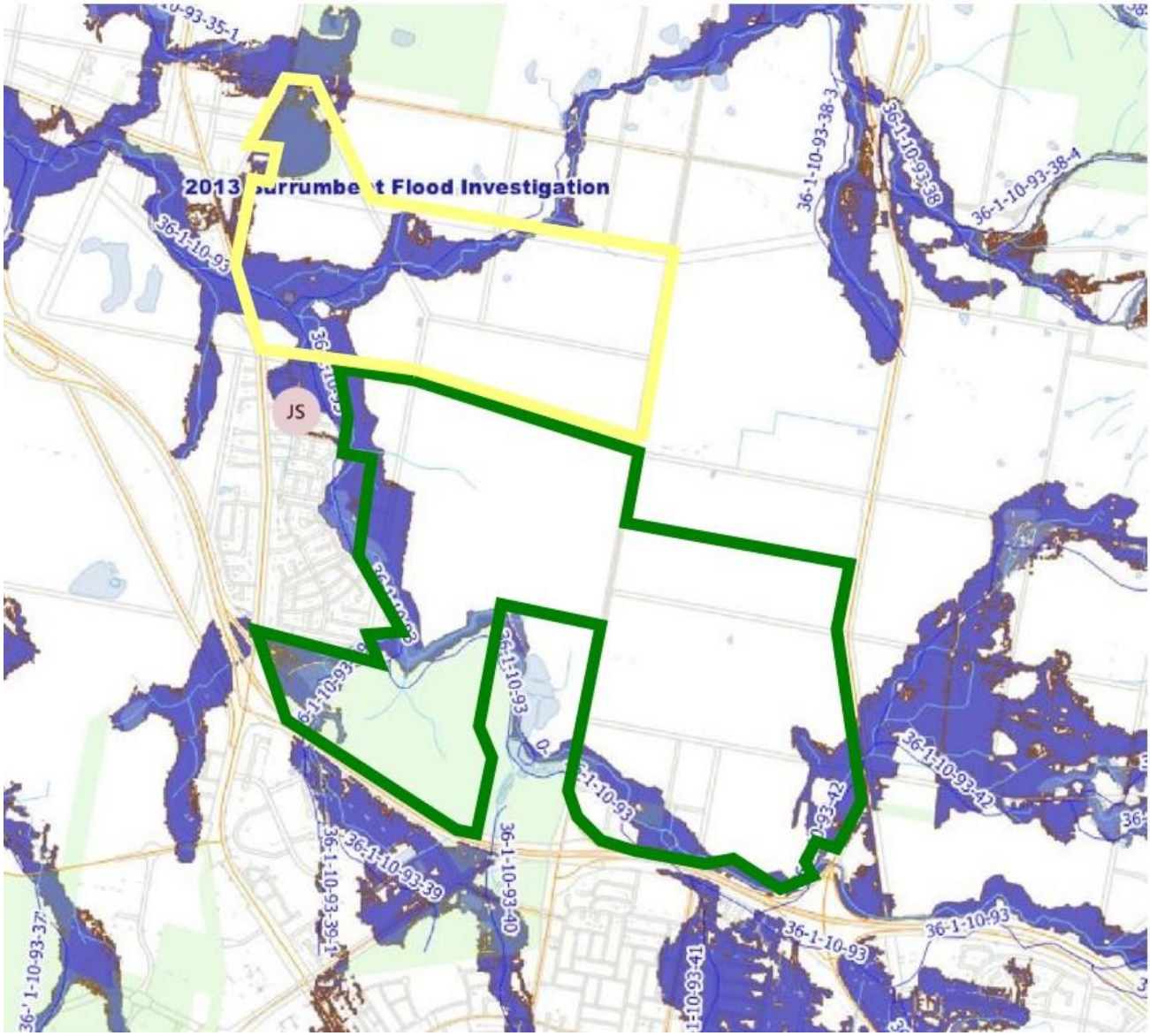

Figure 16 - Snip of flood modelling data provided by the Corangamite Catchment Management Authority (CCMA)

11. Sustainability & Innovation

11.1 Vision

The PSP will aim to significantly raise the bar for the delivery of sustainable communities by including a range of initiatives and embedding directions at the PSP stage, supporting Council in sustainable energy opportunities. Additionally, the PSP offers the opportunity to set new standards in long-term resilience and incorporate adaptation measures during project development.

The integration of innovation into the PSP development process is largely enabled by the VPA's Innovation Pathway Pilot. The Innovation Pathway framework draws upon the Victorian Planning framework, the PSP development process, elements from *Plan Melbourne 2017-2050* and the United Nations Sustainable Development Goals (SDGs). The Innovation Pathway process enables the opportunity to include new innovations that exceed or challenge the benchmarks

established in the *Precinct Structure Planning Guidelines: New Communities (October 2021).* The Ballarat North precinct can draw upon Australian and international best practice, innovation, and materials to create a low-impact neighbourhood with the possibility of being nature positive, including regenerative natural features (e.g. as a food source, fauna habitat, surface water filtration) and utilities that form the basis of highly resilient renewable energy systems.

Several fundamental themes underpin these following sections. These themes include community involvement, adequate funding, appropriate governance and the adoption and support of industry in the creation of subdivisions and the design, procurement and construction of all utilities, transport infrastructure, buildings and structures and the conservation and enhancement of natural features (including 'regenerative' initiatives).

11.2 Utilities development

Stantec's review of utilities has drawn upon national and international frameworks, practices and products and materials.

The basis of this review is to consider alternatives to standard utilities wherever possible to demonstrate the future-proofing and low impact opportunities available for inclusion in the PSP – accordingly, a brief outline of each utility and corresponding opportunities (i.e. 'alternative servicing infrastructure') are described below.

11.2.1 Electricity supply

Forward planning is required to ensure power purchase agreements are secured as far in advance as possible to support precinct development. The electricity network within the PSP can be designed to be powered by 100% renewable energy sources. However, design options should consider connectivity to the existing power grid as a contingency in times of disruptions to renewable power supplies. The inclusion of battery energy storage systems (BESS), located either within the PSP boundaries or adjacent the PSP, is viewed as a critical component of the power network 'architecture'. Also known as 'neighbourhood batteries', these batteries provide short-term power to a 'localised' power distribution network. An existing BESS unit (30 MW/30MWhr) operating in Ballarat (AusNet) can provide power for approximately one hour to 20,000 homes if required. Additionally, planning is underway for the development of a new (i.e. third) zone substation in Ballarat to service the anticipated future growth in power demand in the city.

11.2.2 Sewerage / Alternative Water

On June 24, 2022 the State Government announced funding for the expansion of the recycled water network in Ballarat (refer to Appendix C for the media release). As part of this finding the Ballarat North Water Reclamation Plant will be undertaking works to upgrade the Class A recycled water facility. This funding will increase the plant capacity to produce up to 5 million litres per day. Most of the upgraded capacity will be directed towards the existing recycled water network in Ballarat.

Additionally, in accordance with the Ballarat City Integrated Water Management Plan one of the targets for action (by 2023) is to commence exploration of the supply of recycled water into the expansion of Northern Ballarat. The concept would be similar to the approach adopted by Melbourne Water whereby water recycling plants treat 'reclaimed' water to Class A standard for a variety of uses (excluding drinking water).

11.2.3 Natural Gas

In accordance with Victoria's Gas Substitution (GSR) Roadmap, all new dwellings, apartment buildings and residential subdivisions needing planning permits in Victoria will not be connected with natural gas networks. This has been activated by Amendment VC250 of the Victorian Planning Provisions (included in Clause 53.03). Natural gas will not be included in the Precinct development.

11.3 Sustainability

Renewable Power

There is an opportunity to source electricity from low carbon sources or 100% renewable sources to power the precinct. Existing renewable power sources near Ballarat are available to provide power to the precinct. The precinct could act as a significant creator of renewable power demand in the Ballarat region, and justify additional investment in new renewable

power projects. Renewable energy power demand could be created by signing a power purchase agreement (PPA) between the Precinct (or parts thereof) and a renewable energy generator (e.g. direct agreement), or via an energy retailer. An agreement for a renewable power generator to supply 100% renewable power to the Precinct is a possibility and could shield households within the Precinct for the duration of the PPA term. The adoption of a PPA for the Precinct, or parts of the Precinct, would need to reviewed in light of the Virtual Power Plant concept outlined in the *Emerging trends and innovations* section below. In contrast to a PPA, where the Precinct acquires renewable power from a Third-party, The Precinct could generate renewable power via its collective generation sources (e.g. rooftop solar and household batteries connected to a Virtual Power Plant) such that excess renewable power is made available to the wider Ballarat grid. Further analysis of this concept is recommended, with reference to existing neighbourhood/Precinct models.

Climate change adaption

Ballarat's climate is characterised by four distinct seasons and occasional extremes in weather events, such as heatwaves and snowfall. Winters are particularly cold and windy, with frosts and fog occurring regularly. The Precinct planning process needs to consider these weather and climatic features (unique to Ballarat) in the placement and design of utilities and also in the planning and design of power networks and connections to ensure services such as heating, cooling and insulation can be maintained reliably whilst using renewable energy sources.

The precinct could be affected by the impacts of climate change, resulting in higher average temperatures, higher extreme heat events, increased severity and duration of droughts, increasingly severe rainfall events and higher fluctuations in soil moisture and hardness. These types of climatic events warrant closer scrutiny in order to plan and design to mitigate and adapt. Measures for consideration could include increased household water harvesting/storage, high-albedo surface materials and colours (i.e. higher reflectivity/lower heat absorption), flood mitigations, stormwater drainage for extreme weather events, shading (e.g. for utilities maintenance), resistance to extreme wind, etc.

In addition to the impacts of climate change mentioned here, other symptoms of climate change (in the form of weather-related events) need to be factored within PSP planning. Bushfire risk (and fires in an urban context) must be considered in the context of an increasing frequency of heatwaves, extreme temperatures and strong winds. The resilience of utilities to withstand such fire events should be foremost in planning, design and procurement (of those utilities), including the ability to readily rebuild essential utilities in the event of their loss/destruction. Another type of climate related symptom is flooding which can result in the loss of utility services (potable water, power, etc). The location and positioning of utilities within (or adjacent to) the Precinct in relation to known and predicted flood zones is a fundamental consideration to maintain operability and mitigate against service disruption.

