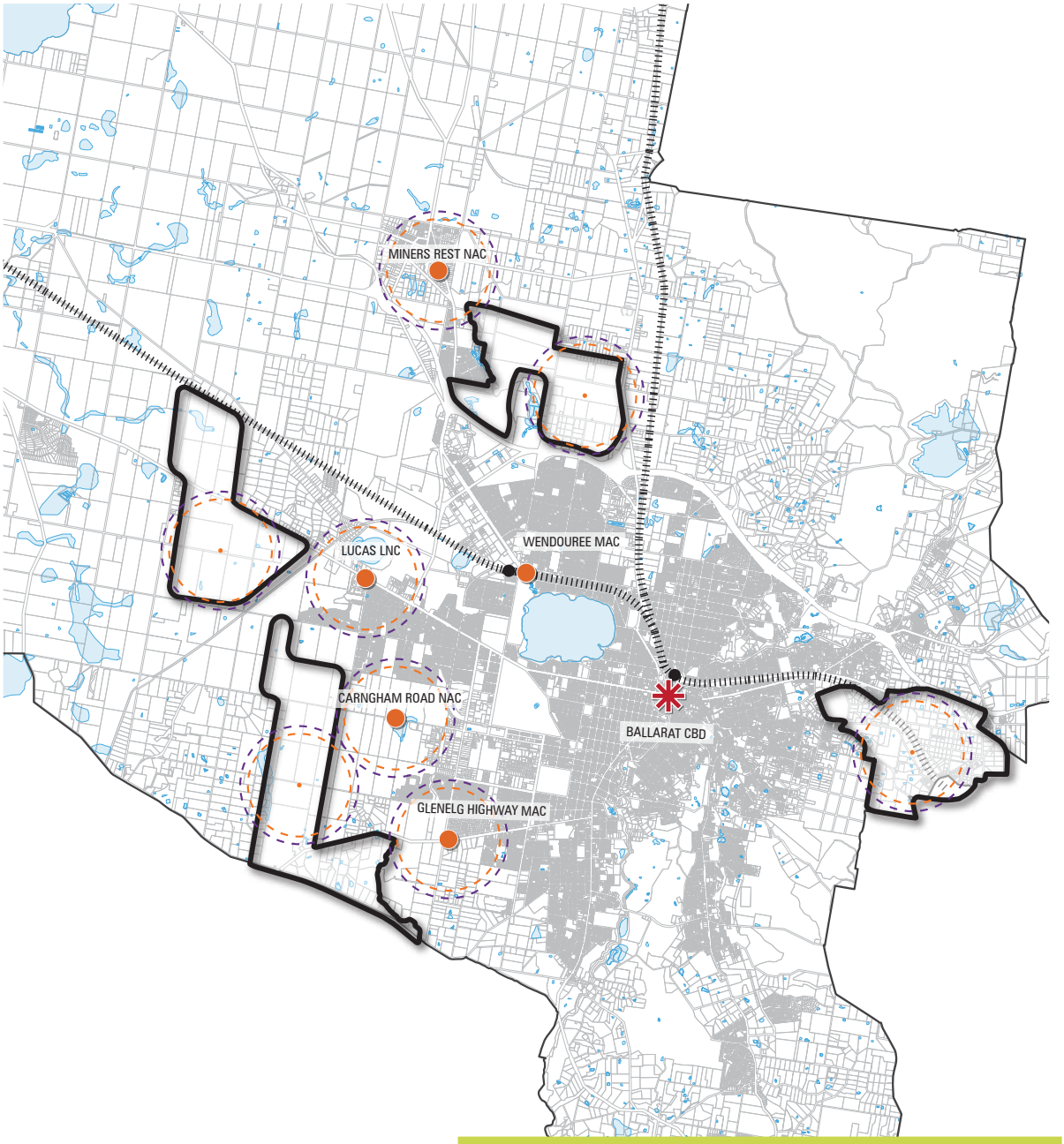


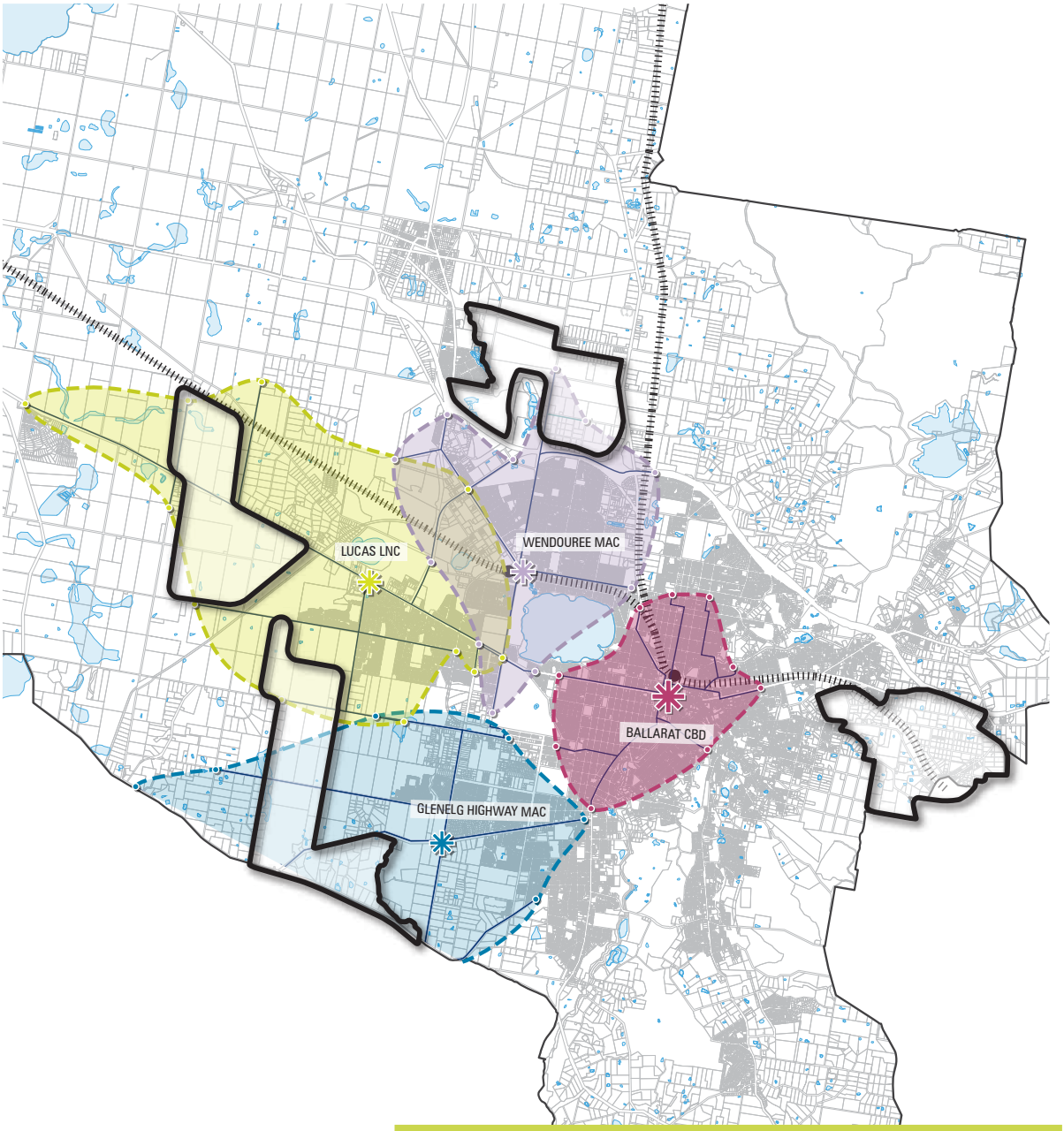
5&10 MINUTE WALKING AND CYCLING DISTANCE

LEGEND

- Greenfield Investigation Areas (GIAs)
- Municipal Boundary
- Ballarat Major Activity Centre
- Large Neighbourhood Activity Center & Major Activity Center
- Theoretical 10 Minute Walking Distance
- Theoretical 5 Minute Cycling Distance
- Water body

0 5km

Map 15 5 & 10 Minute Walking and Cycling Distance



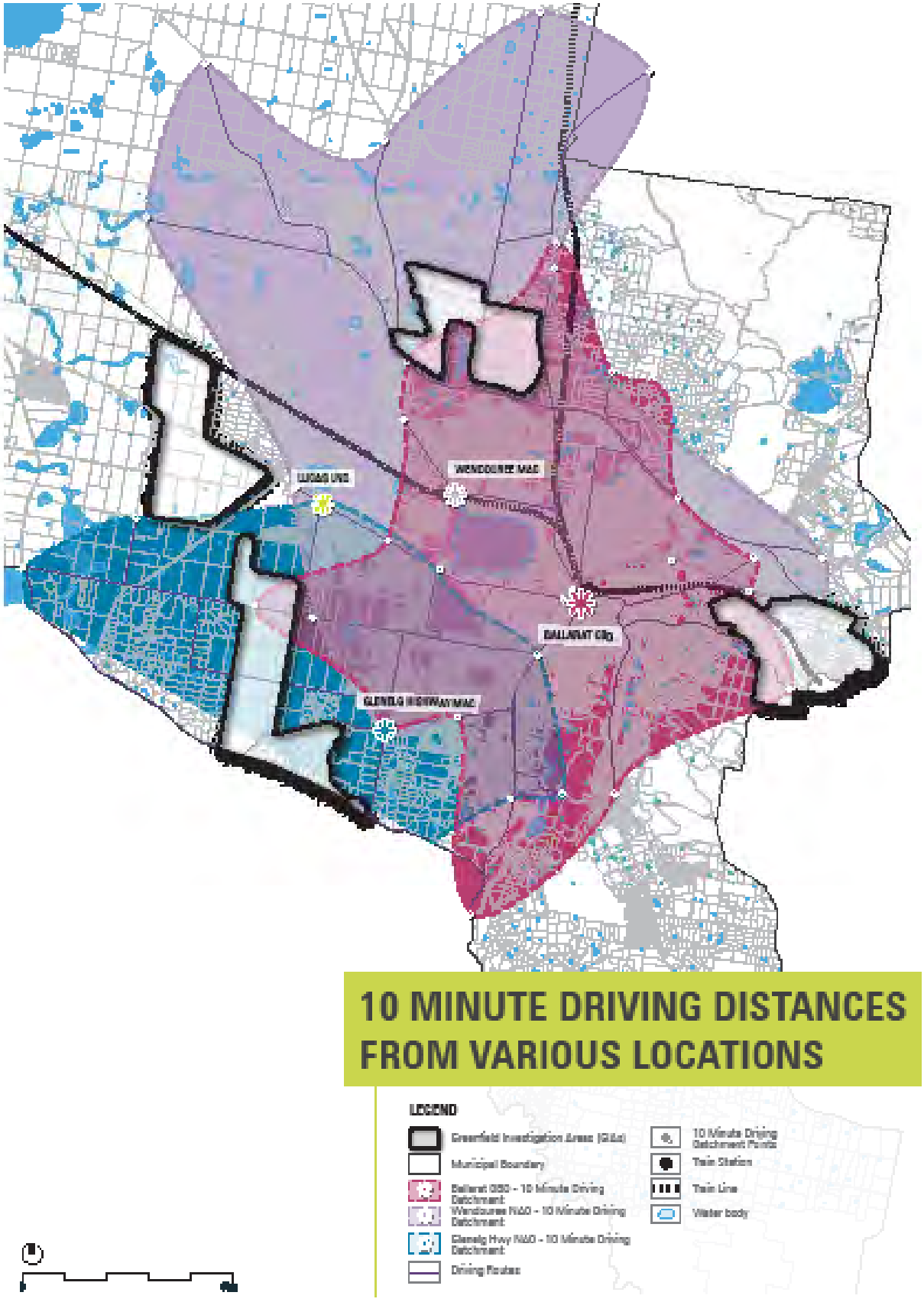
5 MINUTE DRIVING DISTANCES FROM VARIOUS LOCATIONS

LEGEND

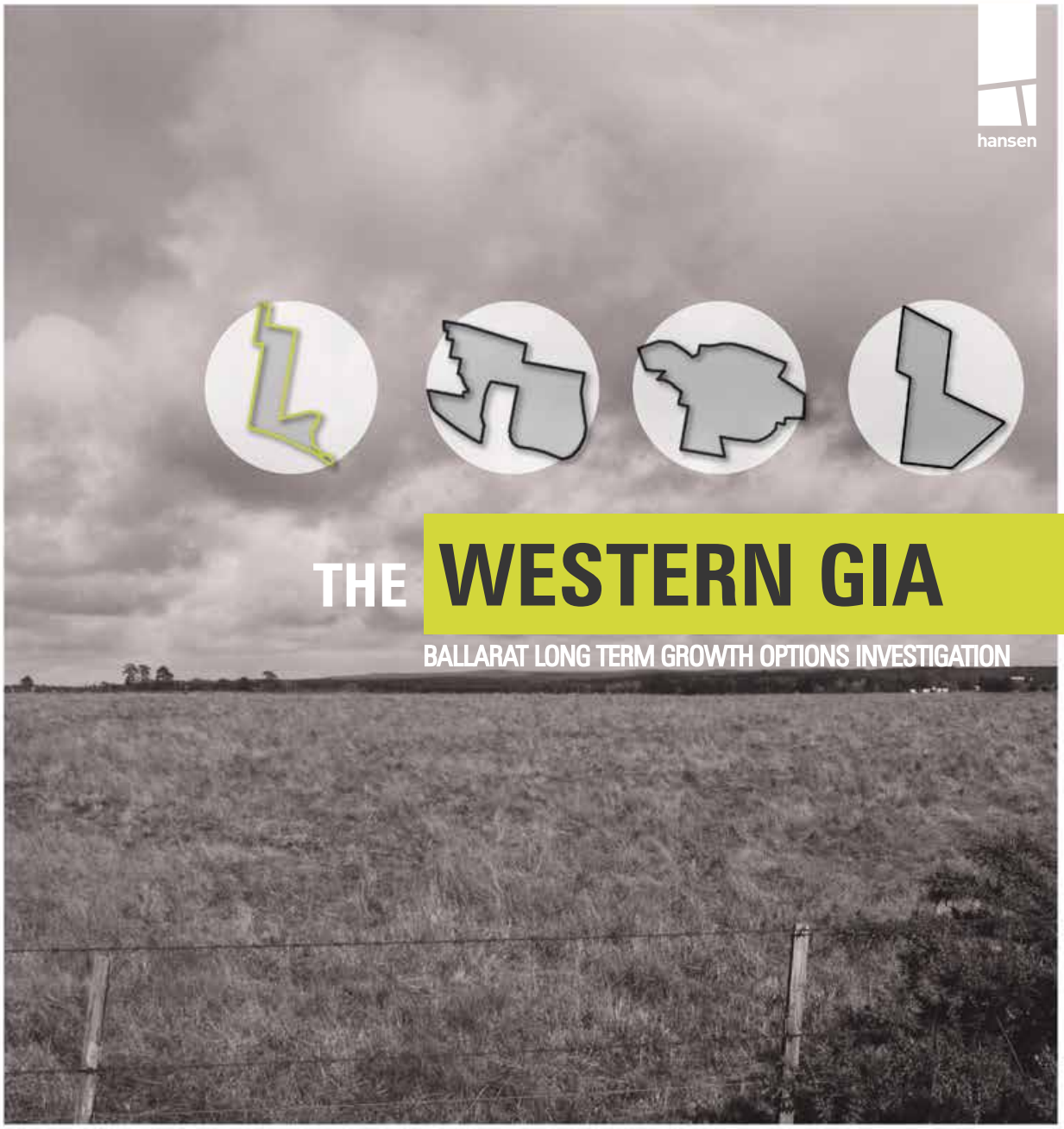
- Greenfield Investigation Areas (GIAs)
- Municipal Boundary
- Ballarat CBD - 5 Minute Driving Catchment
- Wendouree NAC - 5 Minute Driving Catchment
- Glenelg Hwy NAC - 5 Minute Driving Catchment
- Lucas NAC - 5 Minute Driving Catchment
- Driving Routes
- 5 Minute Driving Catchment Points
- Train Station
- Train Line
- Water body