Examples of climate change innovations and measures adopted by precincts and neighbourhoods include the following:

- Bushfire planning example (NSW: bushfire-risk-assessment-for-the-ingleside-planned-precinct-part-1.pdf (nsw.gov.au)) to be considered in the context of Victorian Bushfire Poilcy (Bushfire planning policy)
- Consideration of the 'cool roof' concept (changing roof colours from dark to white/light) to reduce the potential for the 'urban heat island' effect e.g. as assessed by the City of Port Phillip: Study on the Cool Roofs Mitigation Potential in Australia (unsw.edu.au); including a recent study by the University of NSW: Study on the Cool Roofs Mitigation Potential in Australia (unsw.edu.au)
- Design requirements to mitigate against severe wind events need to be included in Precinct planning, especially if above-ground utilities are planned (power, telecommunications). Media article refers to recent storms that occurred in Victoria (February 2024): Push to weatherproof Australia's electricity grid as 77,000 still without power in Victoria | Victoria | The Guardian

Urban cooling

The precinct's generally low proportion of existing shading requires considerable design measures, including the application of a nature positive philosophy in order to increase the net shading effect created by trees and vegetation. This is especially important if higher extreme temperatures and warming climatic trends affect the precinct. The urban heat island effect is a possibility and can be mitigated by applying features such as green (vegetated) roofs and walls, high-albedo colours on structures (e.g. roofs), water cooling features (e.g. mist sprays), significant tree plantings, etc.

As mentioned earlier, the VPA PSP process requires other considerations to mitigate against the effects of climate change. Additional measures in the PSP guideline include achieving a minimum of 30% tree canopy cover in accordance with the PSP Guidelines for New Communities in Victoria (Part3) and the City of Ballarat's Urban Forest Action Plan (target of 40% tree cover in Ballarat by 2040).

Emerging trends and innovations

- Electrifying households is a concept that is gathering momentum in Australia. This involves replacing the use of gas appliances with electricity, incorporation of solar panels and home batteries. Power utilities in the precinct would need to consider the potential for additional demand, storage and resupply from household-to-grid in this scenario.

- Microgrids at neighbourhood (or community) scale are gaining in popularity and are becoming feasible via support provided by government grants (e.g. ARENA). Investigation of these options at a smaller-scale to generate community/household 'custodianship' of microgrids is one option for the Ballarat precinct. Microgrids provide a benefit by enabling the incorporation of renewable energy sources. By integrating solar panels or wind turbines into microgrid systems, communities can reduce their dependence on fossil fuels and significantly decrease their carbon footprint.

- On a suburb (or community) scale, the installation of 'neighbourhood batteries' is becoming increasingly feasible due to a gradual decline in installation costs and annual OPEX; combined with support provided by government grants (e.g. ARENA). Investigation of these options at an appropriate scale could generate community/household 'custodianship' of neighbourhood batteries. The neighbourhood battery concept is becoming financially effective in Australia, primarily due to decreasing procurement and operating costs (as mentioned), increases in the size and/or duration/output of batteries, and the increasing 'design life' of batteries. Modelling undertaken by the Australian National University (2020) *Community batteries: a cost/benefit analysis* indicates that, for installation and operation of a neighbourhood battery in a new suburb in the Australian Capital Territory, the Third Party-owned community battery model was most effective at maximizing profits for the battery owner and also for the community customers. Neighbourhood batteries offer an effective mechanism to provide 'energy equity' to communities whereby not all households can afford to install individual solar units and batteries. Although a disparity in socio-economic circumstances may not be initially anticipated in the PSP, affordability gaps may evolve over time such that individual households (in lower socio-economic circumstances) may benefit from the cost-effectiveness that a neighbourhood battery can provide. Various challenges to neighbourhood batteries may need to be addressed, such as reducing local network tariffs, however, generally, the use of this form of energy storage and distribution is worth investigating further.

- Akin to neighbourhood batteries is a related concept coined the 'virtual power plant' (VPP). A VPP is formed by connecting a number of individual household solar powered batteries via cloud-based platforms to essentially create a collective battery where the combined power output is the aggregate of each individual battery. Since 2016 Australian energy retailer AGL has been developing and trialing the VPP concept in Adelaide. The scheme is growing towards 1,000 households and has been effective at smoothing power distribution (created by the VPP) onto the grid; and power costs for households within the VPP have been reduced. This concept is well worth investigating further as part of the Innovation Pathway Pilot. Information from the Australian Renewable Energy Agency (ARENA): AGL Virtual Power Plant - Australian Renewable Energy Agency (ARENA)

- Circular economy principles can be applied as a standard precinct process, viewing waste as an opportunity for community and businesses (e.g. creation of small, niche waste enterprises). The opportunity for circular neighbourhoods can also be considered for inclusion in the Innovation Pathway Pilot. The concept involves the conscious (organised) elimination and minimisation of materials use and waste production within a neighbourhood (i.e. defined collective of households and potentially small businesses). The materials can also include construction and demolition materials, wastewater and 'greywater'. Activities can also include local food production and distribution (e.g. community gardens). Examples of circular neighbourhoods can be found in this United Nations Environment Program paper: Creating Circular Neighbourhoods: a discussion paper (unep.org). Australian examples are emerging, however for initial reference the following are considered useful in the Victorian context: Victorian Circular Activator | Circular Economy | Victoria, Australia and Home | CEBIC.

- Generation of energy from waste products. The PSP could investigate the potential for wastewater/hydrogen interface and the production of 'green; hydrogen for particular uses in the precinct, Ballarat or the region.
- Research biodiversity sensitive urban design (BSUD) to complement a nature positive approach to design features – aiding overall water retention, reducing urban heat island effect.
- Water recycling and reuse is an integral component of precinct planning in Australia. Initiatives need to be investigated to ensure that long-term climatic trends (e.g. drying trend, longer drought durations) can be withstood by the precinct. Measures such as mandatory household water recycling (e.g. greywater), adequate rainwater storage sizing, and appropriately-sized water pipes are designed into precinct water distribution networks.

Other requirements

Embodied carbon in materials can represent a significant contributor to the overall precinct carbon footprint. Scope 3 emissions (associated with utilities (and other structures)) can be significantly reduced via procurement processes. The opportunity to reduce embodied carbon (and other greenhouse gases) in the utilities supply chain should be investigated, including the identification of features (e.g. power connections) to enable zero-emissions maintenance throughout the life of the precinct.

Electric vehicles and hydrogen-powered vehicles (if relevant, e.g. buses) will require utilities to be designed to store and distribute these renewable energies to sustain routine urban mobility (transport). Investigate a comprehensive network of electric vehicle charging stations. Investigate the ability for the precinct's power grid to absorb and store (e.g. BESS) power that is transferred from household-to-grid.

The process of developing the Precinct Structure Plan is an opportunity to measure the benefits of applying sustainability principles during planning, design, procurement, construction and operations. By creating a 'base case' for utilities design (e.g. measuring all routine, business as usual materials, processes, etc), and comparing the base case with the actual outcomes associated with the utilities included in the precinct, the immediate improvements in sustainable performance can be gauged.

To augment the process of measuring the success of sustainable features and initiatives within PSP planning and development, a sustainability rating tool, such as Green Star Communities Green_Star_-_CommunitiesFramework_Final.pdf (gbca.org.au) could be adopted and applied. Over 80 Green Star Communities ratings have been achieved so far in Australia, with a body of experience and technical knowledge that can be leveraged from the Green Buildings Council of Australia (GBCA) and other entities. A relevant Green Star Communities rating, currently under development, is for the new suburb of Ginninderry, in the ACT. Further information can be found here: Ginninderry | Green Building Council of Australia (gbca.org.au).

12. Road Reserve Layouts

Stantec has prepared concept road cross-sections that comply with the current Infrastructure Design Manual (IDM) and in particular Ballarat City Council's requirements. These cross sections provide potential locations for utility assets within the proposed road reserve profile. Figures 17, 18, 19, 20 and 21 display the Typical Cross sections for the Ballarat North PSP.

For the more detail drawings refer to Appendix D.