0 5km

Map 16 5 Minute Driving Distances from Various Locations

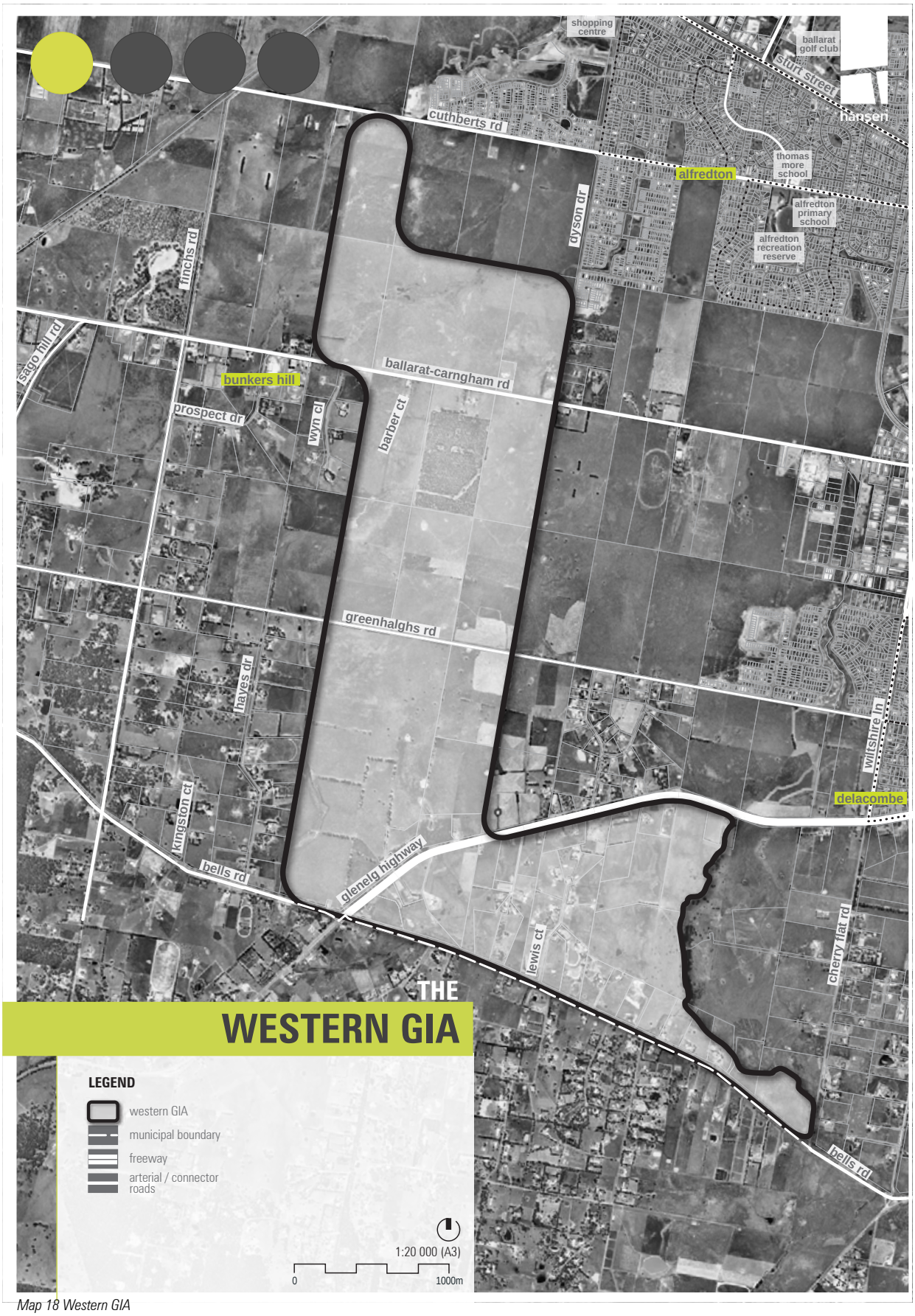


Map 17 10 Minute Driving Distances from Various Locations



THE WESTERN GIA

BALLARAT LONG TERM GROWTH OPTIONS INVESTIGATION



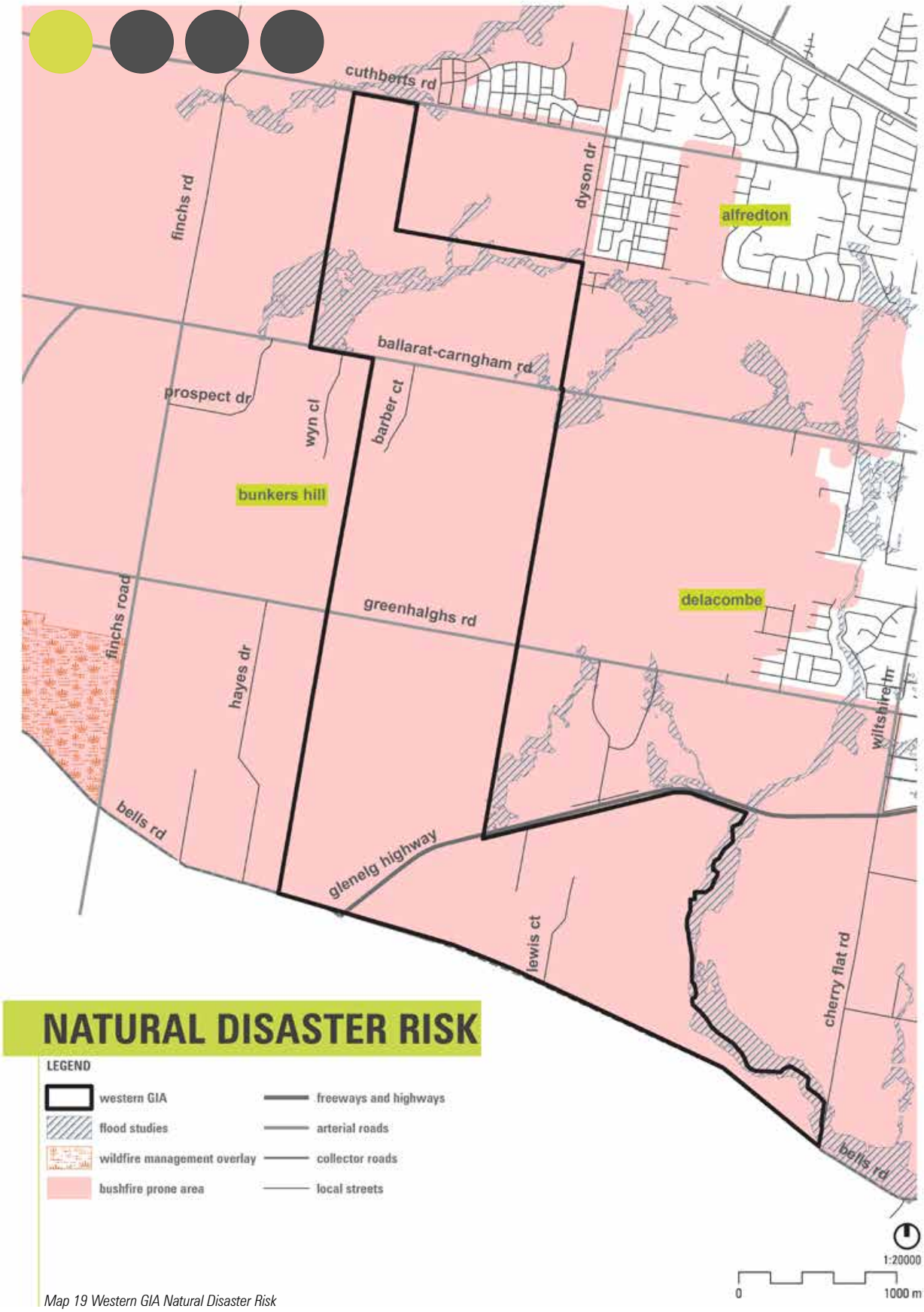
Map 18 Western GIA

THE WESTERN GIA

This section of the report will provide a detailed assessment of the technical background analysis relating to the Western Greenfield Investigation Area (GIA), to inform the feasibility assessment of each GIA in Ballarat.

The Western GIA is:

- Located in parts of Bunkers Hill, Lucas and Smythes Creek;
- Broadly bounded by Dyson Drive, the Kensington Creek corridor and the Ballarat West Growth Area boundary to the east, Cuthberts Road to the north, Bunkers Hill to the east and the municipal boundary / Bells Road to the south;
- Partially bounded by and intersected by the Glenelg Highway; and
- Partially bounded by the proposed Ballarat Western Link Road along its eastern boundary.



Map 19 Western GIA Natural Disaster Risk

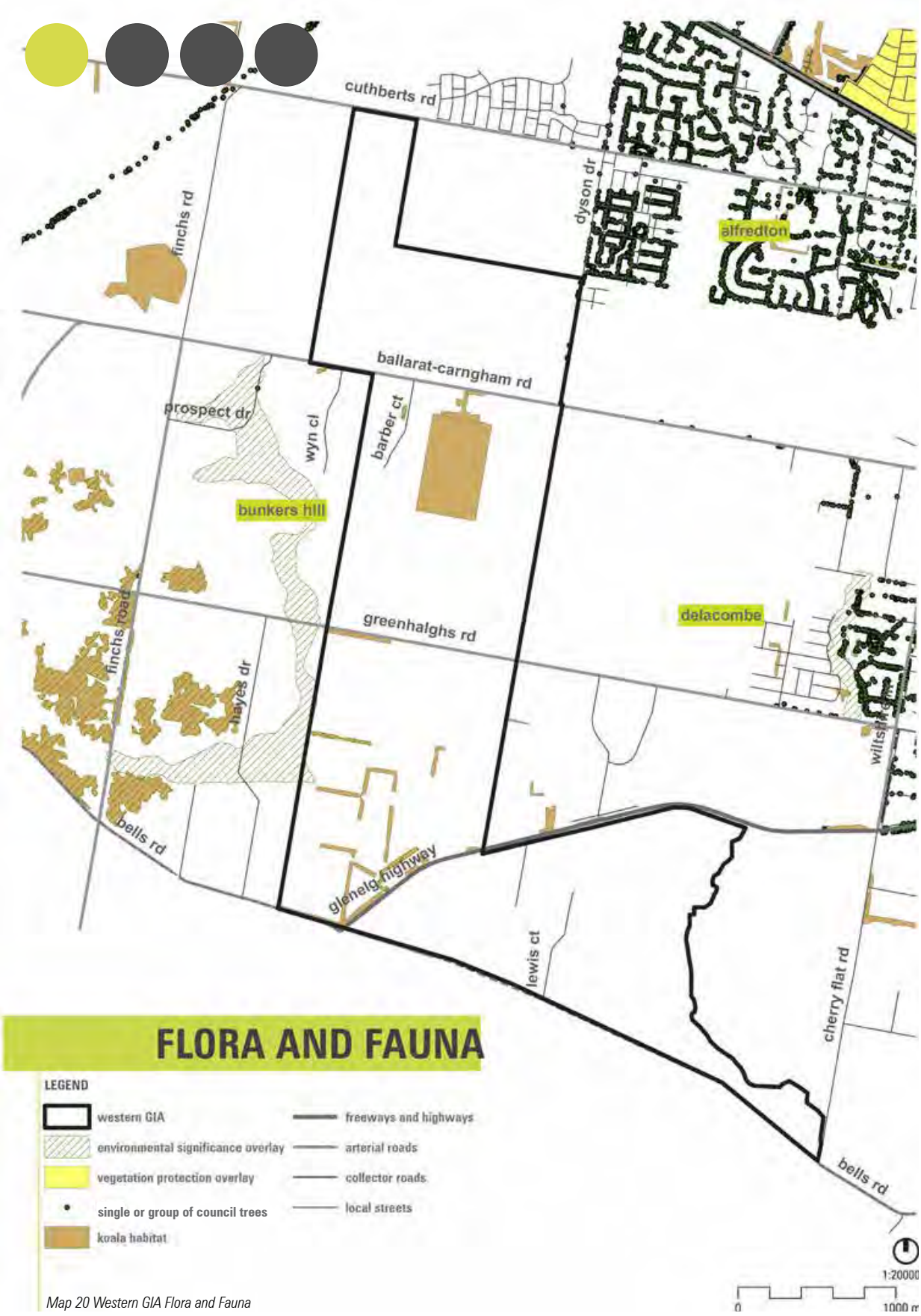
ASSESSMENT OF LAND CAPABILITY

The capability of the land to potentially accommodate future urban development has been considered and assessed from a variety of technical angles and general land use and planning considerations. Planning overlays were particularly important for the feasibility assessment of each of site, specifically those related to natural disaster and flora and fauna. There was less variability evident in the noise levels and historical influences such as contamination, mining and geotechnical conditions between the three sites.

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

NATURAL DISASTER RISK

Natural disaster risk is less of an issue for the Western GIA in comparison to the other GIA's. The majority of the site sits within the Bushfire Prone Area, however the Bushfire Management Overlay (BMO), the Rural Flood Overlay (FO), the Land Subject to Inundation Overlay (LSIO) and the Erosion Management Overlay (EMO) does not apply within this GIA (as shown in Map 19 to the left). Although unlikely, such land could still be impacted by a 100 year flood. Additionally there are areas in the north of the Western GIA that are identified as being potentially be impacted by a 100 year flood, which would be preferable to avoid for development.

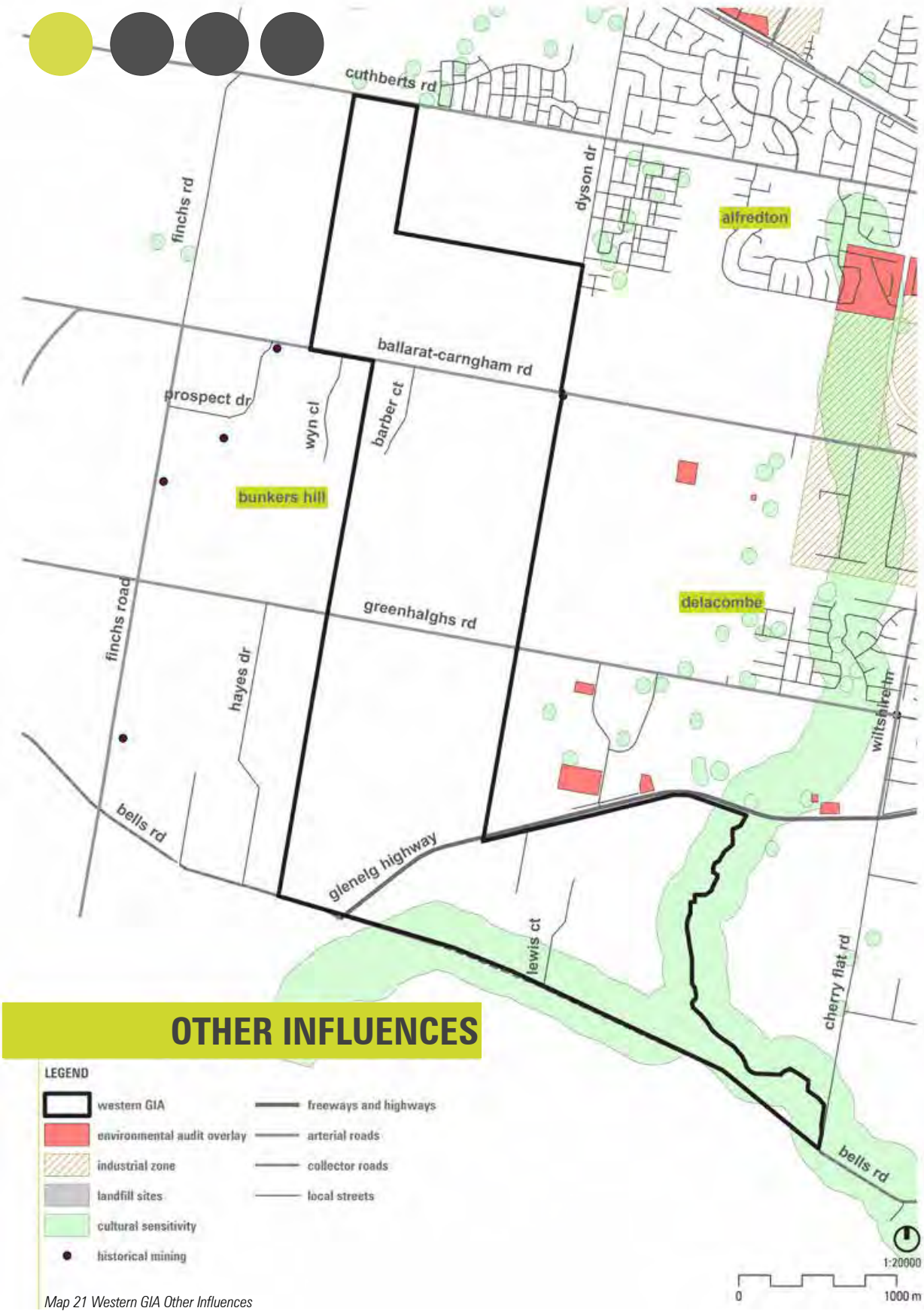


Map 20 Western GIA Flora and Fauna

PROTECTED FLORA AND FAUNA

Flora and fauna is a less significant issue when compared to the other GIA's. The Vegetation Protection Overlay (VPO), Significant Landscape Overlay (SLO) and Salinity Management Overlay (SMO) are not present within the boundary of the site. The Environment Significance Overlay (ESO) applies to some narrow strips in the south-west of the site (Schedule 5) and to a large area to the west (Schedule 2). Further, a 22 hectare likely primary koala habitat has been identified and there are several matters of national significance known to occur within a 500 metre buffer of the Western GIA (as shown in Map 20 to the left).

The Western GIA also has a relatively low Strategic Biodiversity Score. There are several dams along waterways to the south and identifiable creeks including Kensington Creek, along the southern section of the eastern boundary, and Winter Creek, along the southern boundary of the GIA.



OTHER INFLUENCES

LEGEND

- western GIA
- environmental audit overlay
- industrial zone
- landfill sites
- cultural sensitivity
- historical mining
- freeways and highways
- arterial roads
- collector roads
- local streets

Map 21 Western GIA Other Influences

BUFFERS FOR SENSITIVE USES

There are no buffers required for separation from sensitive sites for the Western GIA.

NOISE IMPACT

The Western GIA is located under the Ballarat Aerodrome primary runway 18/36 flight tracks and will be impacted by aircraft noise, with the maximum event noise levels due to aircraft flyover predicted to be up to 80dB(A). Road traffic noise from the Glenelg Highway and future Western Link is also moderate and noise mitigation measures such as noise walls and buffer zones may be required. Noise from industrial and railways is not estimated to impact on the GIA.

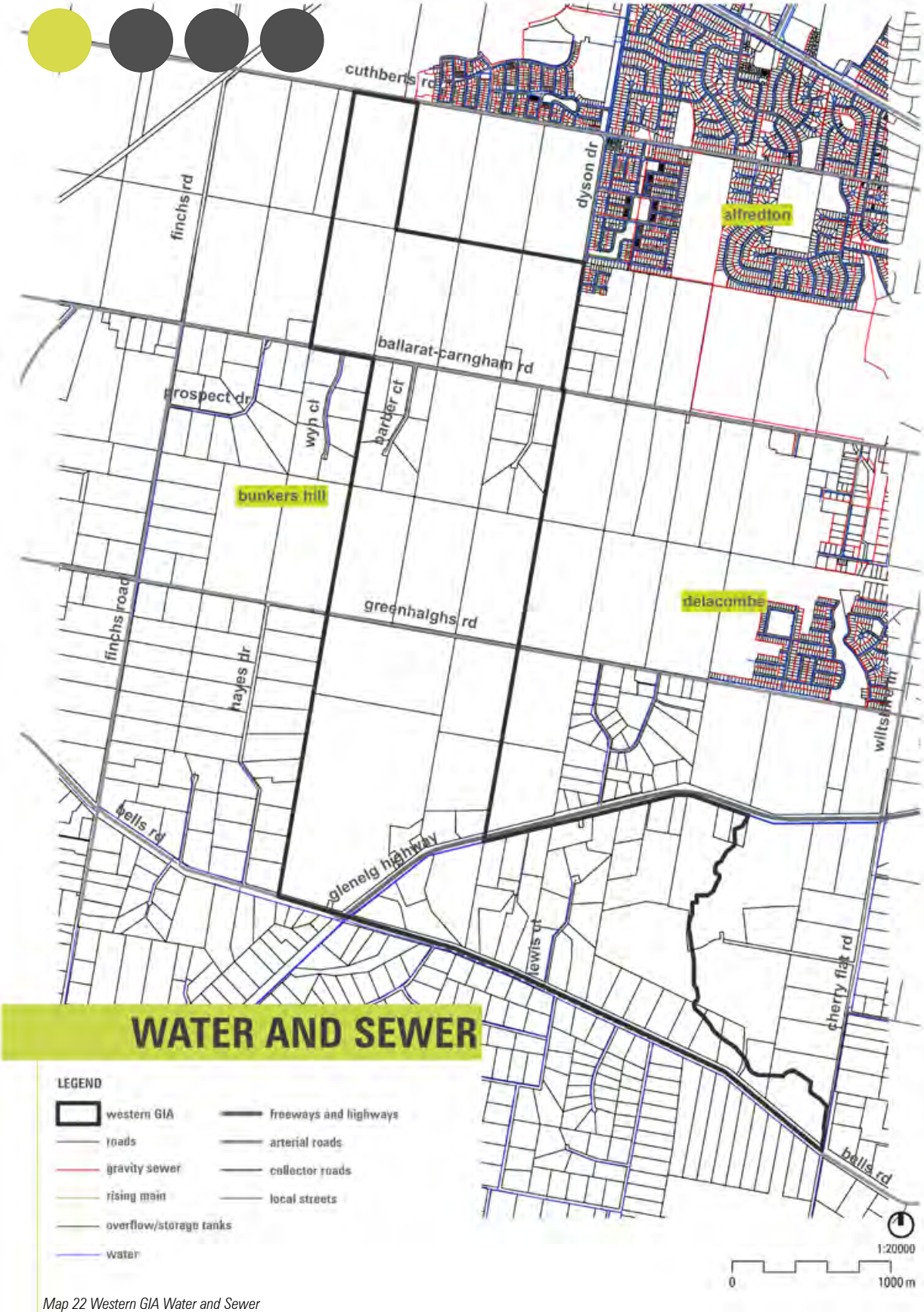
CONTAMINATED SITES & PAST MINING ACTIVITIES

No potentially contaminated land has been identified by an Environmental Audit Overlay (EAO) within the Western GIA. However it does apply to some land parcels within 100 metres of the site. Further, historical mining activities and expired licenses and leases have not been identified on the site.