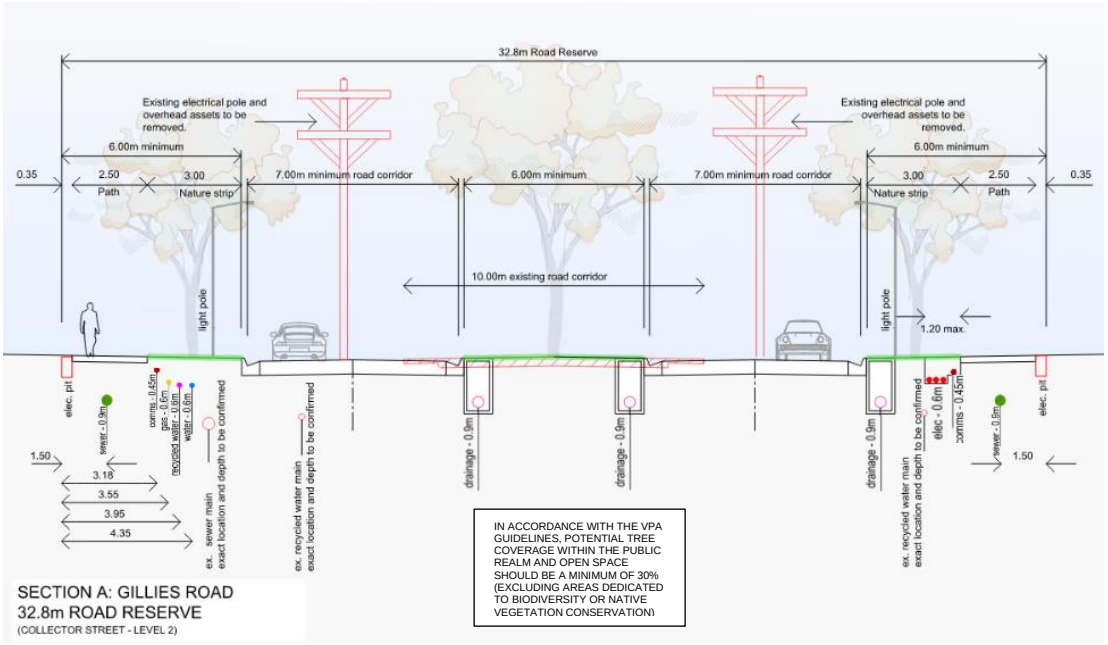

Figure 17 - Typical Cross Section - Collector Street Level 2

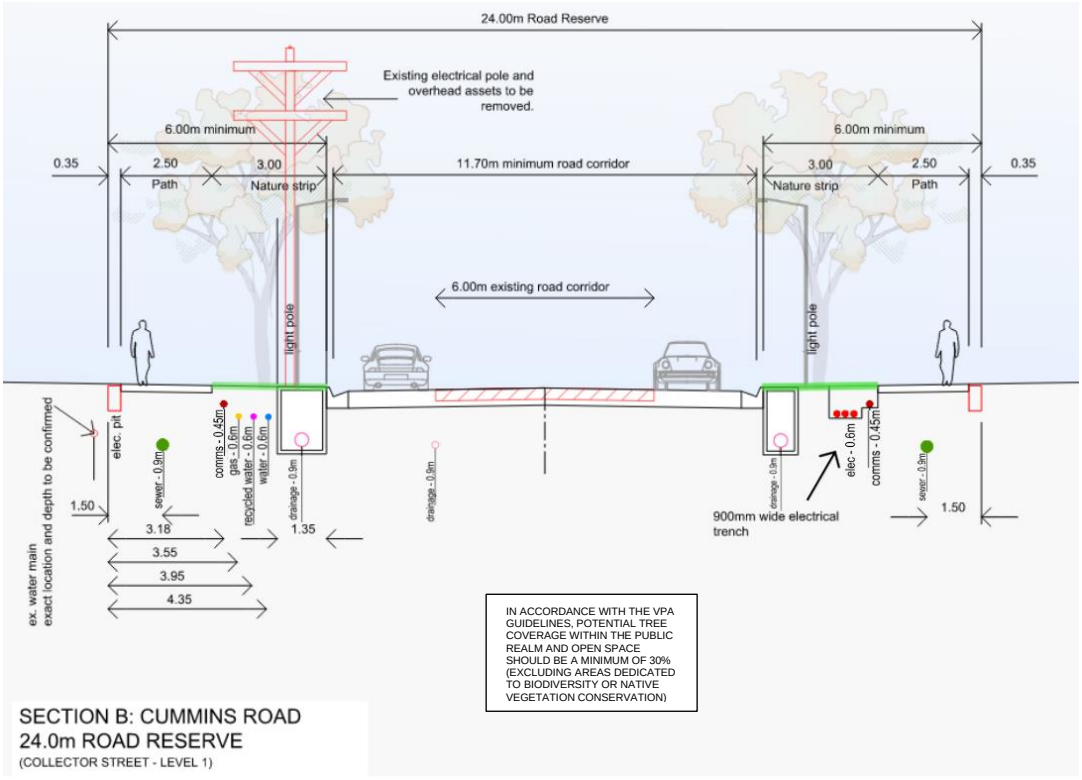

Figure 18 - Typical Cross Section - Collector Street Level 1 (Cummins Road)

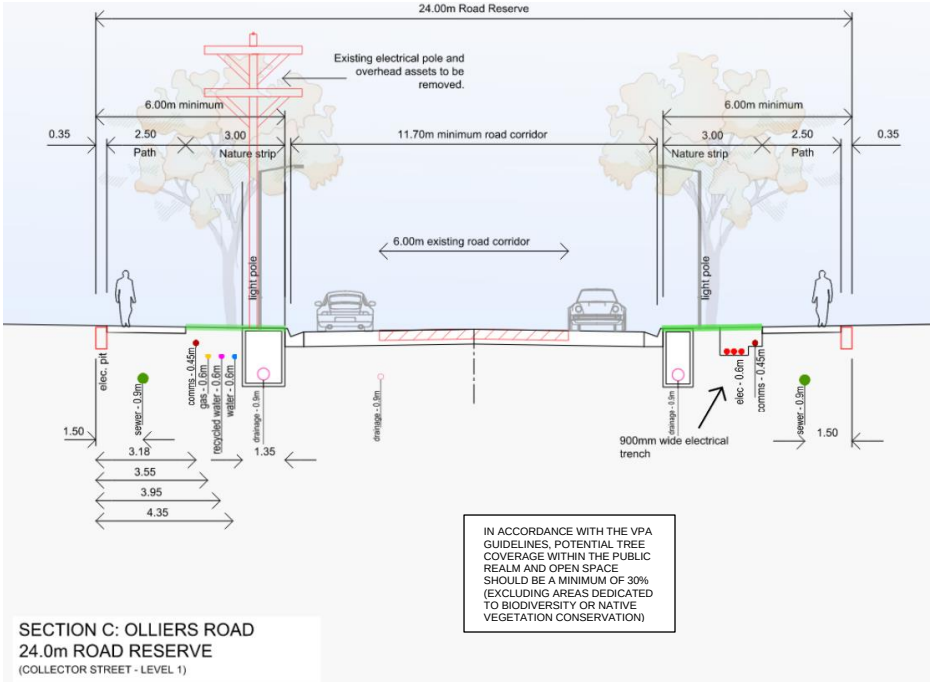

Figure 19 - Typical Cross Section - Collector Street Level 1 (Olliers Road)

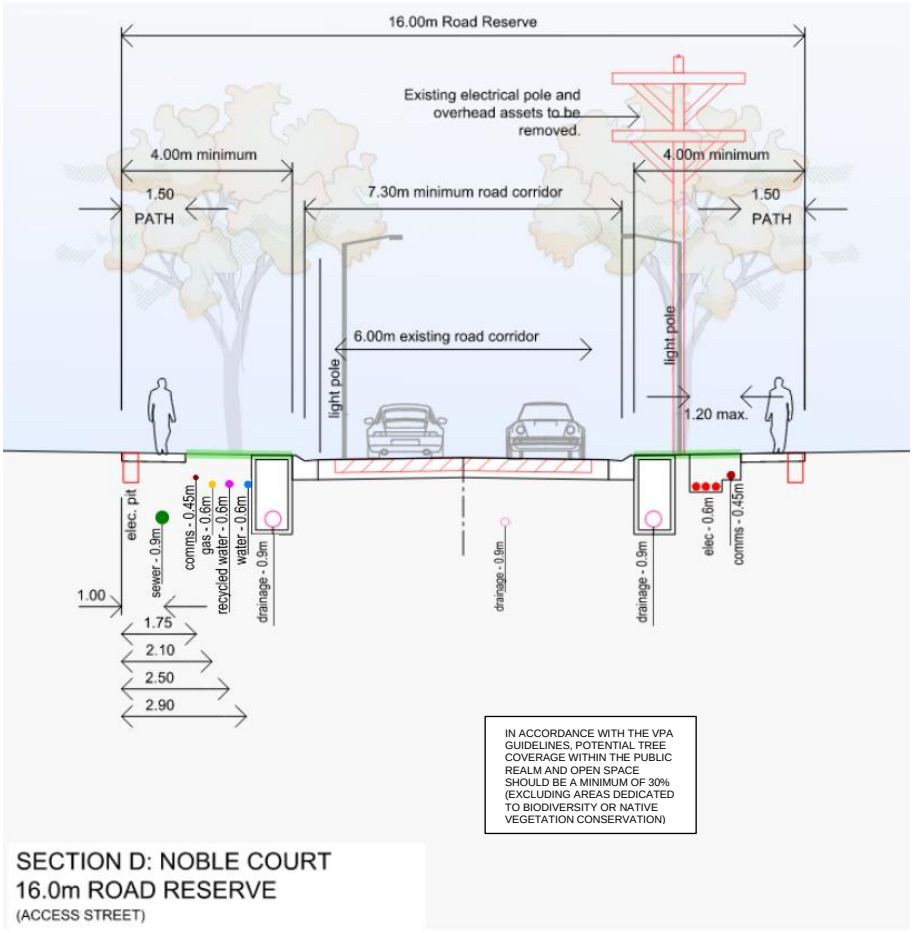

Figure 20 - Typical Cross Section Access Street (with reserve on 1 side) – 16m

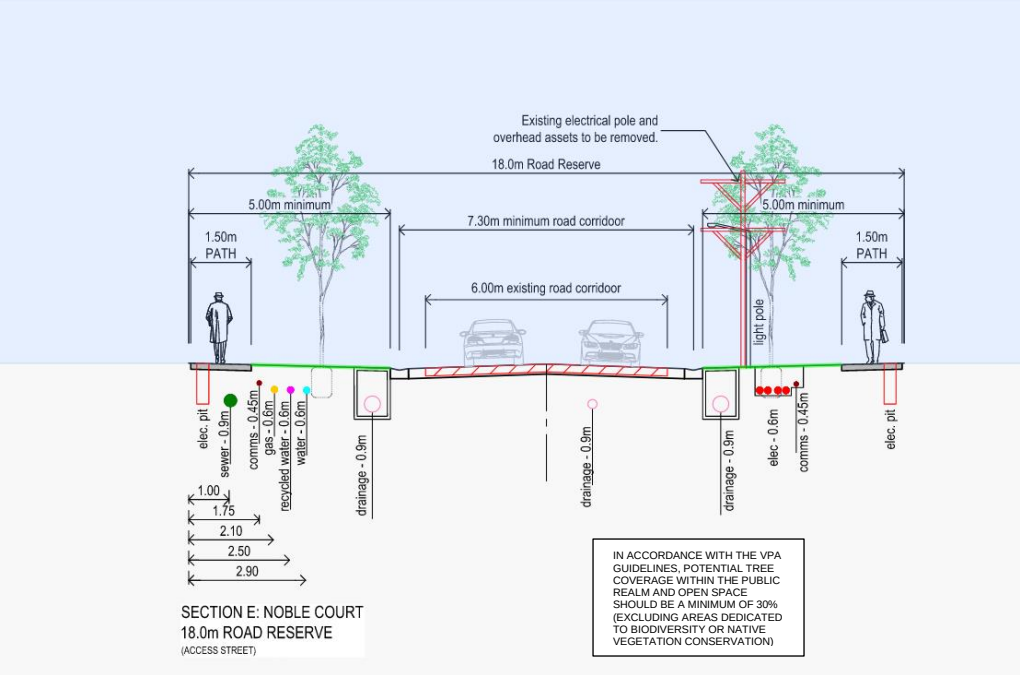

Figure 21 - Typical Cross Section Access Street – 18m

13. Conclusion

The precinct contains a number of existing assets and will also require investment in upgraded and new assets to deliver development as envisaged by the Ballarat North PSP investigation area.

All service authorities are aware of the Ballarat North PSP investigation area as a future development precinct and are at varying stages of incorporating this into their own future asset planning. Central Highlands Water has a strong preference for development to occur eastward from the existing sewer pump station on Gillies Road. Development would occur from a central location of the PSP. Powercor's preference is for development to commence from the west where their current assets are located. CHW and Powercor have differing preferences regarding where development should commence. Considering factors such as the current infrastructure, likely cost and timing for upgrades, and constraints such as topography, we consider it most efficient for the precinct to be staged as indicated in Figure 22, section 1. This also maximises the use of existing infrastructure such as Gilles Road. It is considered that upgrades required for Powercor assets to service the east part of the precinct would be more efficient than upgrading the sewer and water network in the western part of the precinct in the initial stages.

Development of the PSP offers a significant opportunity to create a model of sustainable precinct development in Victoria (and Australia) that includes adaptation and mitigation measures, and the ability to integrate climate resilience measures into renewable energy systems, dwellings, transport networks and natural features. The Precinct could be established to incorporate new innovations and processes to generate a high degree of 'circularity' and self-sufficiency. The opportunity also exists for the Precinct to become a 'net generator' (or power storage bank) of power and act as an energy storage for the Ballarat grid. Various policies and guidelines exist to support the initiatives outlined in Section 11, including the principles contained within the PSP Guideline and the Ballarat Urban Forest Action Plan. In addition to VPA and Ballarat Council initiatives to create an advanced, self-sufficient and climate-resilient precinct, a community-led approach is considered essential to enabling action, where strong governance, high levels of transparency and an 'inclusive community' mindset are established as core behaviours in government, community members and business.