GEOTECHNICAL CONDITIONS

With regards to the geotechnical conditions, they are generally poorer than the other GIA's. The land instability is moderate as there are areas of localised instability, particularly adjacent to the colluvial deposits in existing creeks and waterways however this should be able to be managed through good practice.

Further, the potential for highly reactive heavy clay which can result in widespread cracking and settlement to buildings is relatively high, however this is expected to be managed by good practice.



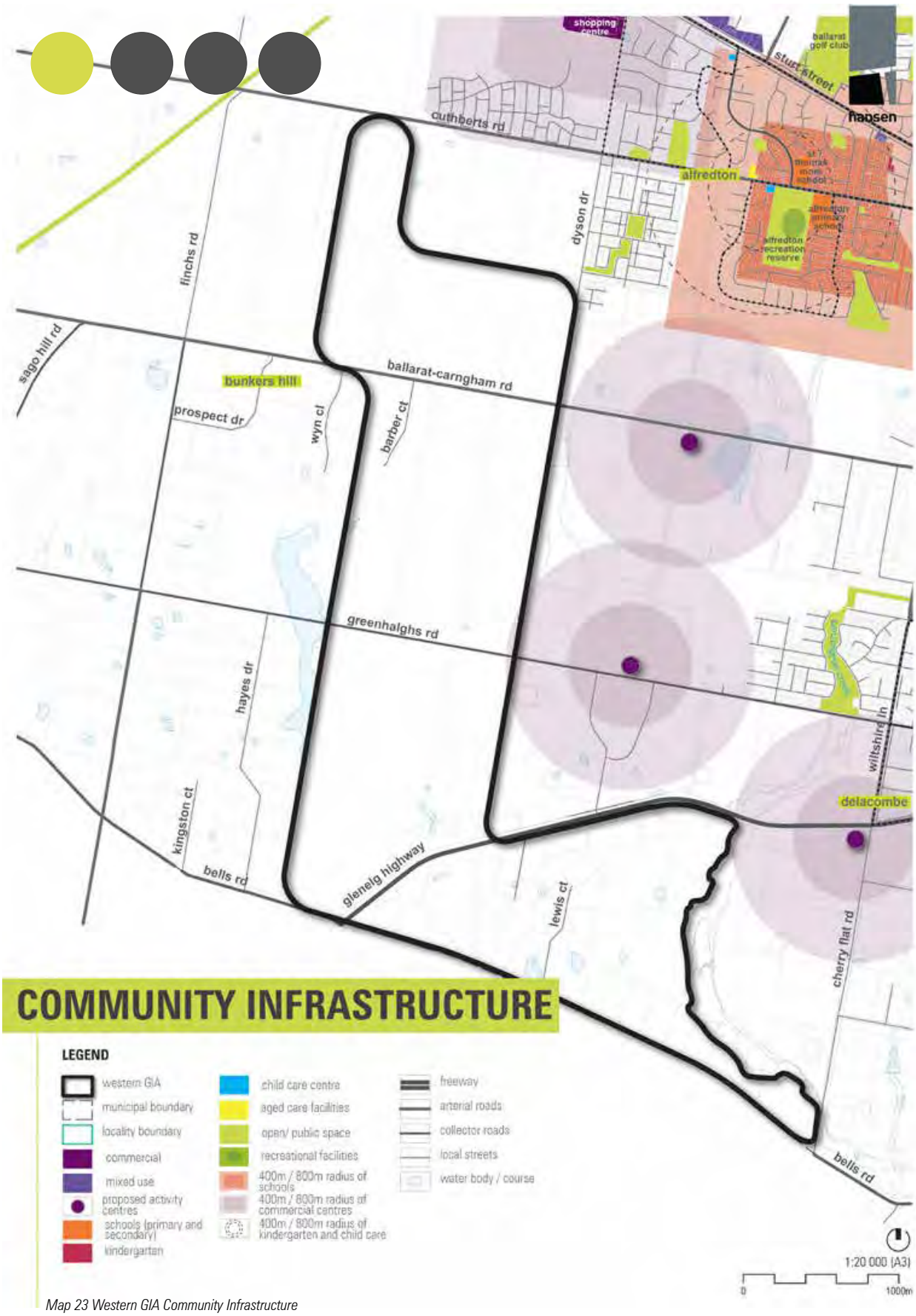
Map 22 Western GIA Water and Sewer

ACCESS TO EXISTING UTILITY INFRASTRUCTURE

The Western GIA is predominantly comprised of undeveloped farming and grazing land. The major utility services present in some capacity include:

- Water Supply (shown in Map 22);
- Electricity (Distribution); and
- Telecommunications.

Formal drainage and sewer infrastructure is not present and information from the gas distribution authorities has not been provided for this assessment. Consequently, it is unknown if gas mains and reticulation pipes exist within the GIA. It has been determined that trunk utility infrastructure does not currently exist within the site and reticulation networks are largely absent. However, the proposed development of the adjacent Ballarat West PSP area will result in the construction of water, sewer, gas and electrical mains along parts on the eastern boundary of the Western GIA. Fixed wireless service as part of the National Broadband Network (NBN) is widely available across the study area.



Map 23 Western GIA Community Infrastructure

ACCESS TO EXISTING COMMUNITY INFRASTRUCTURE

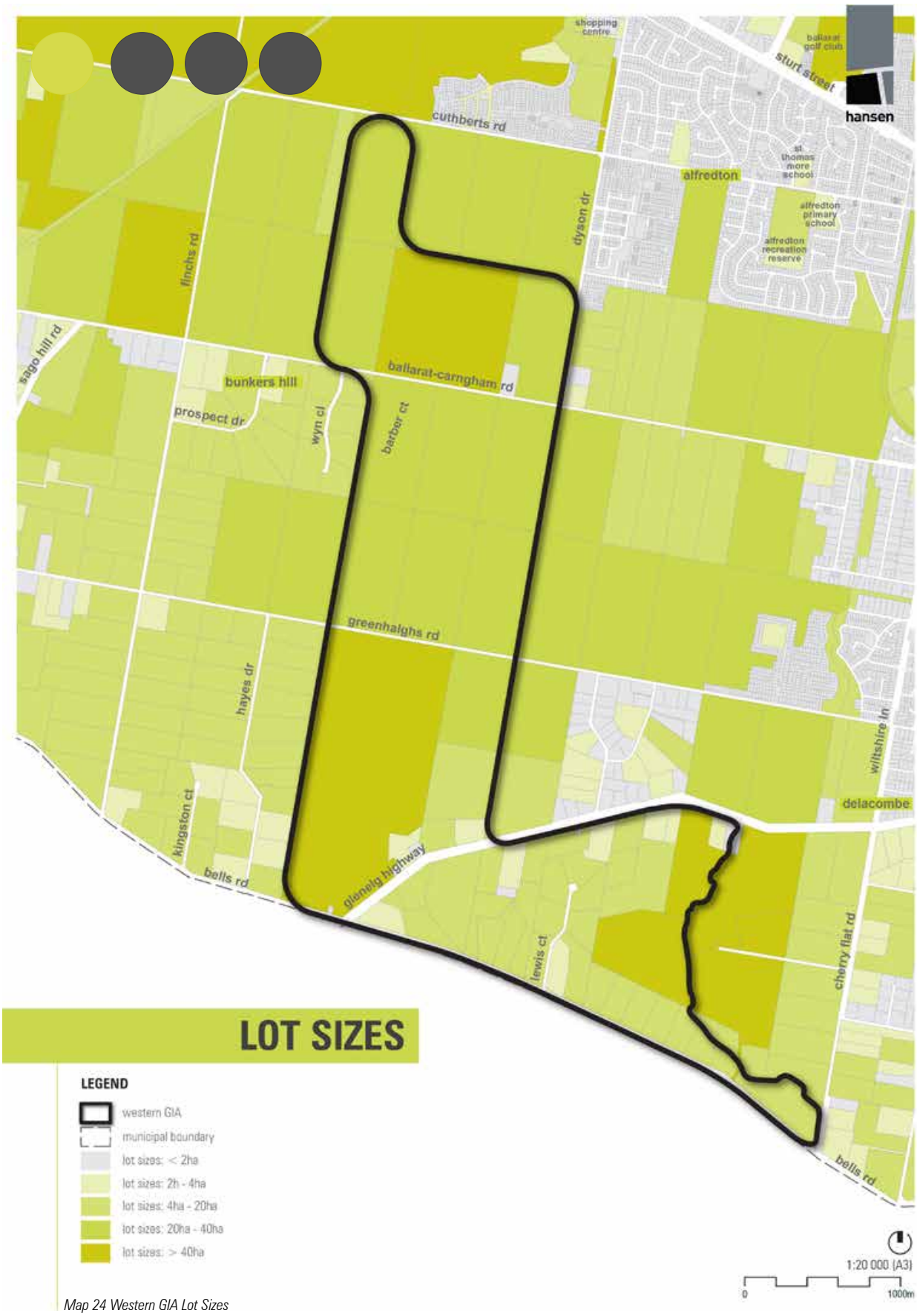
Providing appropriate community facilities within any new growth area is an important consideration. The following table 9 provides an understanding of where existing facilities are located in proximity to the Western GIA boundary. These community facilities have been mapped to the left (Map 23), illustrating their proximity to the GIA. A 400m and 800m radius has been shown from schools, kindergartens, child care centres and commercial precincts to highlight their distance from the GIA. These community facilities have been categorised under the following headings:

- Recreation/ cultural infrastructure;
- Educational infrastructure; and
- Healthcare infrastructure.

It is noted that the Ballarat West Growth Area has identified four activity centres, including one major activity centre at Delacombe (located on Glenelg Highway), which will include a range of community facilities that will service both the existing West Growth Area and potentially accommodate any future growth in the Western GIA. The closest existing community hub is located in Alfredton, approximately 2.5km east of the northern edge of the GIA. This community hub includes 2 primary schools, 2 child care centres, a kindergarten and a recreation reserve. A new shopping centre precinct (Coltman Plaza- Lucas) is currently being developed on the corner of Sturt Street and Dyson Drive which will service the surrounding suburbs.

COMMUNITY INFRASTRUCTURE	APPROXIMATE DISTANCE FROM WESTERN GIA BOUNDARY
Recreation/ cultural infrastructure	
Alfredton Recreation Reserve	2.3km by road
Delacombe Sports Centre	2.9km by road
Educational Infrastructure	
Alfredton Primary School	2.5km by road
St Thomas More School	2.5km by road
Alfreton Child Care Centre	3.0km by road
Goodstart Early Learning Alfredton	2.4km by road
Alfredton Pre-School	3.2km by road
Delacombe Primary School	3.0km by road
Goodstart Early Learning Delacombe	2.6km by road
Lumen Christi Primary School	3.8km by road
Healthcare Infrastructure	
Kallara Residential Care	2.1km by road
Meadow Gardens Retirement Village	2.4km by road

Table 3: Existing Community Infrastructure

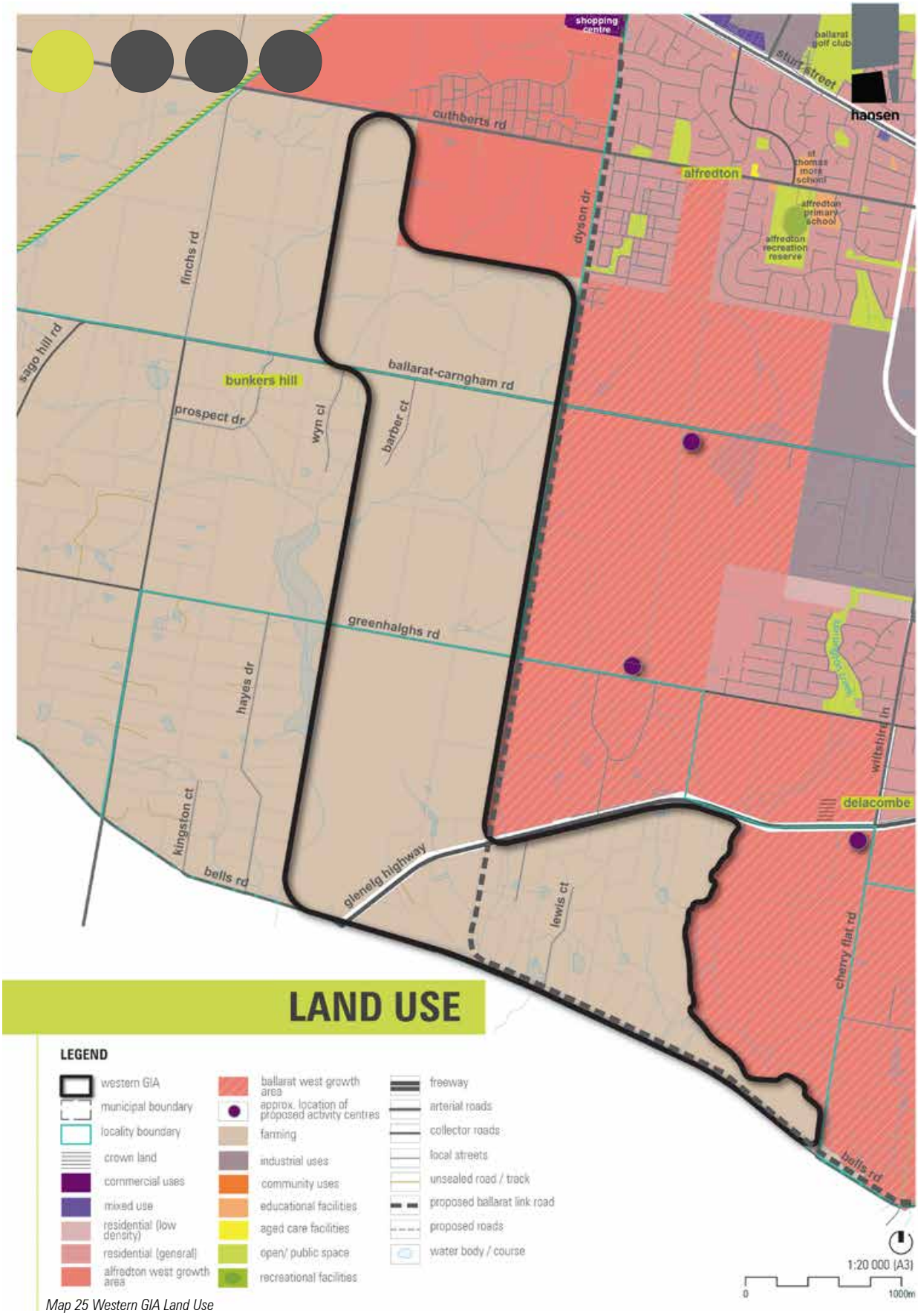


Map 24 Western GIA Lot Sizes

CURRENT LAND USES AND LAND FRAGMENTATION

Of the GIA's being investigated, the Western GIA constitutes relatively open, flat broad hectare farming/ rural land. Land holdings are generally of a larger rural scale, although some large lot rural residential development is located throughout. Typically speaking there are no physical barriers or land form constraints to future development extending into the Western GIA from the Ballarat West Growth Area. The following outlines the current land uses, activities and land fragmentation located within the Western GIA, which have been shown on Map 24 to the left and Map 25: land use overleaf:

- Land located to the north of Glenelg Highway broadly constitutes open hectare rural land which accommodates livestock grazing or otherwise underutilised.
- A commercial tree plantation operation is currently accommodated on a large land parcel located to the south of Ballarat-Carngham Road.
- Many of the larger rural properties accommodate residential dwellings.
- Some 'rural living' type large allotments are located throughout, including to the south of Ballarat-Carngham Road and to the south of Glenelg Highway.
- Land fragmentation is more pronounced in the area south of Glenelg Highway, where land use and activity constitutes 'rural living' subdivision than broad hectare farming.
- While there are seemingly consistent rectangular shaped allotments in a grid formation to the north of the Glenelg Highway, the more fragmented land to the south of the Highway ranges in size and shape, with most the development stretched along Bells Road and Glenelg Highway.
- There are three significantly larger lots (> 40 ha) as shown in the lot sizes mapping to the left, one on the northern boundary, one of the south-western boundary and one split over the south-eastern boundary. The majority of lots sizes range between 4ha and 40ha, with a few scattered lots below 4ha, located predominately at the southern edge.
- There are a number of small water bodies scattered throughout southern area of the GIA. Larger creek lines appear along the western boundary, while the Kensington Creek forms the south-eastern boundary.