The expanded precinct area can be serviced in a similar manner to the core area. The inclusion of the expanded area in the precinct boundary is yet to be decided by the VPA. Should it be determined the expanded area is not to be pursued as part of this PSP, it is likely this area will be pursued in the future as an additional growth area for Ballarat.

As such, it is important all servicing infrastructure is developed with capacity to be connected to land in the expanded area, rather than requiring significant augmentation in the future.
It is recommended servicing authorities continue to plan for service provision in both the core and expanded areas of the precinct, even while development in both the core and expanded areas remain uncertain.

Based on the information provided and existing infrastructure within the Ballarat North PSP investigation area, Stantec has prepared a draft Precinct Sequencing Plan (illustrated in Figure 22 and in Appendix E), which provides Stantec's recommended staging/sequencing of development based on essential infrastructure capacity and its imminent delivery. It does not consider elements outside the scope of this report (utility servicing).

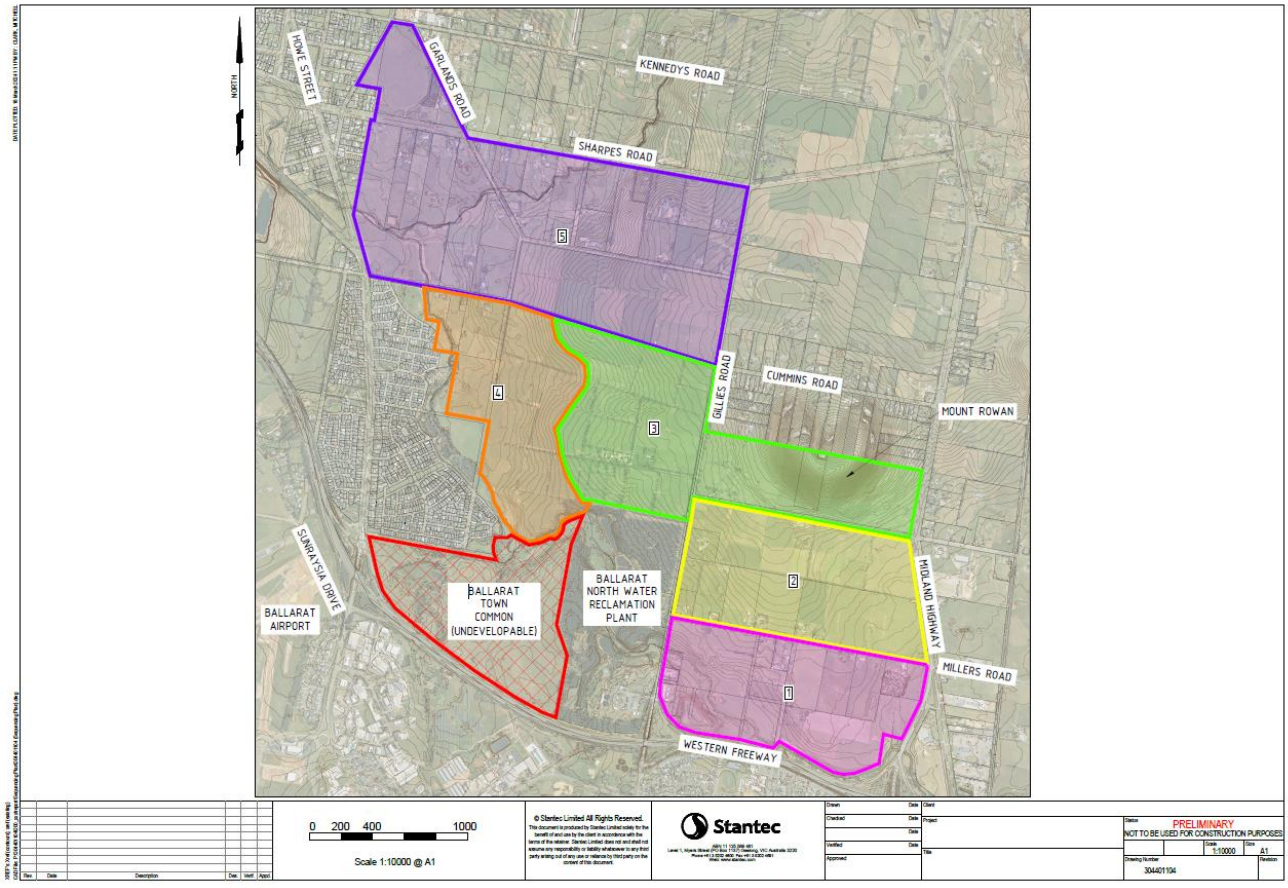

Figure 22 - Stantec's draft Precinct Sequencing Plan

Appendix A Current Services Drawings

BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
LOCALITY

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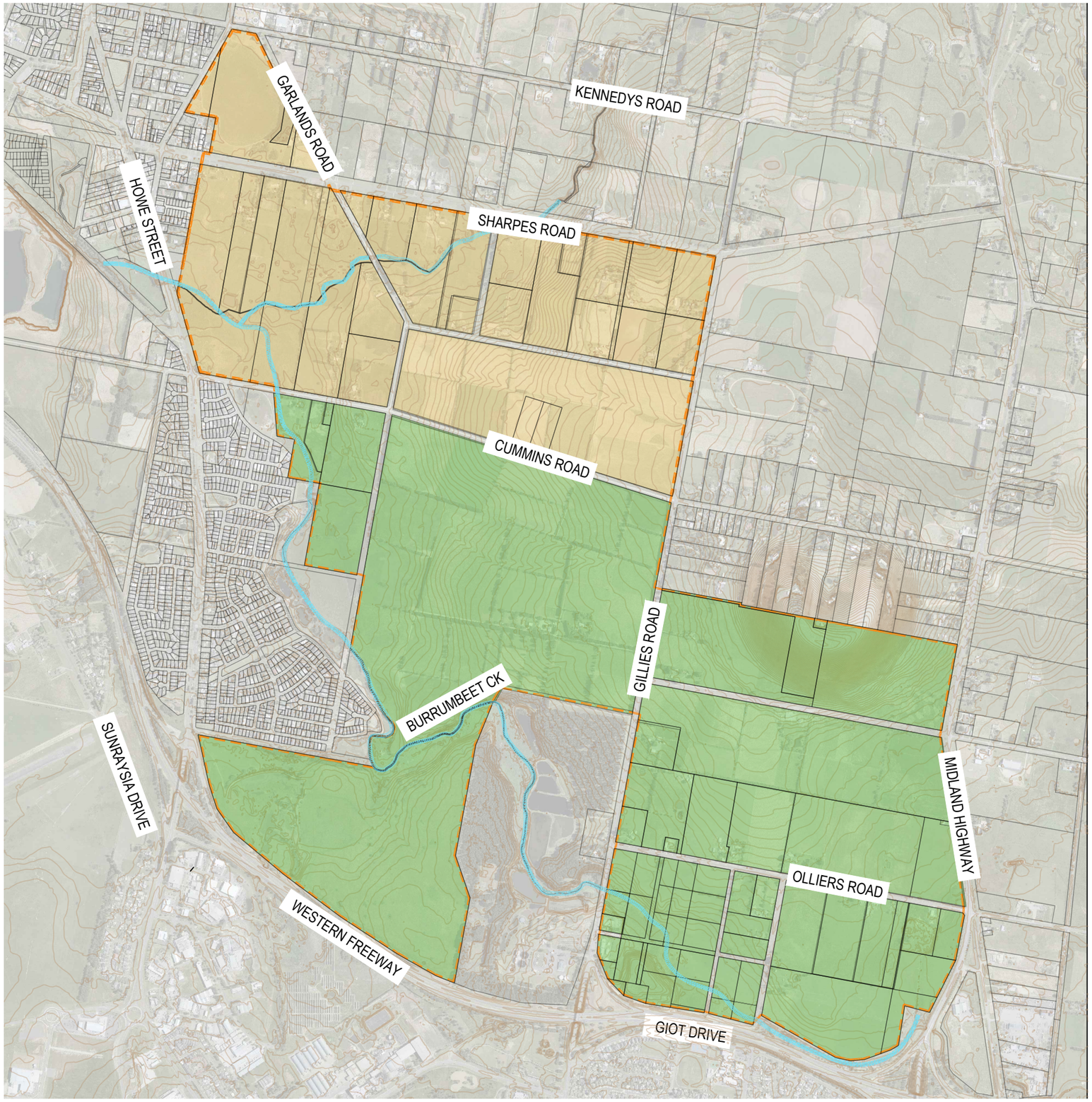

LEGEND

- Precinct Expanded Area
- Precinct Core Area
- Precinct Boundary

N

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BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
WATER