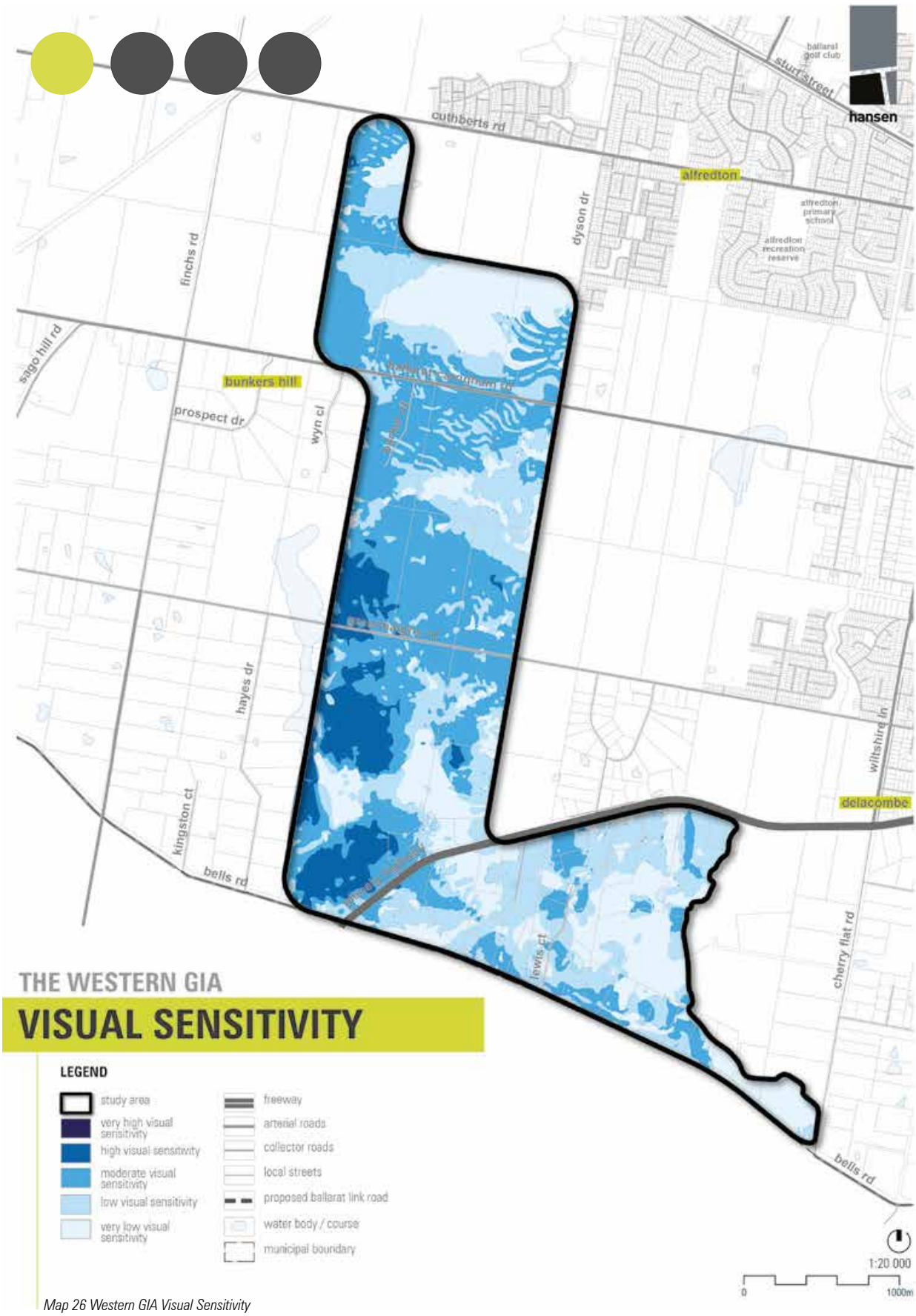


Map 25 Western GIA Land Use

EXTERNAL INTERFACES AND SURROUNDING LAND USES

The following outlines the external interfaces and surrounding land uses (as shown on Map 25 to the left) which inform the current and future context of the Western GIA:

- Land located to the north and east of the GIA, constitutes vacant broad hectare land which is designated for future urban development through the application of the Urban Growth Zone (UGZ). Predominantly this adjacent land remains rural in character and undeveloped, except for a small area of recent residential development immediately to the north east.
- Bells Road on the southern edge of the GIA, constitutes the municipal boundary between the City of Ballarat and the Shire of Golden Plains. Land use and activity within the northern areas of Golden Plains generally consists of larger lot rural residential development which is reflected in the application of the Rural Living Zone (RLZ) over land within Golden Plains.
- Land to the west broadly constitutes open hectare rural land which accommodates livestock grazing or otherwise underutilised. Smaller clustering of rural living lots are noted at Bunkers Hill.
- Regarding future land use and activity a new Major Activity Centre has been proposed along the Glenelg Highway at Delacombe, along with 3 other activity centres in the Ballarat West Growth Area.
- Additionally a major piece of transport infrastructure has been proposed along the eastern boundary of the Western GIA. The Ballarat Western Link Road is a 16km arterial road that has been proposed to connect the Western Freeway to Midland Highway, bypassing the Ballarat CBD. This will become an important link road providing access for the Western Growth Area and servicing the Western Employment Zone allocated to the north of the GIA and would be a primary access route for the Western GIA. The Link Road was adopted in early 2010, with Stage 1 of the proposal currently under construction.



Map 26 Western GIA Visual Sensitivity

VIEW SHEDS AND SIGNIFICANT LANDSCAPES

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by Hansen Partnership. Further detailed information is provided in Appendix 3 which contains Hansen Partnership - Ballarat Greenfield Investigation Areas: Landscape Assessment Report.

LANDSCAPE CHARACTER & VALUE

From a combination of fieldwork and desktop assessment, the following landscape character areas were identified in the Western GIA:

- Plains - Sparsely vegetated, relatively flat and low-lying land north of the Glenelg Highway.
- Plains Rural Living – Sparsely vegetated, relatively flat and low-lying land south of the Glenelg Highway, with a higher frequency of rural living allotments.

These landscape character areas were subsequently assigned with a landscape value, the designation of which was formulated through an assessment based on established approaches as outlined in benchmarking documents and Hansen Partnership's professional experience with similar projects.

- Low Landscape Value: Plains and Plains Rural Living.

VISUAL EXPOSURE

Through an analysis of views within and near to the Western GIA demonstrated in the view shed and views assessment, a picture of visual exposure, or what areas of the study area are more visible than others, was created. For the Western GIA, general trends of visual exposure included the following:

- Lower-lying areas on the western extents of the study area afforded the highest level of visual exposure, with areas of very high visual exposure identified. This was afforded via views on the elevated hillsides throughout the 'Plains' area.
- Views near to the 'Plains Rural Living' character area were generally constrained due to undulating terrain.
- Due to a lack of prevailing canopy vegetation, the results of the fieldwork and view shed were generally supportive of each other.

VISUAL SENSITIVITY

Areas of landscape value and visual exposure have been overlaid to explore their visual sensitivity, or the ability of a specific area to accommodate change. Landscapes with a higher visual sensitivity generally have a lower threshold beyond which changes in the landscape start to detrimentally impact on the value/ significance of that landscape. Visually sensitive landscapes for the Western GIA are as follows:

- Low to moderate visual sensitivity is present in the majority of the 'Plains' area north of Glenelg Road, with lower visual sensitivity afforded to relatively more elevated areas of the northern and eastern extents of the study area. This is afforded by the relatively low landscape value of the area and the limiting effect that the slightly undulating terrain has on views to more elevated areas.
- There are several areas of high visual sensitivity in the lower-lying areas in the south western extents of the study area. As the GIA is of a uniformly low landscape character, this is primarily due to the high visual exposure of these areas due to their prevalence in views from the more elevated hillsides.
- Constrained view lines in the slightly more undulating 'Rural Plains' landscape character area were the primary factor in the assignment of a predominantly low to very low visual sensitivity throughout this area, which is designated with a low landscape value.
- It should also be noted that there were no areas of very high visual sensitivity identified in this study area, with an overall predominance of low and moderate visual sensitivity.

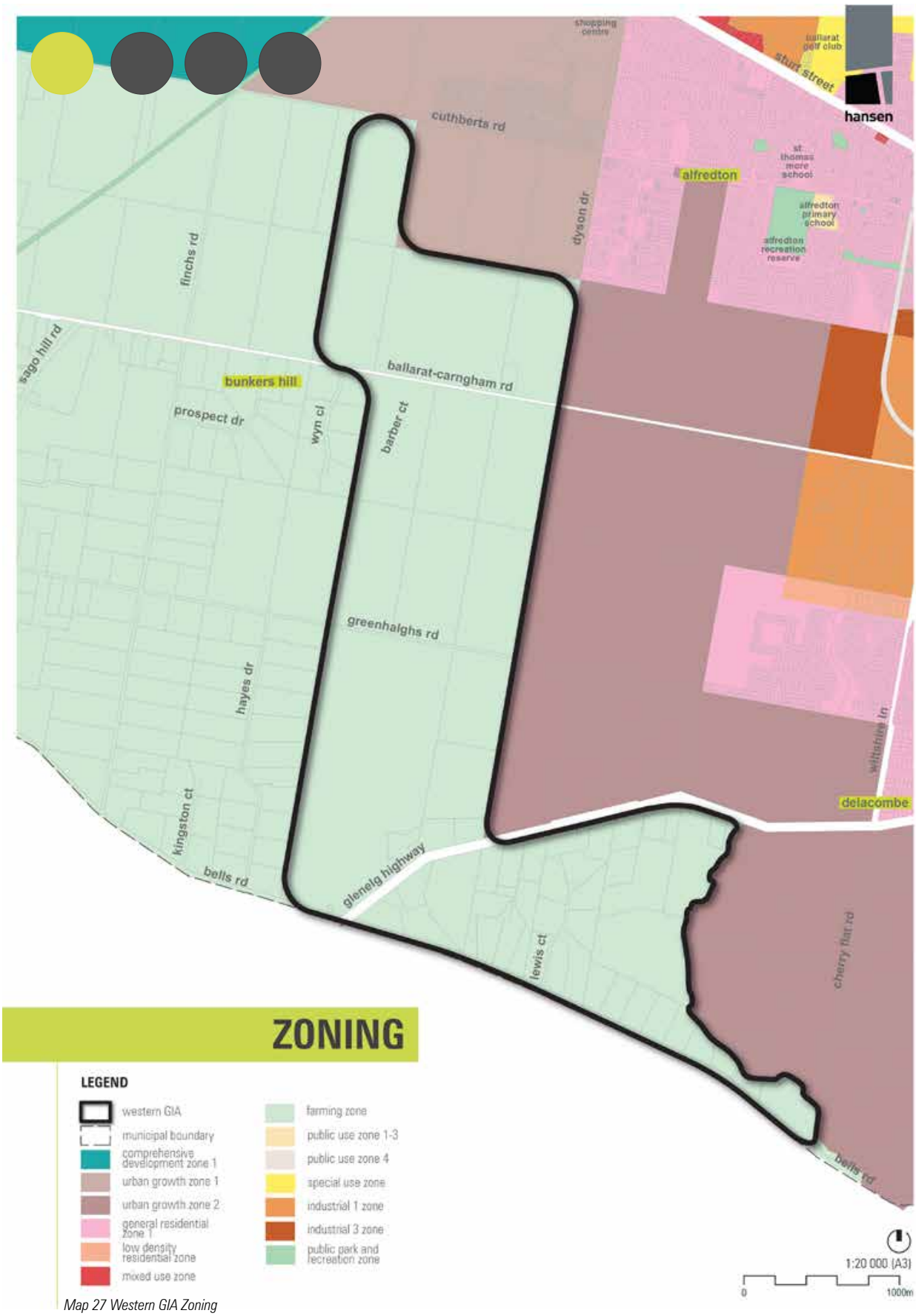
LANDSCAPE ASSESSMENT RECOMMENDATIONS

Landscape Assessment recommendations for the Western GIA are based on assigned visual sensitivity areas, which are the outcome and synthesis of the landscape assessment. It is acknowledged that this is part of a wider assessment of the suitability of the land within the GIA's for development. However, it is intended that this assessment provide some broad guidance for potential development in these areas on the basis of visual landscape principles.

It is also aimed the following provides a broad framework to assist in potentially enhancing the character of areas which were identified as having a somewhat lower landscape value such as the 'Plains' and 'Plains Rural Living' areas.

Recommendations based on the landscape assessment with the aim to maintain and enhance existing high quality or visually sensitive landscape areas include the following:

- Specification of lower density development in areas assigned with a 'High' visual sensitivity rating. This primarily applies to lower-lying land on the western reaches of the GIA.
- Implement a range of built form guidelines that tailor controls suitable to the level of visual sensitivity in a particular area (i.e controls for 'High' visual sensitivity areas), which focus on reducing the visual impact of development, these could include but not be limited to:
  - Locating of structures / dwellings away from significant view lines, ridge lines or high points. If located within a significant view line, efforts should be made to make the structure inconspicuous.
  - Development that is designed and sited to reflect the natural topography and complement the landscape character of the area.
  - Development that is of a low to medium scale while maintaining a moderate building footprint within a landscape setting.
- Consideration to designating areas with a 'High' visual sensitivity rating as public open space or for non-visually obtrusive public facilities as a means of limiting development and hence any associated visual impact in these sensitive areas. Implementation of such also means that significant views obtained from these areas remain in the public realm.
- Protect and enhance areas of significant vegetation as a key, valued character element of the study areas, particularly at roadsides, where it references historic land uses and where groups of well-established native vegetation is present.
- Incorporate significant vegetation into proposed allotments, road reserves or open space areas.



Map 27 Western GIA Zoning

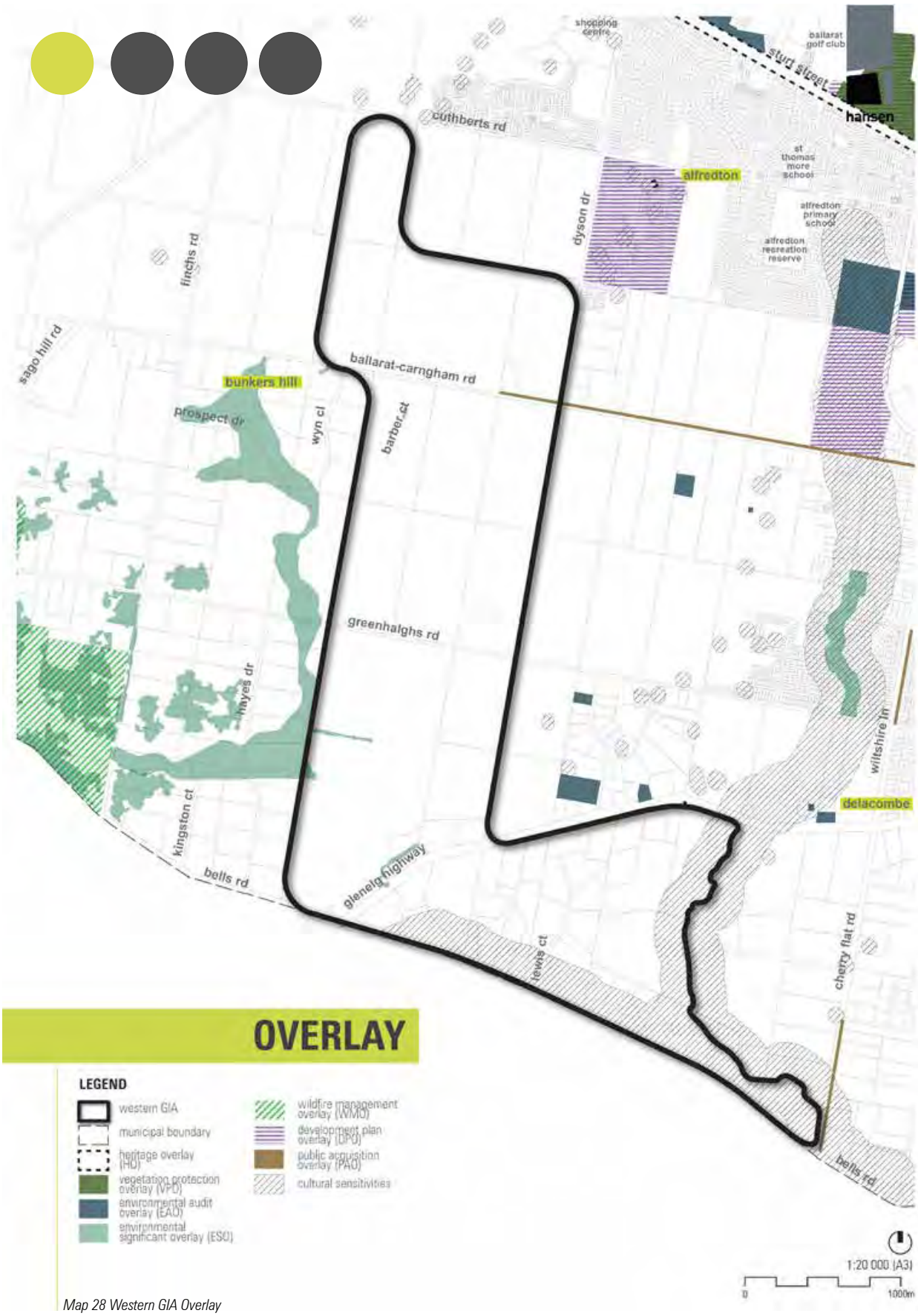
ASSESSMENT OF PLANNING POLICY

The capability of the land to accommodate future urban development has been considered and assessed against the Planning Policy Framework, zones and overlays within the existing Ballarat Planning Scheme, and includes the Ballarat Strategy (2015), implemented by Amendment C194.

CURRENT ZONING

The current zoning of land within the designated Western GIA is exclusively within the Farming Zone (FZ) (shown on Map 27: Zoning to the left). The Farming Zone (FZ) extends to the land located outside of the study area further to the west, whilst the Western GIA abuts the Urban Growth Zone: Schedule 2 (UGZ2) of the Ballarat West Growth Area along its eastern boundary, and the Urban Growth Zone: Schedule 1 (UGZ1) of the Alfredton Growth Area along its northern boundary.

The current Farming Zone (FZ) controls implements a minimum 40 ha allotment size, of which clearly places limitations on further subdivision and potential fragmentation of the Western GIA, whilst guiding land use and activity towards farming and agricultural activities. However, from discussions with landowners during the initial consultation process, it appeared that there was a broader desire for redevelopment of the Western GIA for urban use, where many of the current rural land uses were considered to be 'holding' type activities, until future urban development is potentially facilitated.



Map 28 Western GIA Overlay

CURRENT OVERLAYS

The only overlays found within the Western GIA relates to the: Public Acquisition Overlay, Schedule 1 (PAO1) and Environmental Significance Overlay (ESO) (shown on Map 28 to the left). The Public Acquisition Overlay (PAO1) is applied to a section of land to the northern side of Ballarat-Carngham Road which is designated for road construction or road widening by VicRoads. The PAO1 extends along Ballarat-Carngham Road to Wiltshire Lane / Learmonth Street. The Environmental Significance Overlay (ESO) is applied sporadically to small sections of land located throughout the Western GIA. The ESO Schedule 2 relates to land along the western side of the western boundary from Hayes Drive to Bunkers Hill, designated for stream side and watercourse protection. The three smaller sections of ESO Schedule 5 are areas identified for koala habitat protection.

CULTURAL HERITAGE

Cultural heritage is generally less prominent in the Western GIA in comparison to the other GIA's. The Heritage Overlay (HO) does not apply to any land within the boundary or within 500 metres of the site boundary. Cultural sensitivity is moderate as there are areas of Aboriginal cultural sensitivity along the east and south boundaries of the south eastern section of the GIA (as shown in Map 28 to the left). These are approximately 200 metre buffers from Winter Creek and Kensington Creek, which run along the GIA boundaries in this section. The Western GIA also lies across three Indicative Character areas identified in Mapping Ballarat's Historic Urban Landscape (Context Pty Ltd, 2013). Most of the GIA is located within the Burrumbeet Plains Rural Character area whilst the south-west section is located in the Haddon Hills and Common Rural Character Area and the south-east section is in the Bonshaw/Magpie/Scothman's Lead Mining Landscape Rural Character Area. The Western GIA does not have any sites identified on the Heritage Inventory, under the Victorian Heritage Act 1995.

CURRENT POLICY DIRECTION

The Ballarat Planning Scheme has recently been updated (via Amendment C194) to formally implement the recommendations of the Ballarat Strategy (2015), and making the strategy a specific reference document under *Clause 21.10*.

The Ballarat Strategy (2015) functions to guide growth and development and to appropriately manage such change so Ballarat in 2040 has built on its strengths and retained its values and character. More broadly the Ballarat Strategy (2015) identifies and it recognises the opportunities to manage this change to create a greener, more vibrant and connected Ballarat.

At an overall city scale the Ballarat Strategy (2015) seeks the creation of compact and complete neighbourhoods, and includes a framework to encourage urban renewal and infill development to create a variety of housing types, within proximity of public transport and commercial and community services. It also seeks to build upon the mixture of urban and rural areas and seeks to create high amenity environments which area embedded with natural values and biodiversity by adopting an urban forest approach.

Within the context of the Ballarat Panning Scheme *Clause 21.01-3 Land use vision* outlines that: *"the Ballarat Strategy (2015) applies the community values and key principles as a longterm strategic direction for Ballarat towards 2040. It outlines the shared community vision for a greener, more vibrant and connected Ballarat…"*

Clause 21.01-4 Key issues outlines a number of relevant matters under the heading of settlement and housing, including:

- *Accommodating a projected population of about 160,000 people by 2040.*
- *Maintaining a compact settlement form as part of Ballarat's '10 Minute City'.*
- *Identifying and protecting long-term growth opportunities.*

- *Encouraging a variety of housing opportunities to respond to diverse community needs and aspirations for housing.*
- *Providing quality open space as essential for community health.*

More specifically *Clause 21.02-1 Urban Growth* acknowledges that: *"Ballarat is forecast to grow significantly towards 160,000 people by 2040. Most of this increased population is planned to be accommodated through infill in established areas, convenience living close to public transport, urban renewal precincts, and in properly planned greenfield growth areas such as Ballarat West".*

Figure 2 – Housing Framework Plan (Clause 21.02-1) illustrates 4 longer-term greenfield investigation areas, including the three GIA's nominated within the Ballarat Strategy, in addition to the TIGA land which resulted from the Panel Report recommendations on Amendment C194.

Clause 21.02-1 Urban Growth contains an objective and strategy which are relevant to the current study, including:

- *Objective 1: To support a pattern of growth which reinforces the '10 Minute City'.*
- *Strategy 1.4 Discourage increased development density in fringe areas, particularly those that are more than walking distance from activity centres.*

Likewise *Clause 21.02-4 Greenfield investigation areas* is specifically relevant to informing the context of the current study. This Clause identifies that:

"The Ballarat West Growth Area is the primary greenfield development area for Ballarat. Medium to long-term greenfield investigation areas (as identified in Figure 2 – Housing Framework Plan) require a more detailed feasibility assessment. Identification as an investigation area does not necessarily indicate strategic support for land use change potential.

Objective 4

To ensure that greenfield development is connected to the existing urban area.

Strategies

4.1 Discourage rezoning of additional greenfield land, which would compete with Ballarat West, until the market requires additional supply.

4.2 Ensure that future greenfield development is focused within roughly an 8km arc from the centre of Ballarat.

4.3 Avoid ad-hoc and unplanned greenfield development.

4.4 Discourage disconnected or 'leap frog' development.

4.5 Minimise the impacts of development on Ballarat's historic urban landscape, the environment and Ballarat's natural resource base.

4.6 Ensure the need for buffers to protect major water and sewerage assets and treatment plants from encroachment by sensitive land uses is taken into account as part of any greenfield investigation".

ASSESSMENT AGAINST BALLARAT STRATEGY

As part of this project it is important to assess each of the GIA's at a high level to see how they would broadly comply with and implement the initiatives if the Ballarat Strategy (2015). Accordingly the following comments are made with regard to the Western GIA:

Accessibility

- Would be within close proximity of a number of Activity Centres, including: Lucas LNAC, Carngham Road NAC and Glenelg Highway NAC (figure 12 Current Activity Centres, Ballarat Strategy (2015)).
- Only selected sections of the Western GIA are within the 10 minute drive catchment (figure 15 The '10 Minute City', Ballarat Strategy (2015)).

- Only selected sections of the Western GIA are within the 8km radius from Ballarat CBD (Figure 16 Future Greenfield Investigation Areas, Ballarat Strategy (2015)).
- The Western GIA would have benefit of improved road connections through the development of the Ballarat Western Link Road (figure 23 Improved Road Connections, Ballarat Strategy (2015)).

Public Transport

- Would not be within reasonable proximity of Future High Frequency Public Transport Corridor (figure 20 Towards a More Sustainable Transport System, Ballarat Strategy (2015)). However these could be extended to join the Western GIA along Latrobe Street/ Carngham Road and Glenelg Highway.

Employment

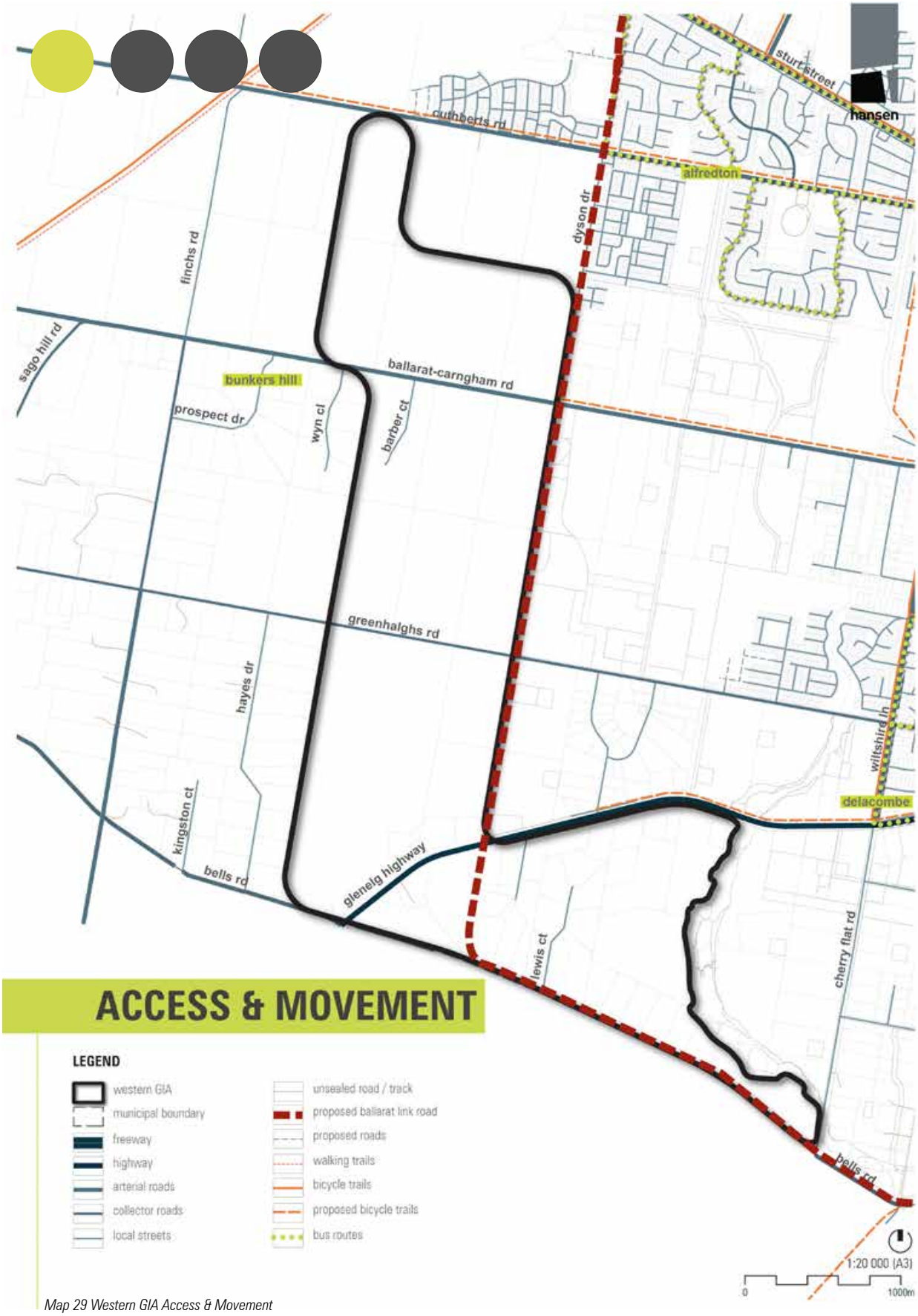
- Would be in close proximity of employment activity associated with industrial zones land on Carngham Road (figure 13 Industrial Areas, Ballarat Strategy (2015)).
- Would have good access to Ballarat West Employment Zone via the Ballarat Western Link Road (figure 13 Industrial Areas, Ballarat Strategy (2015)).

Landscape Interface

- Would be located adjacent to a large section of rural living land use and activity within the neighbouring Golden Plans Shire, located south of Bells Road (figure 19 Rural Living and Township Areas, Ballarat Strategy (2015)).
- The Western GIA is nominated as a rural interface area (figure 30 Rural Interface Areas, Ballarat Strategy (2015))

Neighbourhood Links and Landscaping

- The Western GIA would have potential to include links to join with proposed neighbourhood link networks (figure 22 Neighbourhood Links, Ballarat Strategy (2015))
- Western GIA would be located adjacent to the 'Living Corridor' network identified along the Western Link Road Corridor (figure 26 Living Corridors, Ballarat Strategy (2015))



Map 29 Western GIA Access & Movement

ASSESSMENT OF ACCESSIBILITY

Congestion levels were the most influential factor in differentiating between the GIA's for the accessibility assessment. All of the GIA's have access to employment opportunities and services within a 20 minute private vehicle trip (up to 2041).

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

EXISTING AND PLANNED FUTURE ROAD NETWORK

The site is bounded by Cuthberts Road to the north and Bells Road to the south whilst Glenelg Highway and Ballarat-Carngham Road bisect the site. The Western Link Road is planned to run adjacent to the east boundary of the Western GIA. The existing and future roads have been illustrated in Map 29 to the left).

Congestion levels are moderate and the assessment of transport forecasts contained within the Ballarat VITM Report indicates that in 2041, the network will experience some levels of congestion along key routes providing access to the site during the AM peak period. It is also likely that upgrades of Ballarat-Carngham Road and Cuthberts Road would be required to connect the site with the network providing access to the Ballarat CBD. The Western Link Road is planned to run through the site. Development of the Western Link Road will enhance accessibility to the north and south of the Western GIA and improve localised and regional access, including direct access to the Ballarat West Employment Zone.

PUBLIC TRANSPORT NETWORK AND FACILITIES

The closest point of the site is located approximately 2.5km from Wendouree Station and approximately 4.8km from Ballarat Station. There are no bus routes that currently service the site. The closest bus routes have been shown in Map 29 to the left.

WALKING AND CYCLING NETWORKS

The site is generally located at least 5.5km to 6km from the Ballarat CBD. Accordingly, the majority of walking trips and cycling trips are expected to remain either internal to the site or be limited to the immediate surrounding suburbs. There are no existing routes with dedicated cycling facilities that provide access to the site and with the inclusion of the planned cycling routes, the catchment still remains limited. There is an opportunity for the planned route along Greenhalghs Road (currently terminating at Wiltshire Lane) to be extended to the site to improve access to Ballarat CBD. (as shown in Map 29 to the left).

ACCESSIBILITY TO EMPLOYMENT AND SERVICES

Based on current planning, the site will have a high level of access to employment and retail services by private vehicle for the foreseeable future, however there is negligible access by public transport for the foreseeable future. The employment distribution forecasts outlined in the Ballarat VITM report suggest that more jobs will be located in the west of Ballarat in the future. On this basis there is an opportunity to provide increased public transport services to connect with these locations of employment. There is an opportunity to provide additional transport choice and increased access to employment and retail services through the provision of additional public transport services.

ASSESSMENT OF DELIVERABILITY

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

NEW TRUNK UTILITY INFRASTRUCTURE

Given that there is no trunk utility infrastructure currently within the GIA significant new trunk mains will be required within the Western GIA to deliver all services to the area.

STORMWATER

New trunk drainage infrastructure required includes:

- A number of retention basins located throughout the study area. The size and location of individual basins will largely be dependent on the topography and proposed land use of the study area and should be determined in collaboration with civil engineers and town planners.
- Wetlands that will be incorporated into the floor of each retarding basin to improve water quality. The application of this treatment measure ensures that land acquisition cost to meet WSUD requirements can be minimised.
- A network of stormwater drainage pipes that will convey the post-development 10 year ARI event flow to the retention basin.
- Stormwater drainage pipes that will convey the pre-development 100 year ARI event flow from the retention basins to the outfall creeks.

SEWER

A high level sewer network has been designed in accordance with the design principles outlined in the MRWA WSAA Sewage Code, Pressure Sewer Code and Sewerage Pump Station Code, as required by Central Highlands Water. While the design intent has been for a gravity network, the location of the outfall mains and the predominantly westward grading of the site have meant that three additional pump stations and rising mains will be required. The sewer mains which may require upgrading include:

- The rising main that extends from eastern boundary at the Glenelg Highway to the existing trunk main located on Webb Road. This is approximately 6.5km.
- The rising main that extends to the eastern boundary along Ballarat-Carngham Road. This main is approximately 750m.
- Sewer Pump Station proposed for Ballarat West PSP.

It is also noted that due to the lack of peak wet weather capacity in the downstream network (beyond the Ballarat West PSP area), if significant downstream upgrades are not undertaken, peak flows will need to be contained within the GIA which would require space for detention networks.

WATER

Central Highlands Water has stated that it may be possible to upgrade and extend the network within the Ballarat West PSP area to supply the Western GIA. It is noted that there are existing level of service issues in Alfredton, north east of the Western GIA. These issues would be exacerbated by the additional demand of this growth area therefore requiring upgrades to Alfredton's network infrastructure. Services the Western GIA may also impact the level of service of the Haddon and Smythesdale areas if no upgrades are undertaken.

The proposed Ring Road water main upgrade is planned to address the current deficiencies in the system. This asset may need to be upgraded if growth occurs in the Western GIA.

To reduce demand, Central Highlands Water has indicated a desire to mandate household scale rainwater harvesting and the use of untreated groundwater however the viability of these services requires further investigation.

GAS

AusNet Services has advised that the location of the Western GIA would mean that supply would have to travel across Ballarat resulting in significant pressure reductions. This suggests that significant upgrades and new trunk infrastructure would be required to provide reliable supply to this area.

AusNet Services has advised that two new field regulators are currently being installed to enhance network pressures to ensure capacity for the immediate future. These upgrades do not consider future growth in this area.

ELECTRICITY

Powercor has confirmed that there is limited supply available to the Western GIA, however 22kV feeder augmentation works would be required to support significant growth in demand. Such augmentation works are included in Powercor's 10 year forward plan.

It is noted that Powercor's longer term plan is to establish a substation in Ballarat West. This substation is proposed to cater for growth in the industrial demand in the area but could also have advantages for the Western GIA.

It would be anticipated that at least one new 22kV feeder would be required to support the supply of electricity.

TELECOMMUNICATION

Telstra has advised that trunk infrastructure in growth areas will be dictated by developer applications. These protocols are spelt out by both Telstra and NBN Co and are at a cost to the developer.

NEW COMMUNITY INFRASTRUCTURE REQUIRED

The new community infrastructure required for the various scenarios for the Western GIA has been identified in table 11 below.

CATEGORY	INDICATOR	BENCHMARK	ACCESS DISTANCE	REFERENCE	SCENARIO				PROVIDER	EXISTING FACILITIES	DISTANCE FROM GIA
					1 (8 LOTS PER HA)	2 (12 LOTS PER HA)	3 (15 LOTS PER HA)	4 (20 LOTS PER HA)			
Recreation and Cultural Infrastructure											
Sport and recreation	Provision of recreation areas - active open space	One Level 1 active open space reserve (8 ha per active open space reserve) per 6,000 people	1000 metres for 95% of dwellings	ASRR 2008 GAA 2013	1.9	2.9	3.6	4.8	Local council		
	Provision of indoor sports venues	1 (2 court) facility per 20,000 to 30,000 people		ASRR 2008	0.5	0.7	0.9	1.1	Local council		
Community centres	Provision of community centres	Level 1 Provision ratios up to 10,000 people		GAA 2009	1.1	1.7	2.1	2.9	Local council		
Educational Infrastructure											
Kindergartens	Provision of and occasional care facilities	Provision ratios up to 10,000	600 metres	GAA 2009 Barton et al 2010					Private		
Primary schools	Provision of government primary schools	1 government primary school per 8,000 to 10,000 people	800 metres	ASRR 2008 Barton et al 2010	1.1	1.7	2.1	2.9	State government	Alfredton Primary School	1500 metres
	Provision of non-government primary schools	Provision ratios between 10,000 and 30,000 people	800 metres	GAA 2009 Barton et al 2010	0.6	0.9	1.1	1.4	Private	St Thomas More School	1500 metres
Secondary schools	Provision of government secondary schools	1 government secondary school per 25,000 to 30,000 people	1200 metres	ASRR 2008 Barton et al 2010	0.4	0.6	0.8	1.0	State government		
Healthcare Infrastructure											
GP clinics	Provision of GP clinics	0.34 general practices per 1000 people (Victorian average)		Dept of Health 2011	3.9	5.8	7.3	9.7	Private		
Dental practices	Provision of dentist sites	0.20 dental services per 1000 people (Victorian average)		Dept of Health 2011	2.3	3.4	4.3	5.7	Private		
Aged care	Provision of aged care facilities	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.6	0.9	1.1	1.4	Private	Kallara Residential Care	1300 metres
	Provision of aged care places	88 beds per 1000 people aged 70+		ANAO 2015	102	153	191	254	Private		
Community health centres	Provision of community health centres	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.6	0.9	1.1	1.4	State government		
Hospitals	Capacity	3.9 hospital beds per 1000 people (Australian average)		AIHW 2014	44	67	83	111	State government		

Table 4: New Community Infrastructure

Map 30 Western GIA Land Ownership

LAND OWNERSHIP

The Western GIA has minimal land owners spread across the narrow length of the study area. There are approximately 13 separate land owners in the Western GIA in the area to the north of Glenelg Highway, with six (6) major land holders owning multiple parcels each. South of Glenelg Highway is predominately individual land ownership, with a large area either side of the Kensington Creek corridor on the south-east corner of the GIA, owned by a single entity. The land ownership map to the left (Map 30) illustrates the parcels that have individual ownership, and the collective land parcels (separated by the grey outline), illustrating where multiple land titles are under a single ownership. Where a collective ownership of parcels is dissected by the GIA boundary, the full extent of the ownership of land is shown.

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ASSESSMENT OF INFRASTRUCTURE COSTS

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP and Tim Nott Economics. Further detailed information is provided in Appendix 1 & 2 which contains Tim Nott's and ARUP's separate technical reports.

DEVELOPMENT INFRASTRUCTURE COSTS FOR TRUNK INFRASTRUCTURE

DRAINAGE

The costs associated with the drainage trunk infrastructure for the various scenarios in the Western GIA are stated in table 12 below. The nominated scenarios within the table below relate to the 4 devised lots per hectare scenarios used to test and understand the implications of differing development densities within each of the GIA's.