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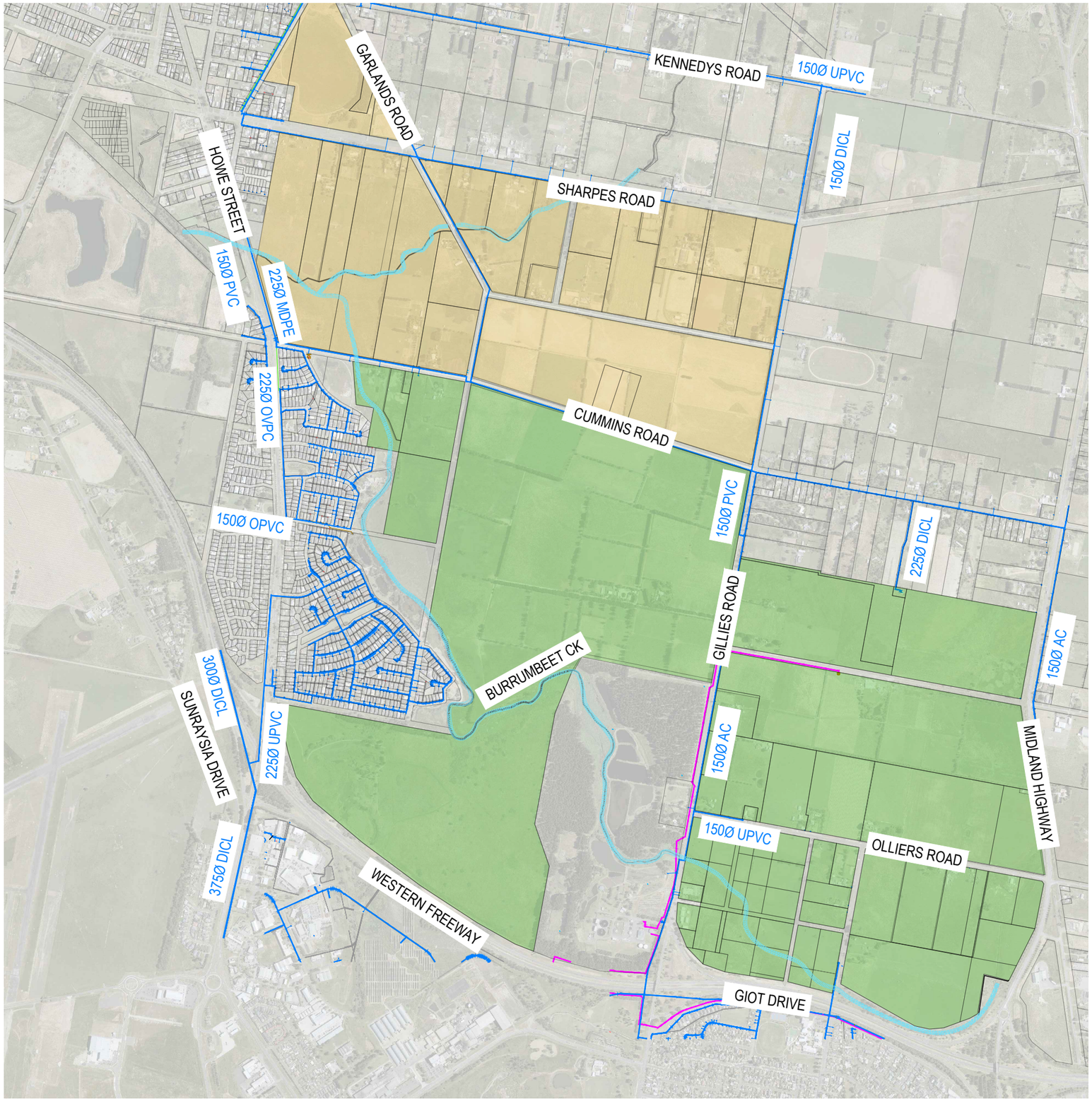

LEGEND

- Precinct Expanded Area
- Precinct Core Area
- Existing Potable Water main
- Existing Recycled Water Main

N

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BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
SEWER

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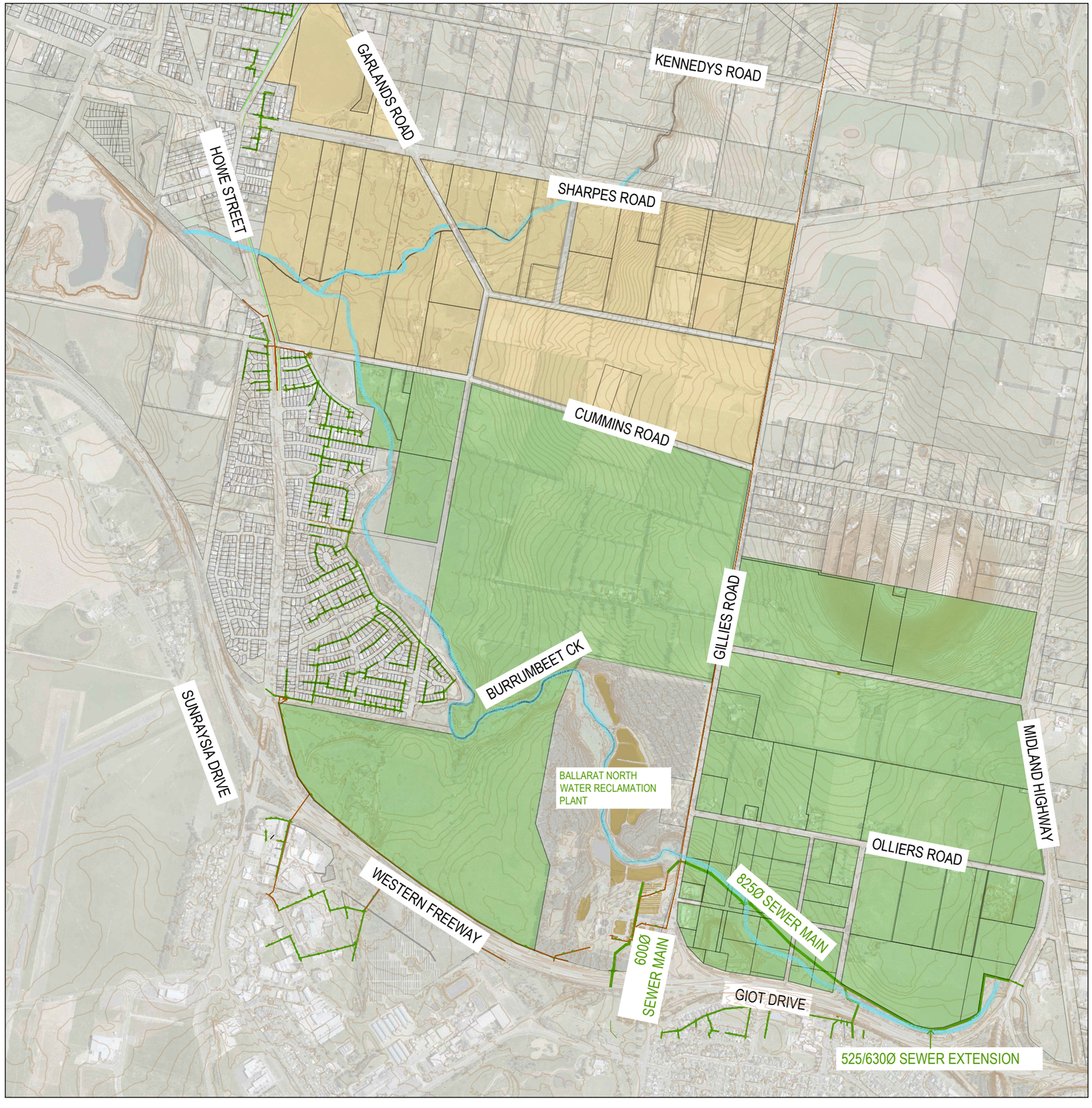

LEGEND

- Precinct Expanded Area
- Precinct Core Area
- Existing Sewer Main
- Existing Pressure/Rising Main

N

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BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
GAS

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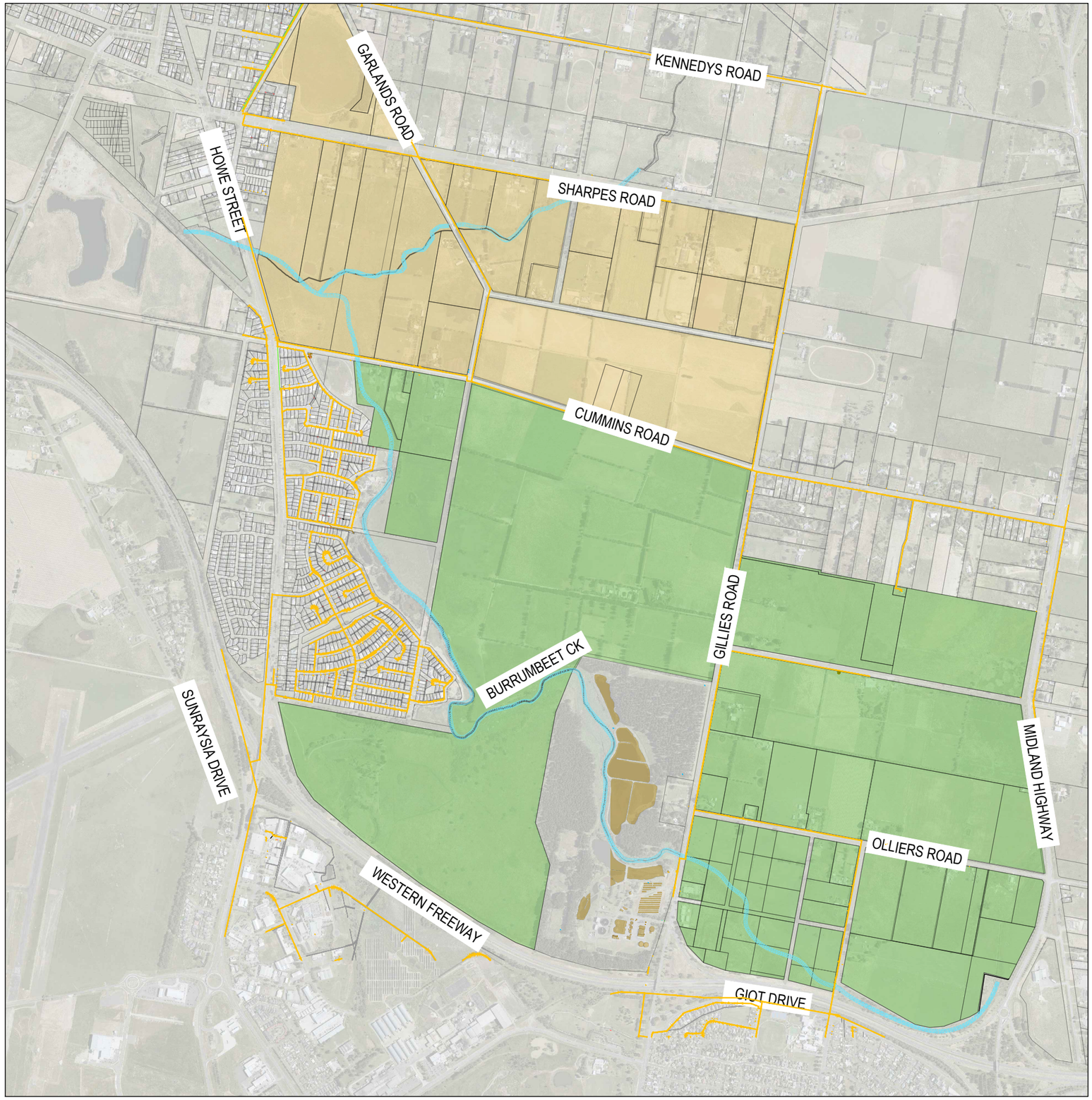

LEGEND

- Precinct Expanded Area
- Precinct Core Area
- Existing Gas Asset (Assumed location)

N

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BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
ELECTRICAL