SEWER AND WATER

As with all of the proposed areas, development of the Western GIA will drive the need for significant investment in new and upgrades to existing infrastructure in the quantum of $40M – $50M. Should this result in the need for a new wastewater treatment plant and re-use facility a further $50M - $80M could be required.

It should be noted that the need to convey sewer flows from this GIA across currently built up areas may introduce further complexities and in turn costs for any related upgrades.

GAS

While the authorities have not provided specific costs for trunk infrastructure, they have noted that the Western GIA will require a significant amount of investment to provide supply from the existing City Gate and maintain service levels across the network.

ITEM	SCENARIO 1 (8 LOTS PER HA)	SCENARIO 2 (12 LOTS PER HA)	SCENARIO 3 (15 LOTS PER HA)	SCENARIO 4 (20 LOTS PER HA)
New pipes and pits	$5,289,695.57	$7,284,297.72	$8,014,012.92	$8,785,827.08
Retention Basins / Wetlands	$12,342,623.00	$16,996,694.68	$18,699,363.49	$20,500,263.19
Council Fees	$617,131.15	$849,834.73	$934,968.17	$1,025,013.16
CAPEX (2015 prices)	**$18,249,449.72**	**$7,284,297.72**	**$27,648,344.59**	**$30,311,103.43**
CAPEX (2040 prices)	**$38,327,784.55**	**$16,996,694.68**	**$58,067,493.05**	**$63,659,861.53**

Table 5: Drainage Trunk Infrastructure Costs

Further details on each of the 4 devised scenarios is provided in the Development Scenarios section of this report. The above table should be read in conjunction with the identified issues with infrastructure provision which is provided under the Assessment of Deliverability sections of this report for each of the relevant GIA's.

ELECTRICITY

Powercor stated that costs associated with supplying this GIA are difficult to provide without a detailed in depth assessment. However, it was noted that costs would vary only slightly between the GIA's being considered and that there was no preference between areas.

TELECOMMUNICATIONS

Telstra has advised that charges for new infrastructure are generally borne by the developer and vary based on: type and size of the development; location; services required by the developer; network type; & relative proximity of Telstra's network with spare capacity.

COMMUNITY INFRASTRUCTURE COSTS

The community infrastructure costs for the various scenarios in the Western GIA have been identified in the table 13 below.

CATEGORY	INDICATOR	UNIT COST	REFERENCE	COST IN SCENARIO			
				SCENARIO 1 (8 LOTS PER HA)	SCENARIO 2 (12 LOTS PER HA)	SCENARIO 3 (15 LOTS PER HA)	SCENARIO 4 (20 LOTS PER HA)
Recreation and Cultural Infrastructure							
Sport and recreation	Provision of recreation areas - active open space	$ 6.75 million	Urban Enterprise, 2014	$13,500,000	$20,250,000	$27,000,000	$33,750,000
	Provision of indoor sports venues	$ 9 million	Urban Enterprise, 2014	$9,000,000	$9,000,000	$9,000,000	$9,000,000
Community centres	Provision of community centres	$ 4.4 million	Urban Enterprise, 2014	$4,400,000	$8,800,000	$8,800,000	$13,200,000
Educational Infrastructure							
Kindergartens	Provision of kindergartens	$ 1.3 million	City of Kingston, 2014	$1,300,000	$2,600,000	$2,600,000	$3,900,000
Long day care and occasional care	Provision of long day care and occasional care facilities	$ 4.1 million	ACT Government, 2012 McComish, 2013	$4,100,000	$8,200,000	$8,200,000	$12,300,000
Primary schools	Provision of government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$12,200,000	$24,400,000	$24,400,000	$36,600,000
	Provision of non-government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$12,200,000	$12,200,000	$12,200,000	$12,200,000
Secondary schools	Provision of government secondary schools	$ 20 million	Department of Treasury and Finance, 2014	$-	$20,000,000	$20,000,000	$20,000,000
Healthcare Infrastructure							
GP clinics	Provision of GP clinics	$ 1.4 million	Selesnew, 2008	$5,600,000	$8,400,000	$9,800,000	$14,000,000
Dental practices	Provision of dentist sites	$ 1.4 million	Selesnew, 2008	$2,800,000	$4,200,000	$5,600,000	$8,400,000
Aged care	Provision of aged care facilities	$ 17.9 million	Department of Treasury and Finance, 2014	$17,900,000	$17,900,000	$17,900,000	$17,900,000
	Provision of aged care places	$ 595,000 per place	Department of Treasury and Finance, 2014	$60,690,000	$91,035,000	$113,645,000	$151,130,000
Community health centres	Provision of community health centres	$ 50.2 million	Department of Treasury and Finance, 2014	$50,200,000	$50,200,000	$50,200,000	$50,200,000
Hospitals	Provision of hospital beds	$ 844,000 per bed	Department of Treasury and Finance, 2015	$37,136,000	$56,548,000	$70,052,000	$93,684,000

Table 6: Community Infrastructure Costs

DEVELOPER COSTS FOR LOCAL INFRASTRUCTURE

The developer costs for local infrastructure for the various scenarios in the Western GIA have been identified in the table 14 & 15 below.

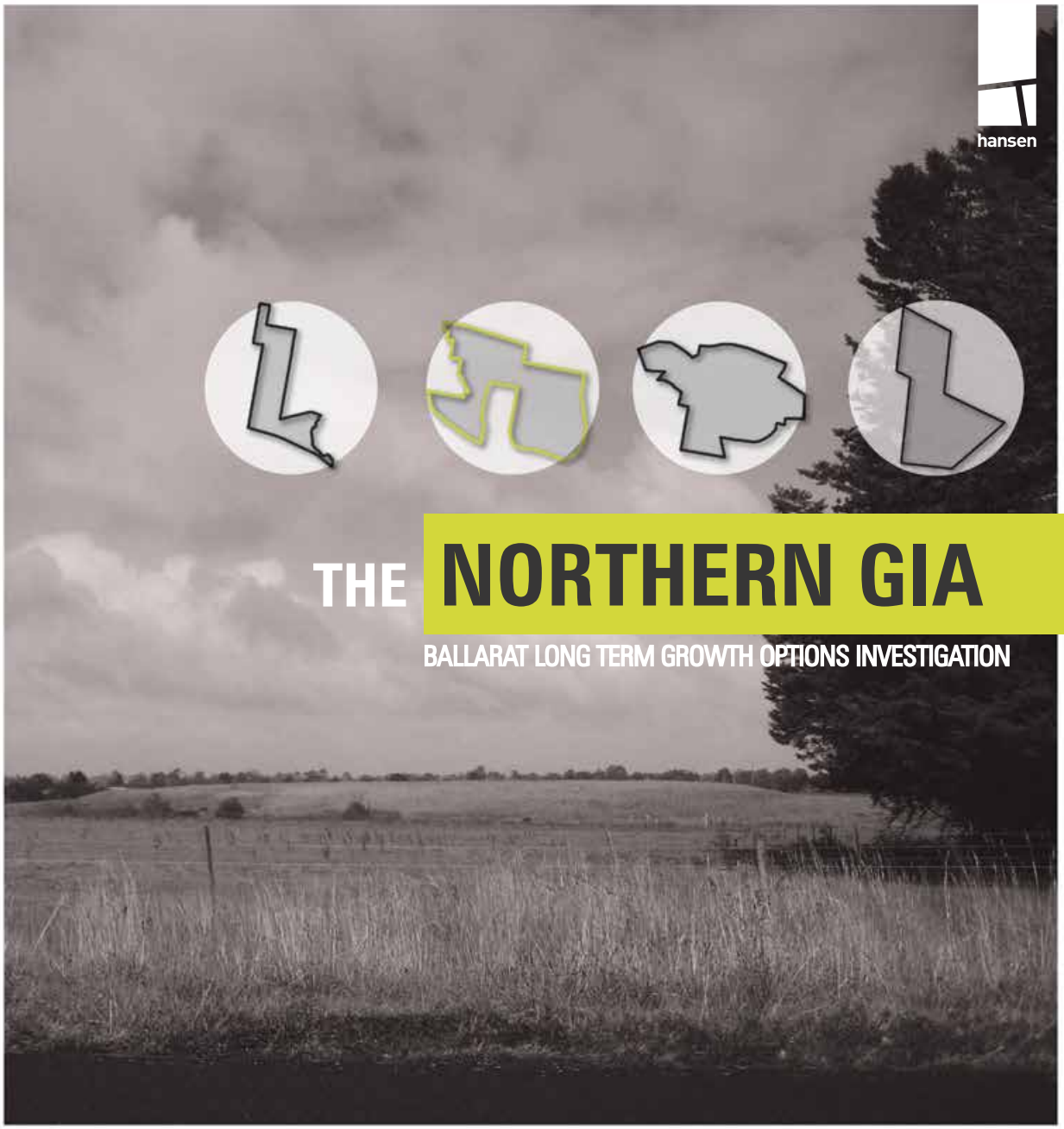
WESTERN GIA OPTION COMBINED COST ESTIMATE - 2015 PRICES				
	Scenario 1 (8 lots per ha)	Scenario 2 (12 lots per ha)	Scenario 3 (15 lots per ha)	Scenario 4 (20 lots per ha)
Roads	$57,955,413	$64,393,048	$64,393,048	$70,091,938
Water Supply	$20,683,710	$26,372,536	$29,787,577	$30,792,720
Sewer	$13,492,328	$15,777,584	$16,575,001	$18,985,829
Total	**$92,131,451**	**$106,543,168**	**$110,755,626**	**$119,870,486**

Table 7: Developer Cost Estimates For Local Infrastructure Using 2015 Prices

WESTERN GIA OPTION COMBINED COST ESTIMATE - 2040 PRICES				
	Scenario 1 (8 lots per ha)	Scenario 2 (12 lots per ha)	Scenario 3 (15 lots per ha)	Scenario 4 (20 lots per ha)
Roads	$121,718,879	$135,239,303	$135,239,303	$147,208,202
Water Supply	$43,440,256	$55,388,020	$62,560,343	$64,671,359
Sewer	$28,336,803	$33,136,333	$34,811,081	$39,874,341
Total	**$193,495,938**	**$223,763,656**	**$232,610,727**	**$251,753,902**

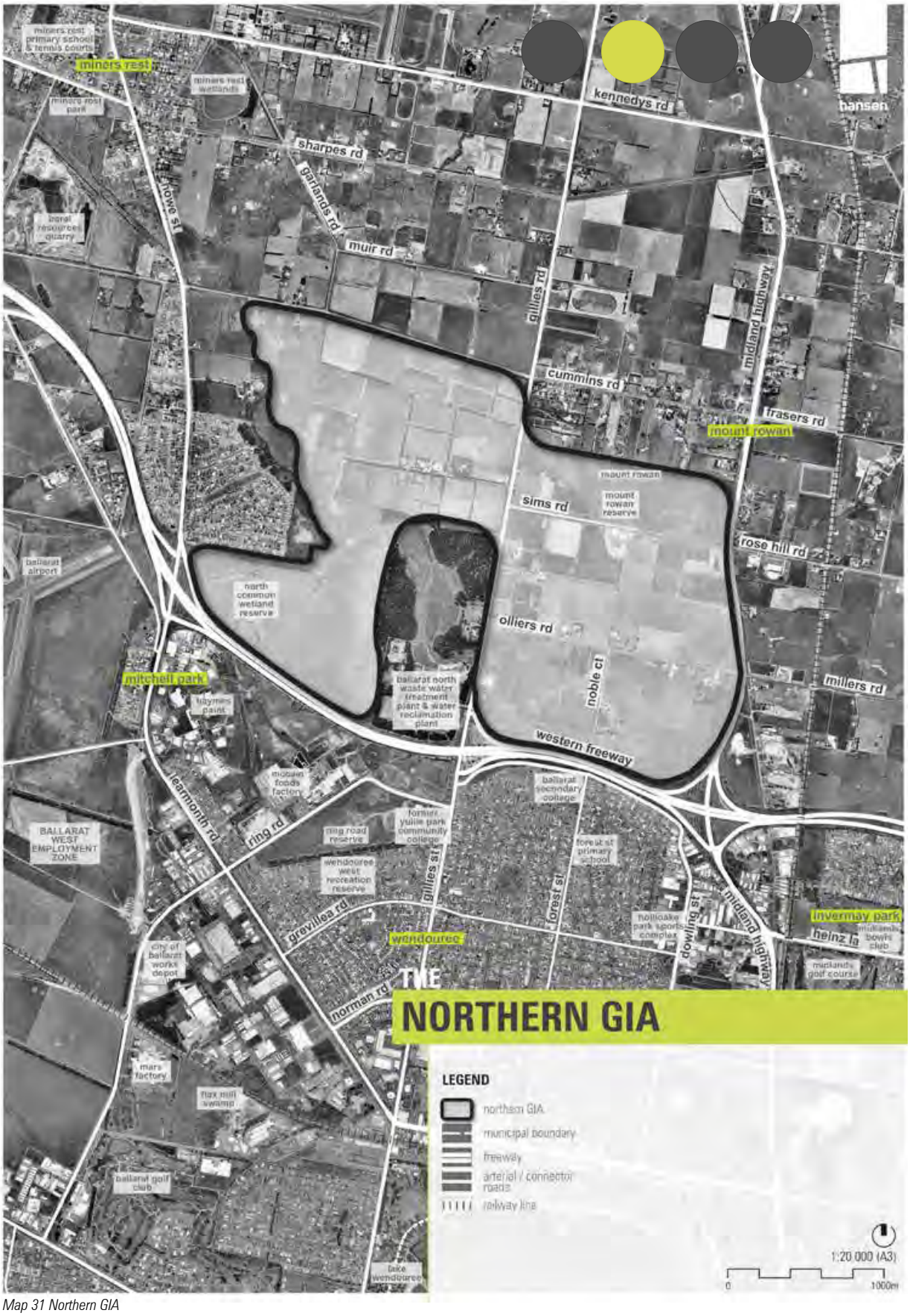
Table 8: Developer Cost Estimates For Local Infrastructure Using 2040 Prices

The above tables should be read in conjunction with the identified issues with infrastructure provision which is provided under the Assessment and Deliverability sections of this report for each of the relevant GIA's. Further details on each of the 4 devised scenarios is provided in the Development Scenarios section of this report.



THE NORTHERN GIA

BALLARAT LONG TERM GROWTH OPTIONS INVESTIGATION



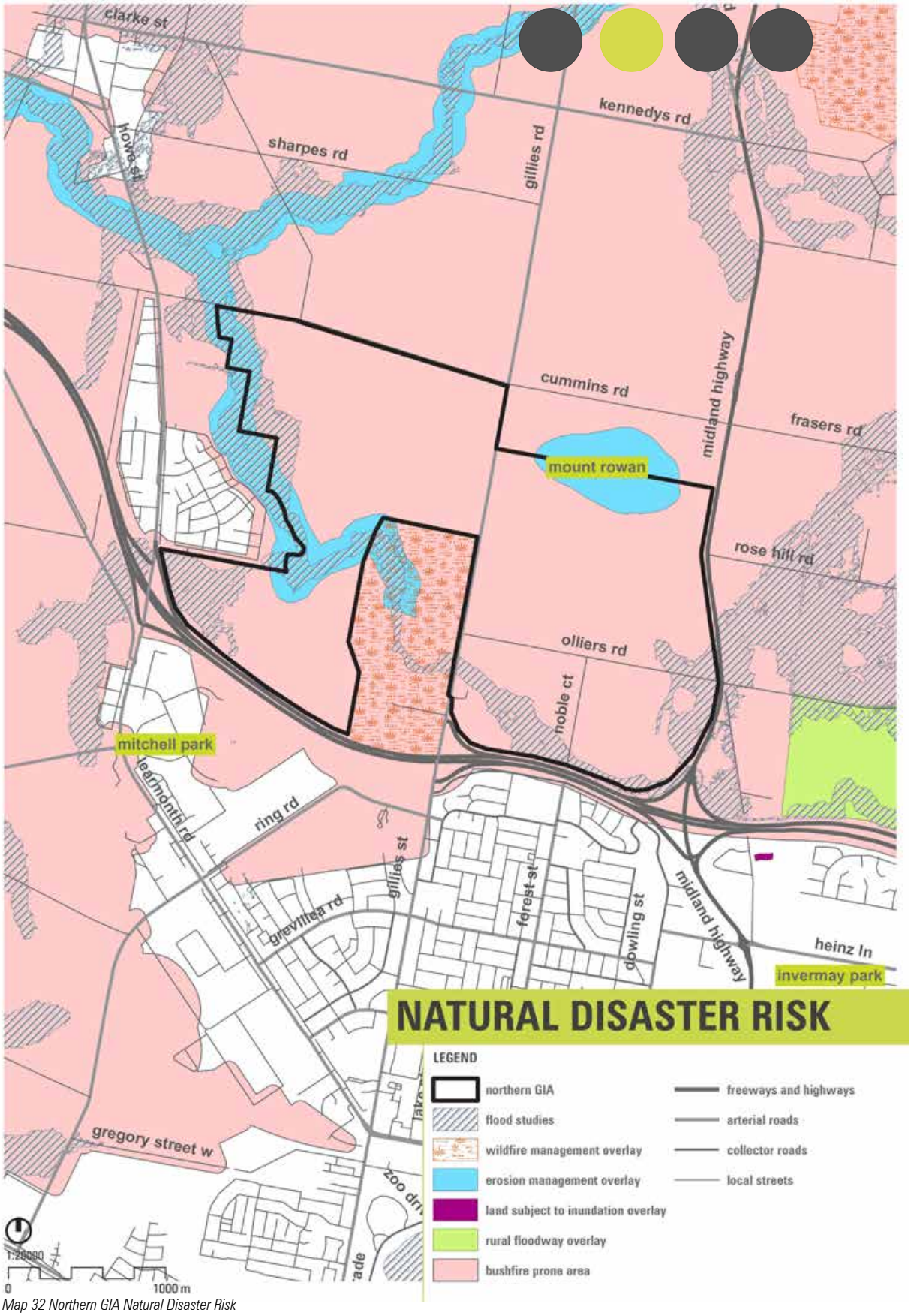
Map 31 Northern GIA

THE NORTHERN GIA

This section of the report will provide a detailed assessment of the technical background analysis relating to the Northern Greenfield Investigation Area (GIA), to inform the feasilbity assessment of each GIA in Ballarat.

The Northern GIA is:

- Located in parts of Mount Rowan and Miners Rest;
- Broadly bounded by Mount Rowan / Cummins Road to the north, the Burrumbeet Creek Corridor / Delaney Drive to the west, the Western Freeway to the south and the Midland Highway to the east; and
- Adjacent to the Ballarat North Waste Water Treatment Plant & Water Reclamation Plant on the northern side of the freeway.