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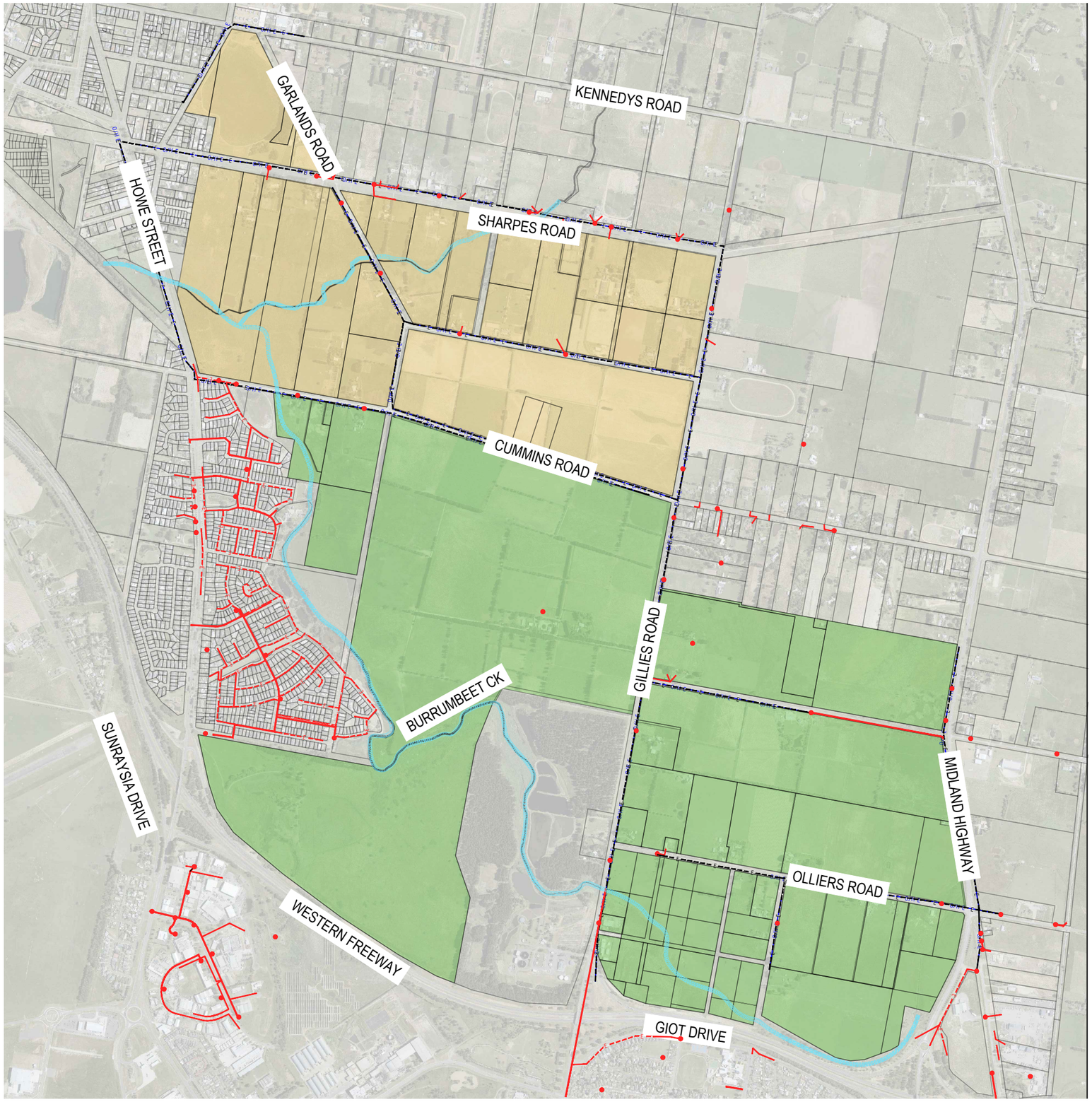
SEPTEMBER 2023
Rev. 01



LEGEND

- Precinct Expanded Area
- Precinct Core Area
- −O/HE− Existing overhead electrical asset
- −E− Existing underground low voltage electrical asset
- Existing underground high voltage electrical asset

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BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
COMMUNICATIONS

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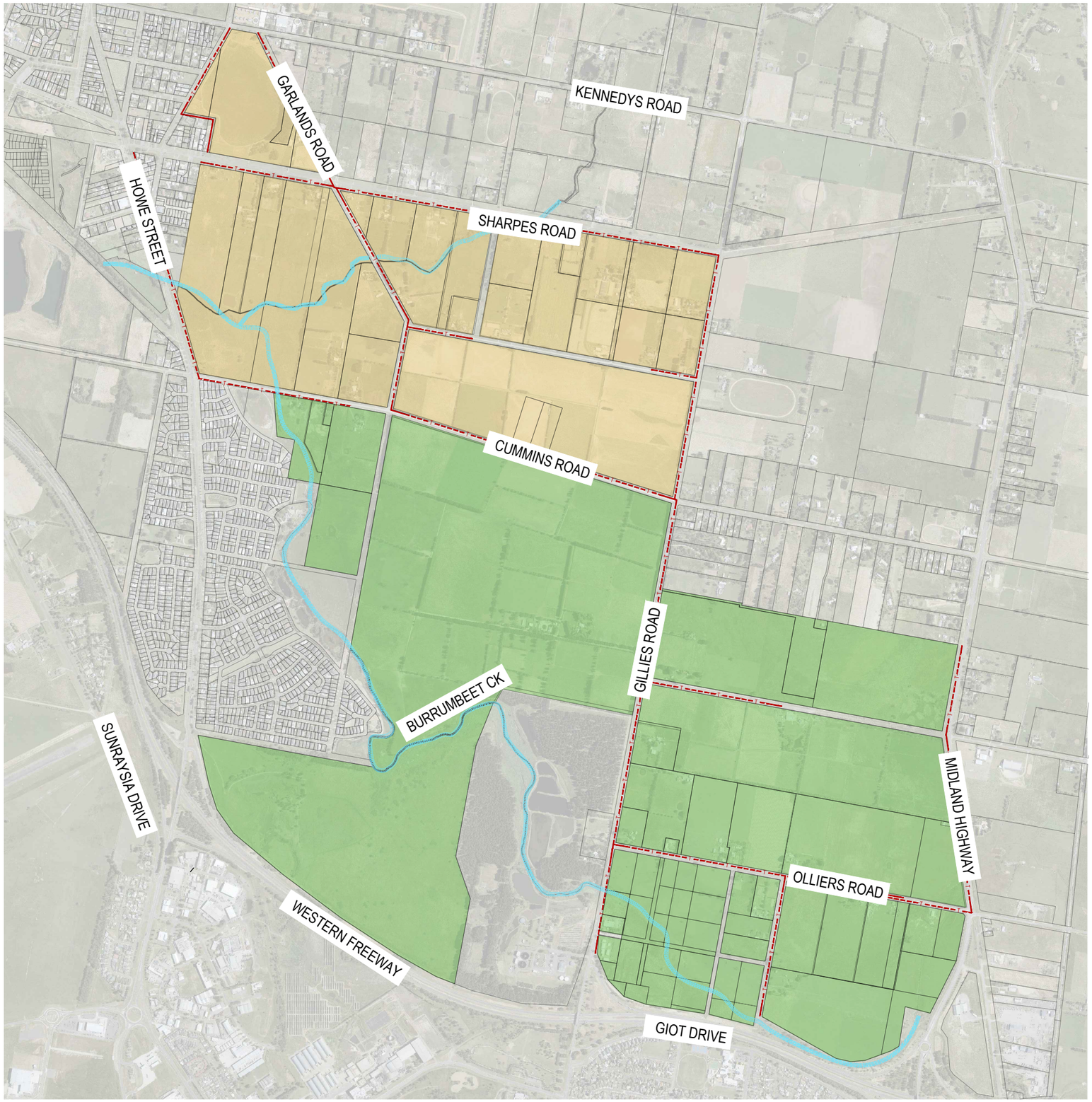

LEGEND

- Precinct Expanded Area
- Precinct Core Area
- Existing communications asset

N

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BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
STORMWATER DRAINAGE

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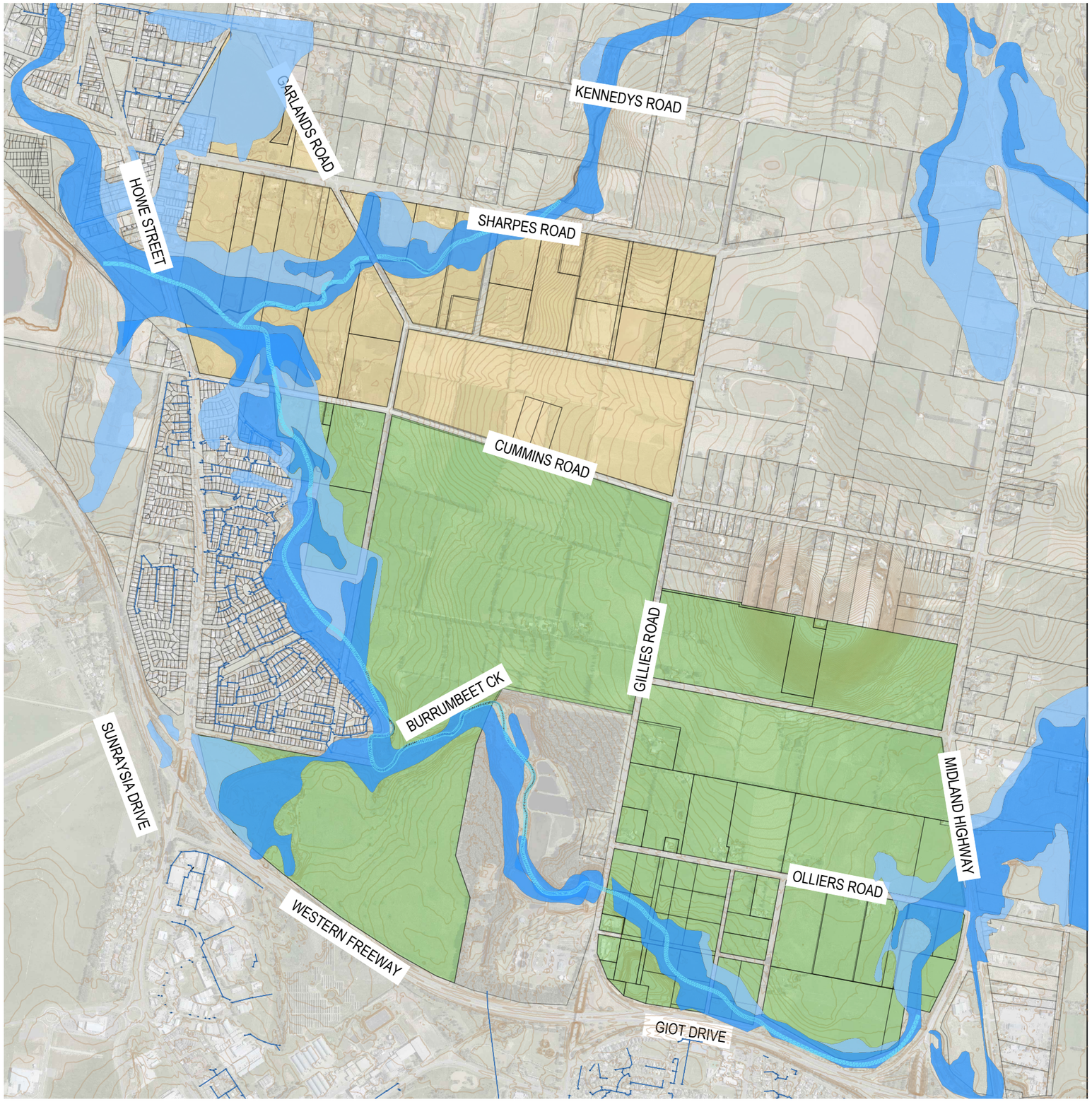

LEGEND

- Precinct Expanded Area
- Precinct Core Area
- Existing Stormwater Drain
- Floodway Overlay
- Land Subject to Inundation Overlay

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Appendix B Media Release – New Homes to go all Electric

Media Release

The Hon Lily D'Ambrosio MP
Minister for Climate Action
Minister for Energy and Resources
Minister for the State Electricity Commission

Friday, 28 July 2023

NEW VICTORIAN HOMES TO GO ALL ELECTRIC FROM 2024

New Victorian households will save up to $1,000 off their annual energy bills while reducing household emissions, as part of the Andrews Labor Government's landmark decision to phase out gas in new homes.

Across the world, the cost of gas is rising sharply, and so is uncertainty around supply. Victorians are at the mercy of private companies exporting gas overseas – which has a real impact on the cost to Victorians at home.

That's why the Labor Government is doing the work to make energy more affordable for Victorians, getting them the best deal on their home energy bills.

From 1 January 2024, planning permits for new homes and residential subdivisions will only connect to all electric networks, with houses taking advantage of more efficient, cheaper and cleaner electric appliances.

These changes will apply to all new homes requiring a planning permit, including new public and social housing delivered by Homes Victoria.

Going all-electric can be delivered at no extra cost to the buyer – and will slash around $1,000 per year off household energy bills – or up to $2,200 for households that also have solar installed.

Commencing immediately, all new public buildings that haven't reached design stage will also be all-electric. This includes new schools, hospitals, police stations and other government-owned buildings.

Victoria has the highest use of residential gas in Australia, with around 80 per cent of homes connected. The gas sector contributes about 17 per cent of the state's emissions, and the move to electric systems is a key element of meeting Victoria's nation leading emissions reduction targets of 75–80 per cent by 2035 and net zero by 2045.

These moves build on the 2022 reform that removed the requirements for gas connections for new homes. Since then, Victoria's leading builders and developers have already begun delivering energy-bill saving and low emissions all electric homes.

To ensure homeowners can maximise the benefits of household renewable energy, the Government is investing $10 million in a new Residential Electrification Grants program. Grants will be available to volume home builders, developers and others to provide bulk rebates for solar panels, solar hot water and heat pumps to new home buyers up front.

This will mean new home buyers will save $4,600 before they even move in and will remove double handling of installations – saving buyers money and hassle.

To help prepare for the transition, the Government is also investing $1 million in targeted training to ensure the construction industry is supported in the transition to all electric and 7 star homes.

This builds on Solar Victoria's $11 million training and workforce development package that will upskill plumbers and electricians to take advantage of the renewable energy revolution.

Victorian plumbers and electricians will be the key to delivering this critical transition – that's why the Government is upskilling the plumbing and electrical workforce to ensure they have rights skills to take advantage of this growing industry.

Media Contact: Siobhan McKenna 0480 147 921 | siobhan.mckenna@minstaff.vic.gov.au

The Government is delivering a $3 million package including free training for 1,000 plumbers and apprentices to design and install energy efficient heat pumps and solar hot water systems, and free training for 400 electricians and fourth-year apprentices to safely design and install rooftop solar and home battery systems.

To make it easier to go all-electric, eligible new home builders, as well as existing homeowners and renters, can access the nation leading Solar Homes program – offering $1,400 solar panel rebates and interest free loans of $8,800 for household batteries.

All Victorian households and businesses are also eligible for the VEU gas to electric rebates to upgrade heating and cooling and hot water heaters.

The Government will work closely with industry including gas appliance manufacturers, the building and construction sector, local government, trade unions and consumer organisations to manage business, workforce and consumer impacts and support the sector in the transition.

The Government is working to update the nation leading Gas Substitution Roadmap, which will be released later this year.

Quotes attributable to Minister for Energy and Resources Lily D'Ambrosio

"We know that with every bill that arrives, gas is only going to get more expensive. That's why we're stepping in to help even more Victorians get the best deal on their energy bills."

"Reducing our reliance on gas is critical to meeting our ambitious emission reduction target of net zero by 2045 and getting more Victorians on more efficient electric appliances which will save them money on their bills."

Quote attributable to Minister for Planning Sonya Kilkenny

"All-electric homes are healthier, cleaner and cheaper to run. Going all-electric ensures Victorians building a new home are part of this exciting energy transition."

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Appendix C Announcement of Funding, Expansion of the Recycled Water Network in Ballarat

Juliana Addison MP

STATE LABOR MEMBER FOR WENDOUREE

MEDIA RELEASE

Friday, 24 June 2022

EXPANDING THE RECYCLED WATER NETWORK IN BALLARAT

The Andrews Labor Government is delivering greater water security to Ballarat by supporting an expansion of the city's recycled water network.

As part of the Integrated Water Management project we're investing $1 million towards upgrading the capacity of the Ballarat North Water Reclamation Plant and recycled water pump station to deliver additional recycled water for irrigating recreational spaces in Ballarat.

The project is one of 11 metropolitan and 17 regional projects selected for funding under the first round of the $14.1 million Integrated Water Management grants program.

The project will increase the capacity of the Class A recycled water facility at the Ballarat North Water Reclamation Plant to 5 million litres daily and will increase recycled water pumping and pipeline supply capacities to Lake Wendouree.

It will also install new connections delivering recycled water to Wendouree West Recreation Reserve and Victoria Park for irrigation year round as well as create new opportunities for future recycled water usage, reducing the pressure on the city's water supply.

The Andrews Labor Government has contributed $1 million from its Integrated Water Management grants program to the capital costs. Along with $2.55 million from Central Highlands Water, and $500,000 from the City of Ballarat. In total, the collaborative partnership will deliver a total investment of $4.45 million, including in-kind support.

This will see an increase in Central Highlands Water's capacity to provide recycled water throughout the year, which is particularly important during the summer months.

Quotes attributable to Minister for Water Lisa Neville

"With climate change and more extreme climatic events, as well as the expected near doubling of Victoria's population by 2051, we need to do more with less water."

Quotes attributable to Member for Wendouree Juliana Addison

"I'm pleased that we are partnering with City of Ballarat & Central Highlands Water to future proof our city."

"The expansion of the Ballarat North Water Reclamation Plant will improve water security for the community and supporting the irrigation of the city's green spaces all year round."

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Appendix D Typical Road Cross Sections

BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
TYPICAL SECTIONS - 01

NOT TO SCALE
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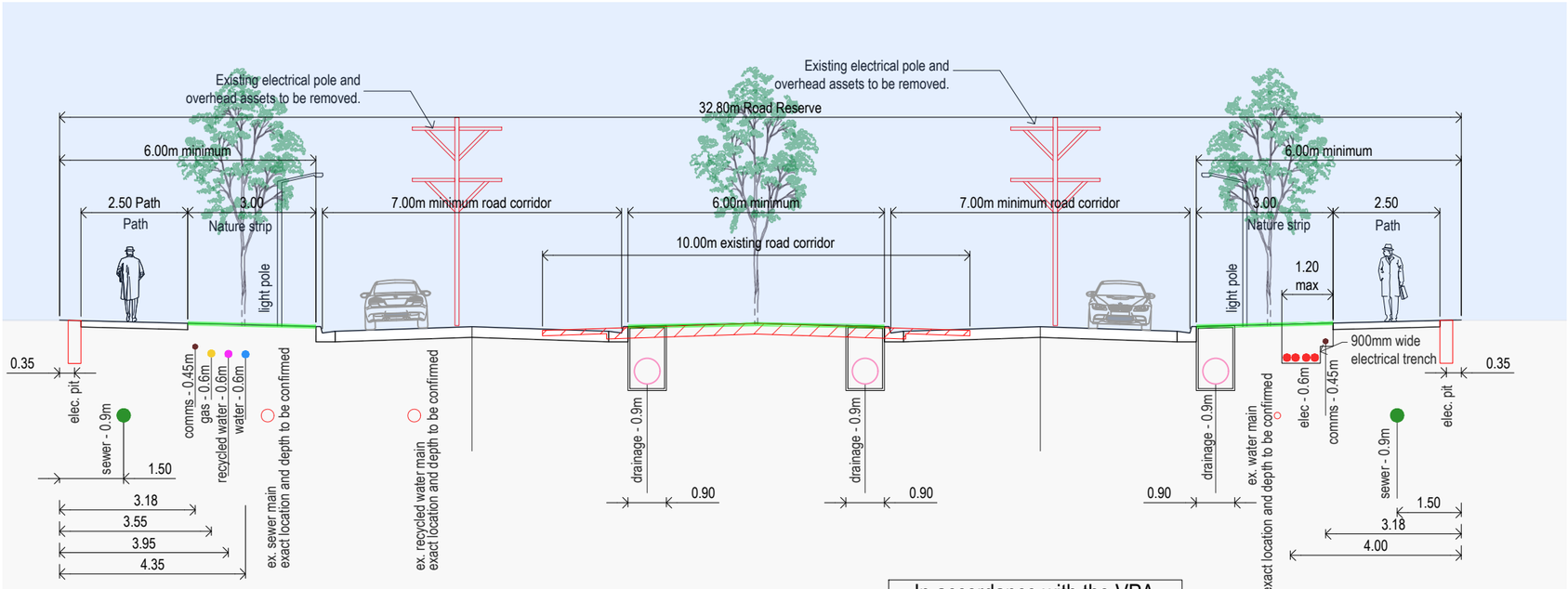
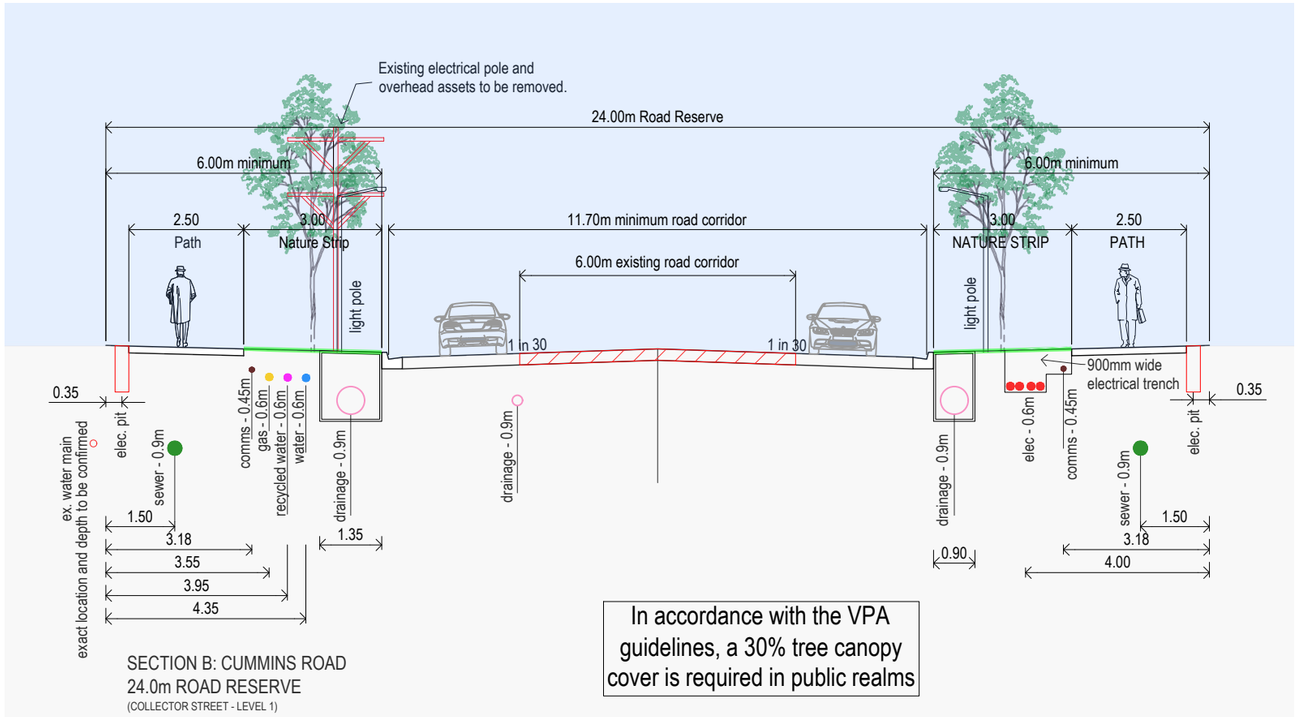