Map 32 Northern GIA Natural Disaster Risk

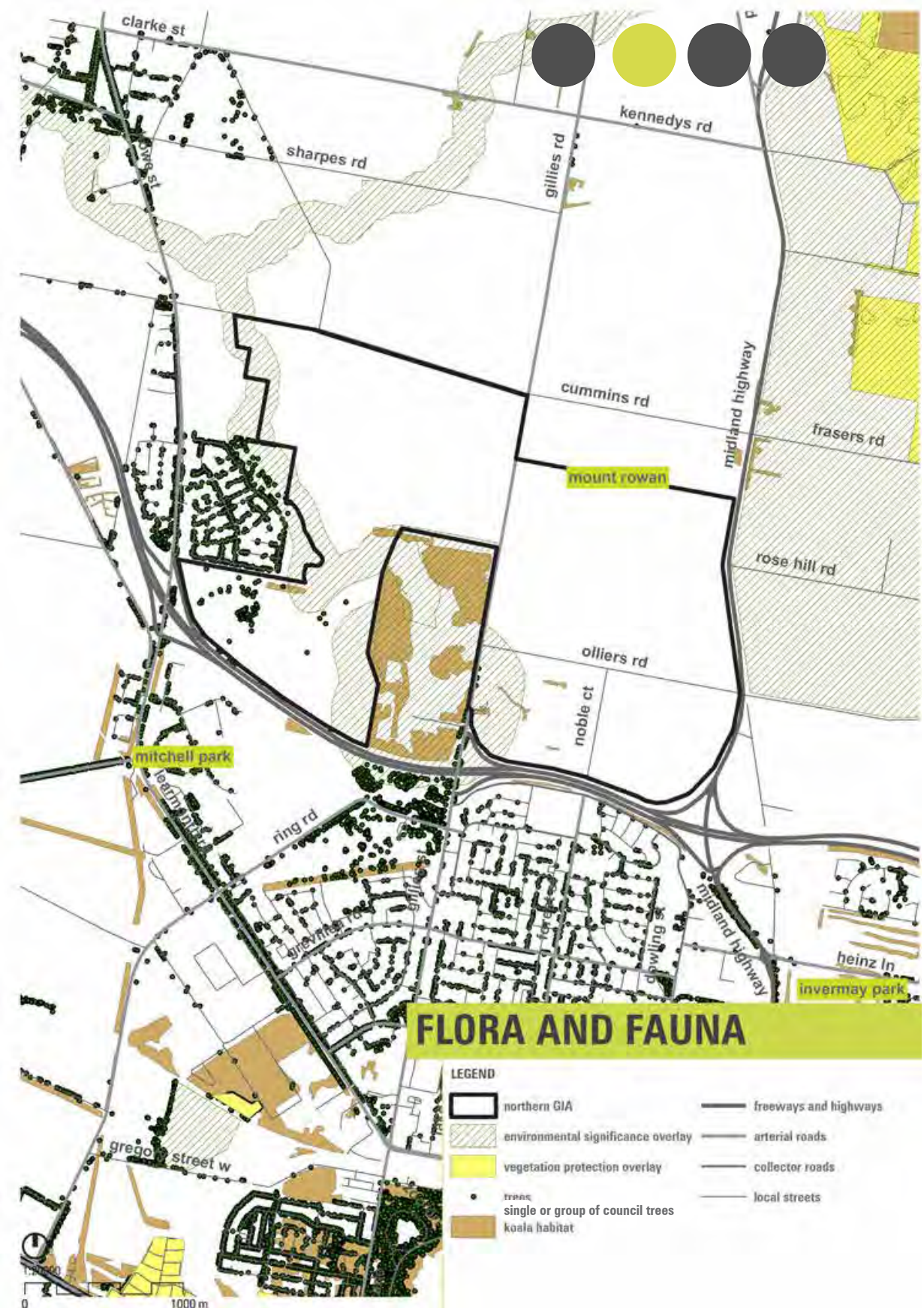
ASSESSMENT OF LAND CAPABILITY

The capability of the land to potentially accommodate future urban development has been considered and assessed from a variety of technical angles and general land use and planning considerations. Planning overlays were particularly important for the feasibility assessment of each site, specifically those related to natural disaster and flora and fauna. There was less variability evident in the noise levels and historical influences such as contamination, mining and geotechnical conditions between the GIA's.

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

NATURAL DISASTER RISK

With regards to natural disaster risk, both fires and flooding are potential issues in the Northern GIA (as shown in map 32 to the left). The Bushfire Management Overlay (BMO) does not apply to any land within the Northern GIA. However it does apply immediately south of the boundary, to the parcel of land bounded by the Western Freeway and the GIA where the Ballarat North Water Reclamation Plant is located. The Bushfire Prone Area designation applies to all of the land. The Erosion Management Overlay (EMO) applies to some land within the GIA including 100 metre buffer zone either side of the Burrumbeet Creek and Mount Rowan. Further, there are some areas to the south and west of the Northern GIA that are likely to be impacted by a 100 year flood. The Floodway Overlay (FO) indicate that areas adjacent to the Burrumbeet Creek, as well as the south west corner of the GIA will be impacted by flooding and these areas would be preferable to avoid for development.



Map 33 Northern GIA Flora and Fauna

PROTECTED FLORA AND FAUNA

Fewer constraints are presented by flora and fauna than in other GIA's. The Vegetation Protection Overlay (VPO), Salinity Management Overlay (SMO) and likely koala habitat has not been identified within the GIA. The Environmental Significance Overlay (ESO) is located around the Ballarat North Wastewater Reclamation Plant (Schedule 4) and around Burrumbeet Creek (Schedule 2) and the Significant Landscape Overlay (SLO) applies to Mount Rowan (shown in map 33 to the left). There are patches of Endangered EVCs in the GIA and according to the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) register, there are several matters of national significance known to occur within a 500 metre buffer of the Northern GIA. The majority of the site has a relatively low Strategic Biodiversity Score, with the exception of the south-west and north-east of the GIA and the most significant waterways on the site are Burrumbeet Creek and the North Common Wetland Reserve.

BUFFERS FOR SENSITIVE USES

In terms of site buffers the Airport Environs Overlay (AEO) applies to the land directly to the west of the GIA and the 15 ANEF contour extends into the GIA. The majority of the GIA is located within the Horizontal Surface RL 480.5 metres contour, with the RL 470 contour extending into the west of the site which is equivalent to a building height of approximately 50metres. It is noted that there is a small parcel of industrial zoned land in the south east corner of the GIA and there is a former landfill in the southern section of the GIA. Although the Environmental Audit Overlay (EAO) has not been applied by the EPA, there is the potential for this to be applied to the former landfill and industrial zoned land at some point in the future by the EPA, however the likelihood of this cannot be determined at this stage.

Buffers regarding the Ballarat North Water Reclamation Plant are discussed in the following section.

Map 34 Ballarat North Water Reclamation Plant

BALLARAT NORTH WATER RECLAMATION PLANT

The Ballarat North Water Reclamation Plant is located adjacent to the proposed Northern GIA. It is also acknowledged that there is an Environmental Significance Overlay (shown in map 33) surrounding the plant as previously discussed. The recommended separation distance from a wastewater treatment plant should be determined in consultation with the EPA (EPA Victoria, 2013). Based on guidelines in the EPA Publication 1518, recommended separation distances for industrial residual air emissions, the buffer distance would be approximately 920 metres, based on the assumption that the plant is classified as an 'aerobic pondage system' serving an estimated population of 33,600 (GHD, 2014). If implemented a 920m buffer would increase the size of the existing ESO. The GHD Report notes however that it could be argued that the buffer specified in EPA Publication 1518 was intended for a treatment plant that relied only on lagoon treatment, i.e. one that did not have a mechanical/biological pre-treatment plant such as that in the Ballarat North WRP (GHD, 2014) and as such the appropriate buffer would be 320m. The GHD Report is inconclusive and notes that a more appropriate buffer would be an intermediate distance between 920m and 320m.

The above separation distances are taken as default distances from the EPA Publication 1518. The GHD Report has been commissioned by the proponents for the Wyndholm Park Estate, Miners Rest development, which would be impinged by a 920m buffer. Following consideration of the default buffer distances the GHD Report determines a site specific buffer distance based on site meteorological and treatment plant information. From this modelling it identifies a requirement for a significantly reduced buffer distance below 920m, the majority of which is restricted to the existing WRP site and the Western Freeway. The site specific assessment approach is consistent with the considerations identified within EPA Publication 1518, but this also notes that separation distances should be determined in consultation with the EPA.

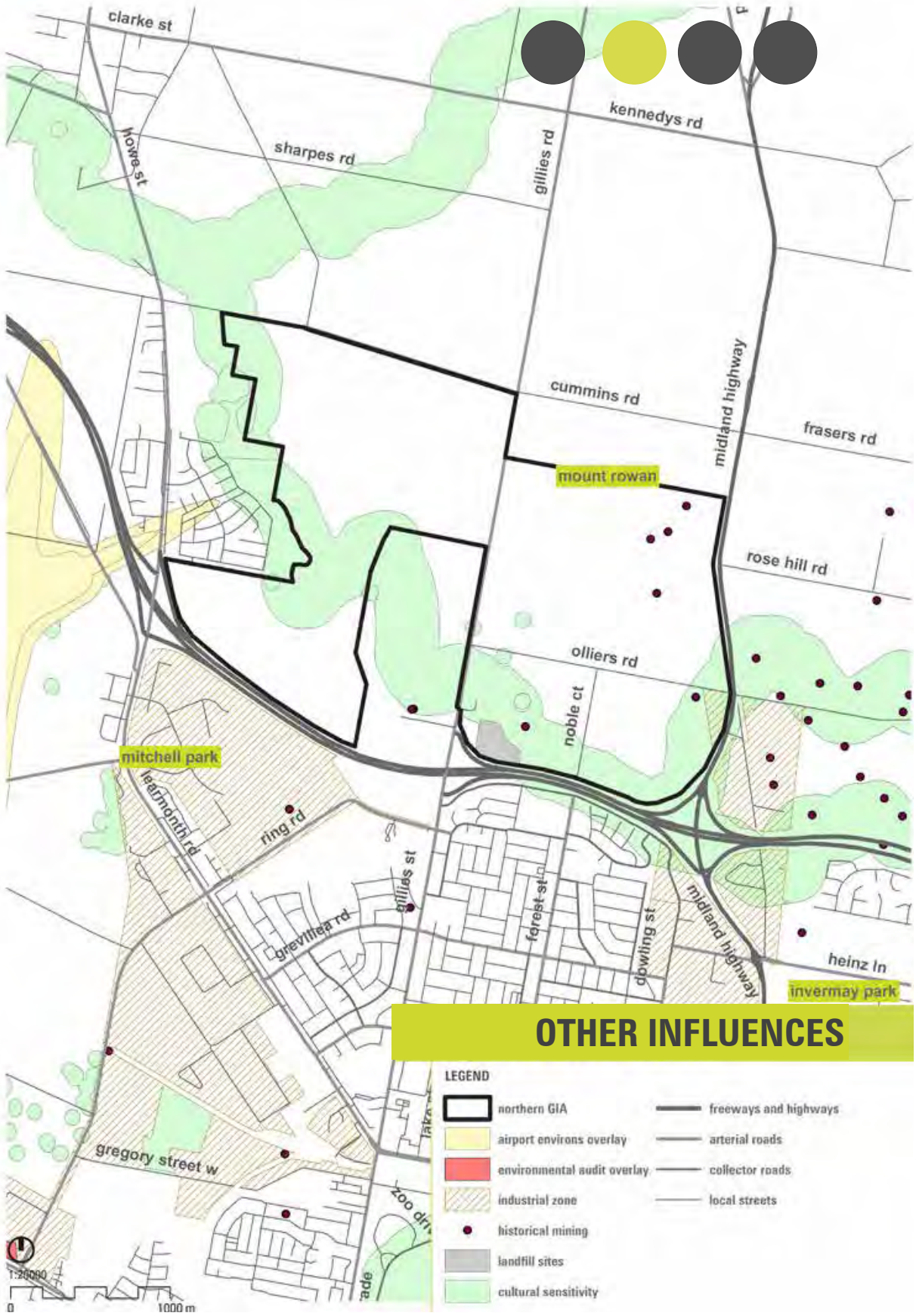
Further the introduction to EPA Publication 1518 notes that site specific assessments must satisfy the EPA. It appears that this has not occurred.

Central Highlands Water are aware of the GHD Report, and in response, in considering the proposed Wyndholm Park Estate, Miners Rest, have noted that they are not opposed to the rezoning, but would seek inclusion of a buffer zone. This infers that Central Highlands Water are reluctant to consider a reduction in the current buffer associated with ESO and may seek to include an increased buffer.

Verbal conversations with Central Highlands Water as part of this project indicate:

- A recognition that the buffer within the existing ESO is based on the WRP odours prior to the plant upgrade;
- They are aware of the recommendations in the GHD Report;
- They are not actively seeking a change to the ESO as while the upgrade may have reduced the buffer requirement (based on an interpretation of EPA Publication 1518, or a site specific assessment), the need for this buffer may return if there is significant population increase and the need to increase the capacity of the existing WRP.
- There is a view that once the buffer is reduced through a change to the ESO and development permitted it will be difficult to have this reinstated.

On the basis of the above it is considered that the ESO remain the primary consideration to guide future development in the Northern GIA until such a time as this changes. It is noted that as the ESO is part of the Ballarat Planning Scheme, then City of Ballarat will need to be a key participant in any changes to this overlay.



Map 35 Northern GIA Other Influences

NOISE IMPACT

Noise is relatively high in comparison to the other GIA's as both aircraft and traffic are expected to impact on noise levels in the GIA. The Northern GIA is located under the Ballarat Aerodrome runway 05/32 flight tracks and the maximum event noise levels due to aircraft flyover are predicted to be up to 95 dB(A).

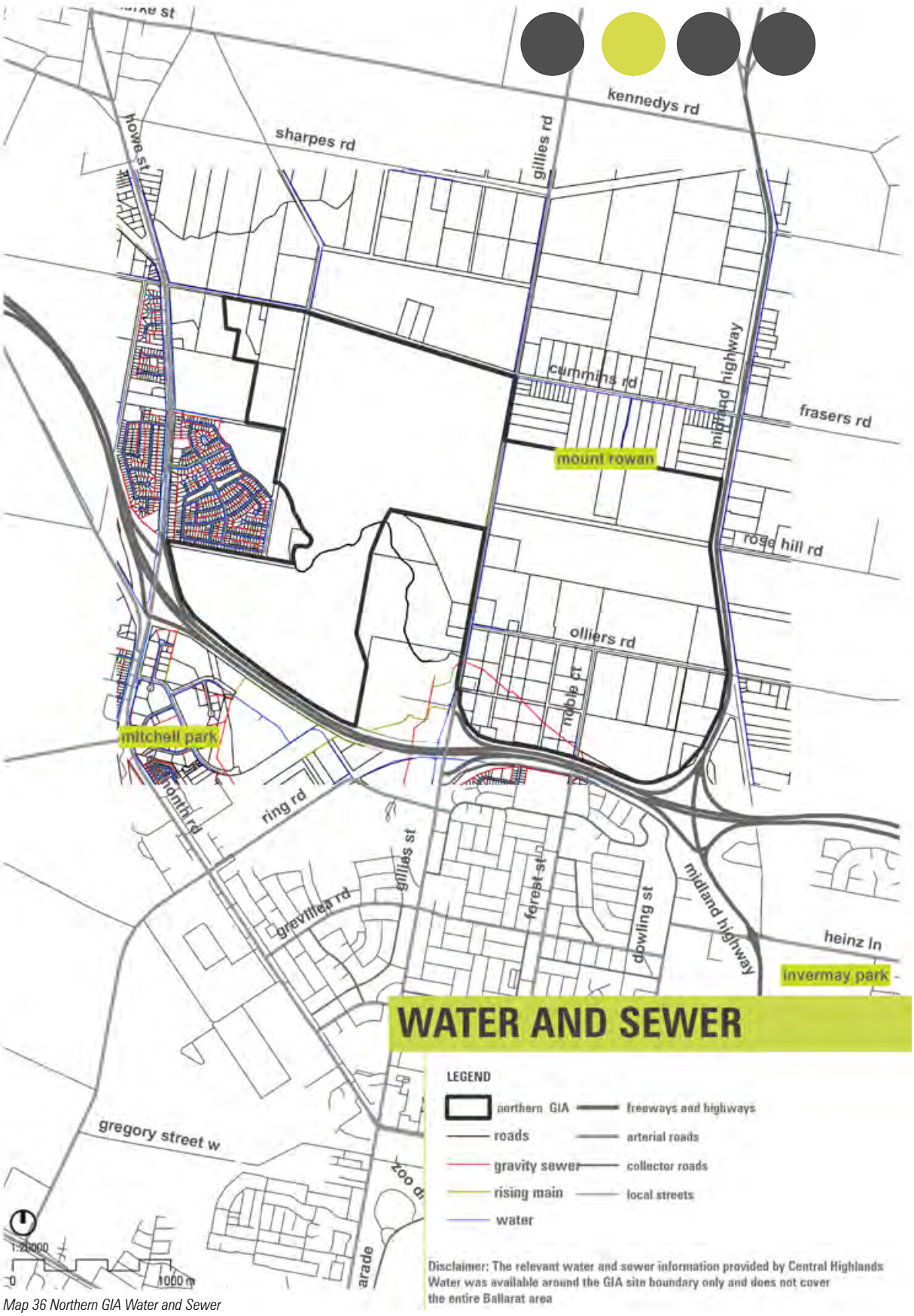
The Northern GIA is affected by road traffic noise from the Western Freeway and Midland Highway and noise mitigation measures would apply in the GIA including noise walls and buffer zones from the Western Freeway. Industrial noise from the two operational INZ1 industrial zones and the water treatment facility will also require a buffer of 150 metres.

CONTAMINATED SITES & PAST MINING ACTIVITIES

Land contamination is relatively low in comparison to the other sites. No potentially contaminated land has been identified by the Environmental Audit Overlay (EAO) within or surrounding the Northern GIA. However it is noted that a former landfill site exists on the south east of the GIA and past mining activities on the site include six point locations in the eastern part of the GIA (shown on map 35 to the left). This has the potential for contamination and the exacerbation of geological issues, however this has not been evident within the GIA. There are no expired mining licenses or leases within the GIA boundary.

GEOTECHNICAL CONDITIONS

The geotechnical conditions are moderate in comparison to the other GIA's. Land instability is moderate as there are steep contours around Mount Rowan with potential rockfall hazard and there are pockets where localised instability may occur, particularly adjacent to the existing creek and waterways. The potential for highly reactive heavy clay which can result in widespread cracking and settlement to buildings is also relatively high, however this is expected to be managed through best practice measures.



Map 36 Northern GIA Water and Sewer

ACCESS TO EXISTING UTILITY INFRASTRUCTURE

The major utility services present in some capacity in the study area include:

- Sewerage (shown in map 36);
- Water Supply (shown in map 36);
- Electricity (Distribution); and
- Telecommunications.

Formal stormwater drainage infrastructure does not currently exist within the GIA.