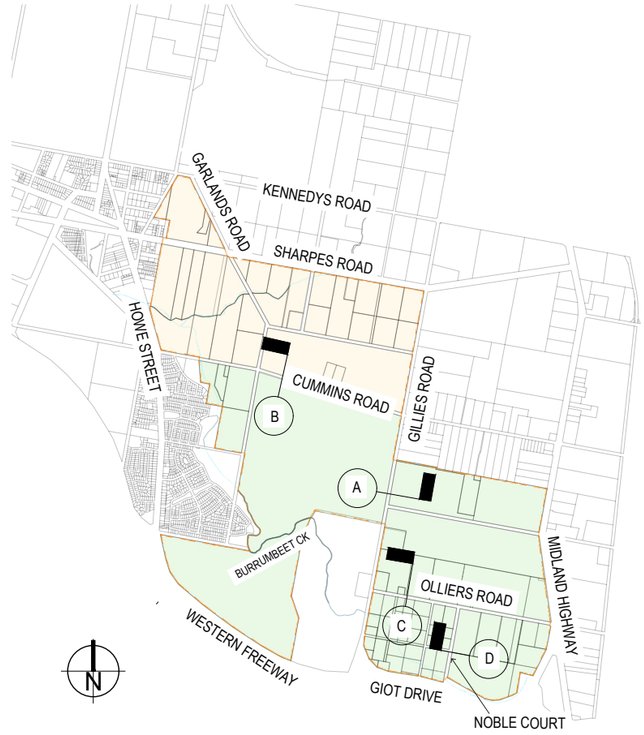
SECTION A: GILLIES ROAD
32.8m ROAD RESERVE
(COLLECTOR STREET - LEVEL 2)

In accordance with the VPA guidelines, a 30% tree canopy cover is required in public realms



SECTION B: CUMMINS ROAD
24.0m ROAD RESERVE
(COLLECTOR STREET - LEVEL 1)

In accordance with the VPA guidelines, a 30% tree canopy cover is required in public realms



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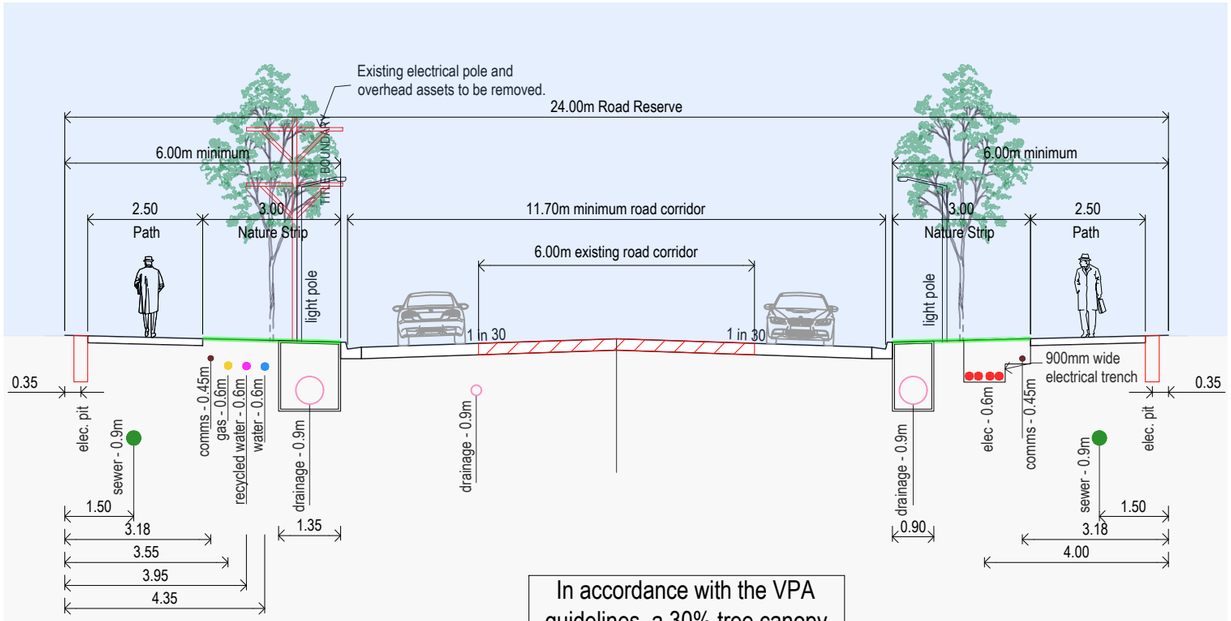
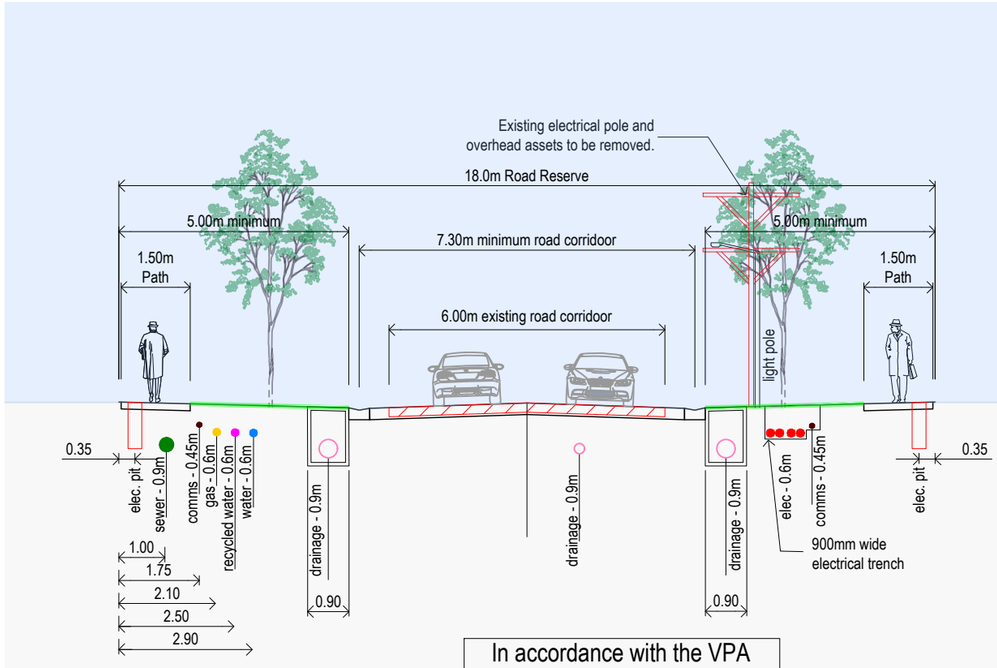
BALLARAT NORTH PSP AND DCP
BALLARAT, VIC 3350
TYPICAL SECTIONS - 02

NOT TO SCALE
SEPTEMBER 2023
Rev. 01



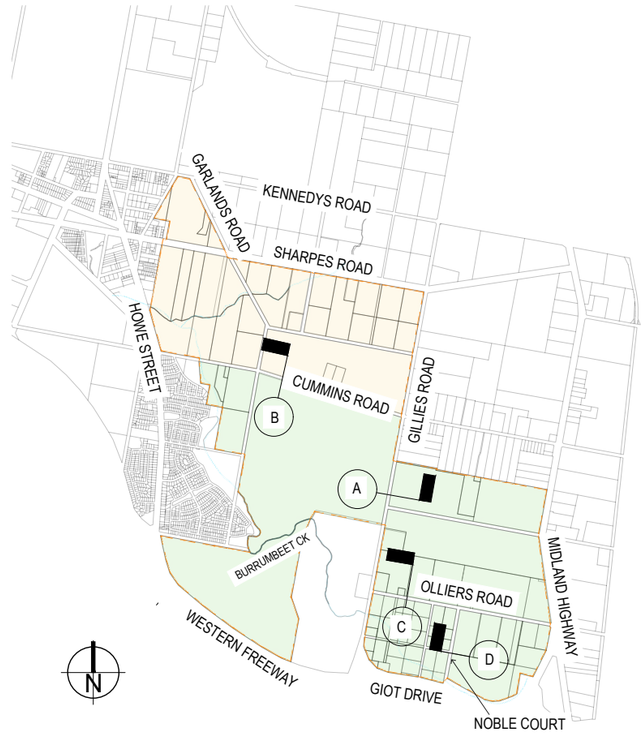
SECTION C: OLLIERS ROAD
24.0m ROAD RESERVE
(COLLECTOR STREET - LEVEL 1)

In accordance with the VPA guidelines, a 30% tree canopy cover is required in public realms



SECTION D: NOBLE COURT
18.0m ROAD RESERVE
(ACCESS STREET)

In accordance with the VPA guidelines, a 30% tree canopy cover is required in public realms



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