Central Highlands Water provides and manages the existing sewerage infrastructure within the Northern GIA. Effluent within the GIA is directed to the Ballarat North Water Reclamation Plant (WRP). The existing Ballarat North WRP is located on Western Highway/ Gillies Road junction, along the southern border of the study area. As a consequence of this facility's proximity to the GIA, there are a number of trunk outfall mains that travel within the site and around its perimeter. This gravity fed systems has no spare capacity at its pump station. . Several other sewer outfall mains enter the wastewater facility from the southern and western boundaries of the GIA. Central Highlands Water does not own any sewer assets along the northern or eastern boundaries of the site and sewer reticulation within the GIA does not currently exist.

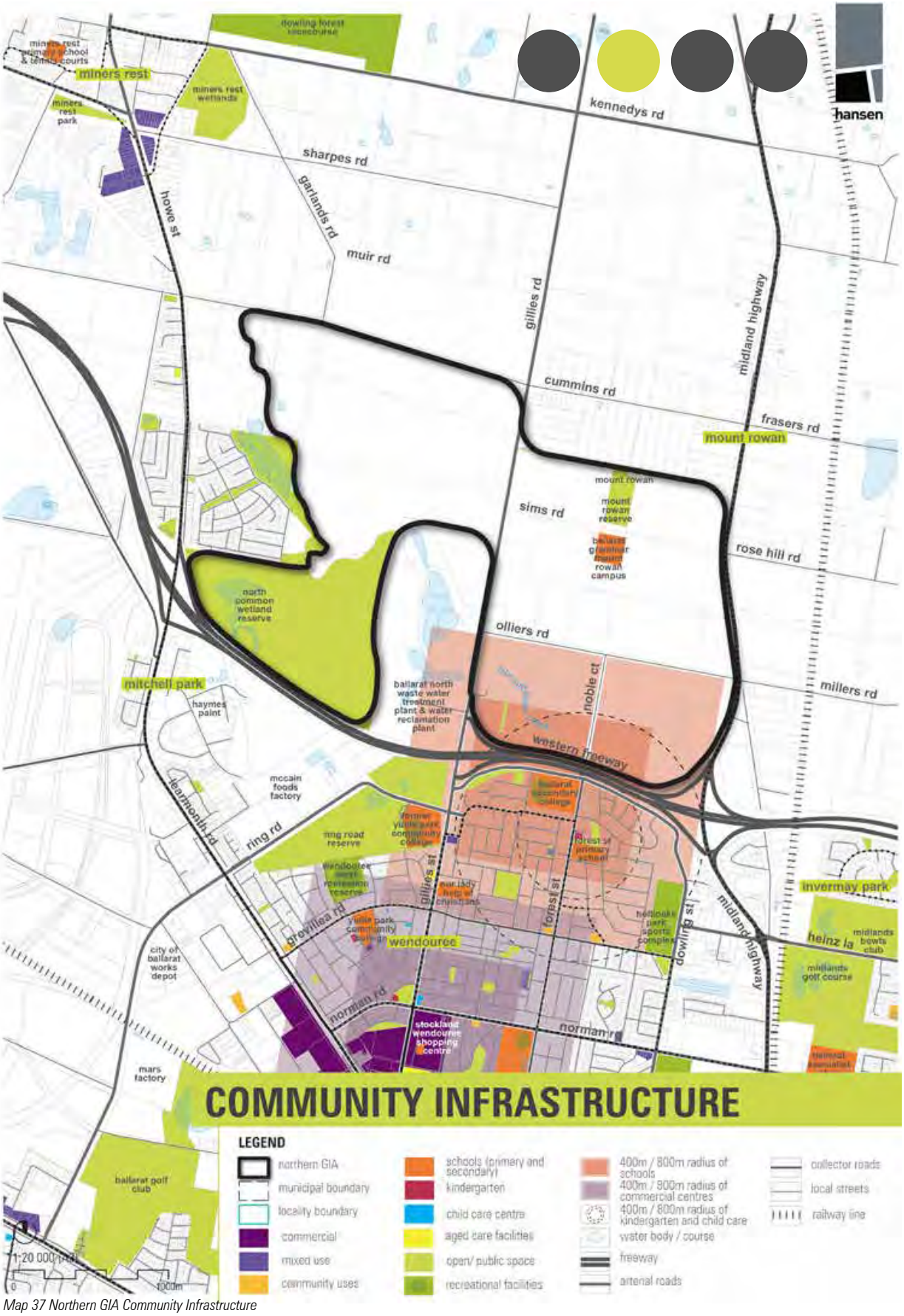
Central Highlands Water provides and manages the existing water supply infrastructure within Ballarat and the outlying areas. The Ballarat water supply is primarily comprised of two headwork systems: the Ballarat System and the Lal Lal System. Potable water to the Northern GIA and the surrounding areas is derived from the Ballarat System and delivered via the Northern Tanks Zone network The only water assets within the Northern GIA are the 150mm diameter pipes that run north-south down Gillies Road and east along Olliers Road. Gillies Road is serviced by a single DICL pipe for most of its length, while the supply of potable water along Olliers Road extends approximately 260m east from the Gillies Road/Olliers Road intersection.

APA Group Transmission is responsible for the high pressure gas transmission assets and SP AusNet is responsible for the distribution supply assets. SP AusNet has not provided asset information for this size area but has advised that there is approximately 20% additional capacity to service the existing network but cannot confirm that the current network will be able to service the projected population of Ballarat in 2040. Recent supply issues for Miners Rest saw augmentation works undertaken in the area.

SP AusNet operates and maintains the Ballarat Terminal Station (BATS) and the electrical transmission lines that feed into the zone substations. The existing high voltage distribution network in the study area is predominantly limited to the eastern half, along the major access roads within the area, namely; Cummins Road, Gillies Road, Sims Road and Olliers Road. High voltage circulation around this portion of the site is largely achieved with overhead power lines, with overground cabling restricted within easement along Cummins and Sims Road. Powercor has confirmed that some capacity exists to service this GIA.

Telstra is the main distributor of communication services to residential and commercial customers within the Northern GIA. Information regarding where the cables identified as part of the Dial Before You Dig (DBYD) enquiry are managed has not been provided by the utility companies.

The National Broadband Network (NBN) has been rolled out in sections of the Northern GIA, such that fixed wireless is accessible in all areas east of Gillies Road as well as that south of Burrumbeet Creek. NBN rollout has not commenced within most of the area located immediately east of Gillies Road and north of Burrumbeet Creek. It is anticipated that by the time urbanisation of this region occurs, NBN rollout will have been completed for all of the study area. Limited information has been provided with regard to the existing network capacity, however it is anticipated that communications providers will upgrade and expand networks in line with regional growth profiles pending developer applications.



Map 37 Northern GIA Community Infrastructure

ACCESS TO EXISTING COMMUNITY INFRASTRUCTURE

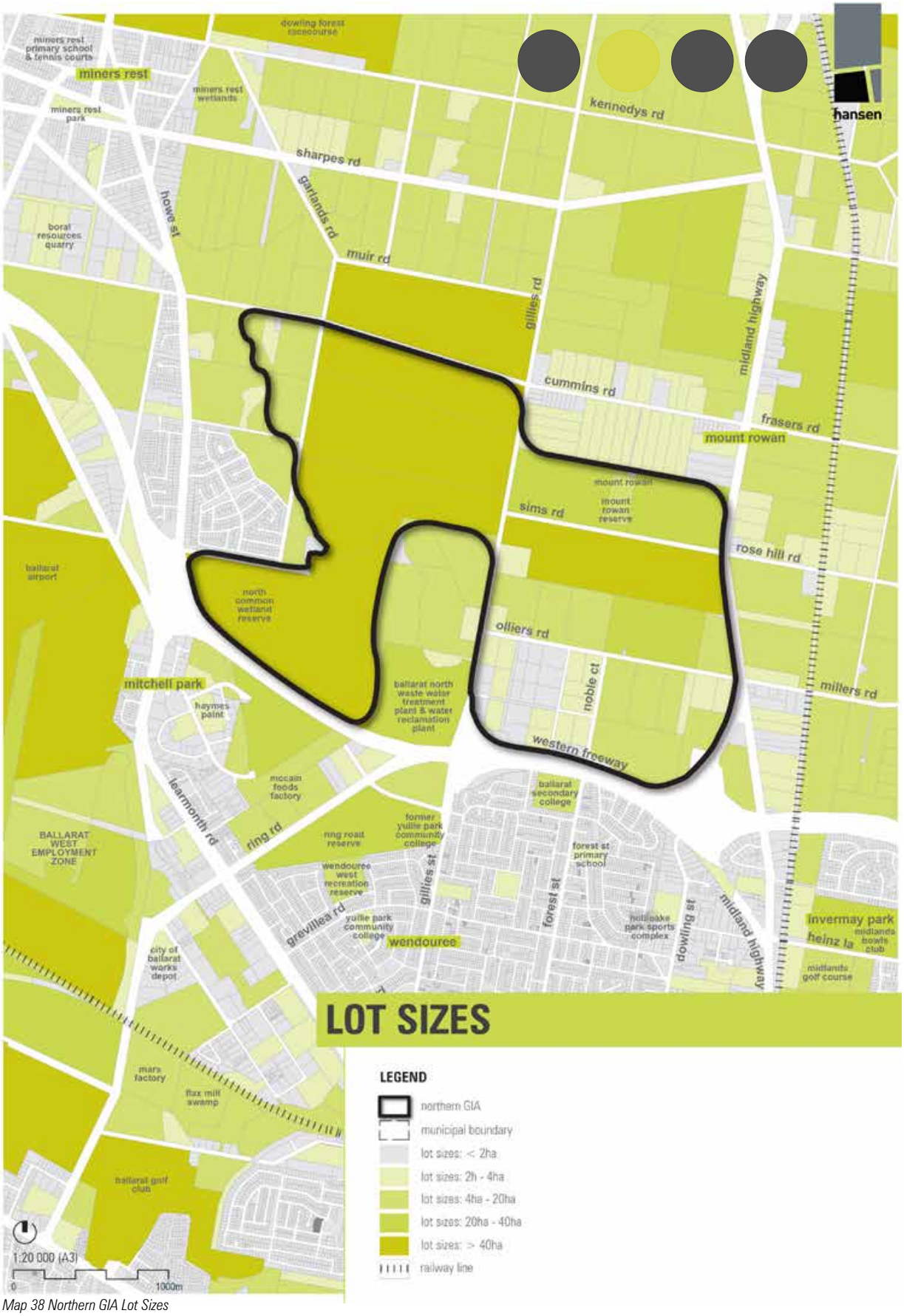
Providing appropriate community facilities within any new growth area is an important consideration. The following provides an understanding of where existing facilities are located in proximity to the Northern GIA. These community facilities have been mapped to the left (map 37), illustrating their proximity to the GIA. A 400m and 800m radius has been shown from the closest schools, kindergartens, child care centres and commercial precincts to highlight their distance from the GIA. These community facilities have been categorised under the following headings:

- Recreation/ cultural infrastructure;
- Educational infrastructure; and
- Healthcare infrastructure.

The Northern Growth Area will potentially benefit from both the community services in Miners Rest, as well as those within Wendouree and Ballarat North. However, the services within Wendouree, particularly surrounding the Stockland Wendouree Shopping Centre are likely to be more attractive. Wendouree provides a number of primary and secondary schools, child care centres, kindergartens and a number of commercial precincts and recreational facilities. The closest schools, as shown in the mapping to the left are the Ballarat Secondary College and the Forest St Primary School (on the southern side of the Western Freeway), which are within a 400-800m radius of the northern GIA. However, access to the schools are not via a direct route as it would require crossing at Gillies Street or Midland Highway.

COMMUNITY INFRASTRUCTURE	APPROXIMATE DISTANCE FROM NORTHERN GIA BOUNDARY
Recreation/ cultural infrastructure	
Community Hall	1km
Wendouree West Community Hub	1.7km by road
Wendouree Library	2.2km by road
Hollioake Park Sports Complex	1.8km by road
Wendouree West Recreation Reserve	1.9km by road
Educational Infrastructure	
Ballarat Secondary College (Wendouree Campus)	1.0km by road
Forest Street Primary School	1.7km by road
Yuille Park P-8 Community College	1.6km by road
Our Lady Help of Christians	1km by road
Miners Rest Primary School	2.4km by road
Pelican Childcare	1.5km by road
Wendouree Children's Services	1.9km by road
Rowan View Pre-School	1.6km by road
Hazel Rd Pre-School Centre	2.3km by road
Ballarat Grammar Mount Rowan Campus	Within GIA
Healthcare Infrastructure	
Ballarat Community Health-Grevillea	1.5km by road
Ballarat Functional Medicine Centre	2.3km by road
Ballarat Community Health Centre	2.5km by road
Karrung Uniting Care	1.0km by road
Queen Elizabeth Village (Aged Care)	2.5km by road

Table 9: Existing Community Infrastructure



Map 38 Northern GIA Lot Sizes

CURRENT LAND USES AND LAND FRAGMENTATION

Land use within the Northern GIA broadly constitutes relatively open, flat broad hectare farming / rural land, save for distinctive landform of Mount Rowan located to the north. The context of the Northern GIA is also categorised by the location of the Central Highlands Waste Water Treatment Plant which partially bisects the study area. The following outlines the current land uses, activities and land fragmentation located within the Northern GIA which have been shown on map 32 to the left and 33 overleaf:

- Land located to the north of the Western Highway and east of Gillies Street broadly constitutes open hectare rural land which accommodates livestock grazing or otherwise underutilised rural land use.
- The Ballarat Grammar Mount Rowan Campus is located on the southern side of Sims Road, within the GIA, with the Mount Rowan Reserve and Mount Rowan itself located along the northern boundary.
- Land located to the north of Central Highlands Waste Water Treatment Plant, also constitutes open hectare rural land which accommodates livestock grazing or otherwise underutilised rural land use.
- Land located to the west of the Central Highlands Waste Water Treatment Plant constitutes large open paddocks and environmental land, including part of the alignment of Burrumbeet Creek, which runs into the North Common Wetland Reserve, located on the south-western corner of the GIA. This low lying land is designated as Crown Land (nominated as a public reserve), and consequently is likely to remain undeveloped.
- Generally it appears that the existing rural properties with dwellings function as rural residential lifestyle type activities rather than accommodating active and intensive rural/ agricultural uses.
- Land parcels on the eastern side of the GIA are generally regular and rectangular in shape and averaging between 4ha and 40ha in size, following an east / west grid pattern, with some smaller lots (2-4ha) on the southern edge.
- Some land fragmentation has resulted from the creation of rural residential lifestyle type allotments, below the minimum 40ha allotments size of the current Farming Zone (FZ). Large land parcels appear on the western side of the GIA, which are over 40ha. A single lot, running along Sims Road is also greater than 40ha, as shown in the lot size mapping to the left.

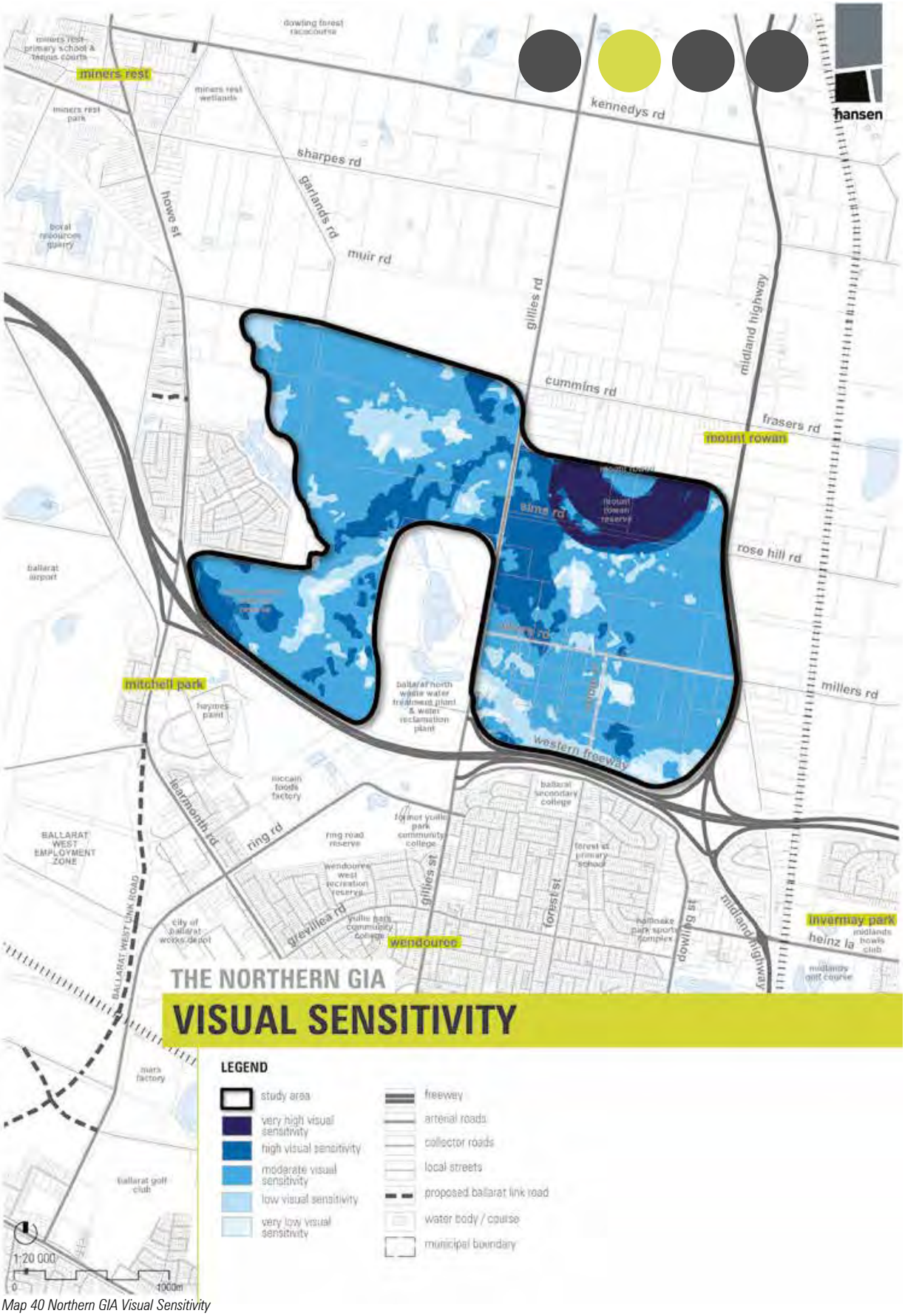
EXTERNAL INTERFACES AND SURROUNDING LAND USES

The following outlines the external interfaces and surrounding land uses (shown on map 33 to the left) which inform the current and future context of the Northern GIA:

- Miners Rest constitutes a small standalone township settlement located along Maryborough-Ballarat Road, to the north of Ballarat and north-west of the Northern GIA.
- Miners Rest has been designated as short to medium residential growth; however some physical constraints exist in the form of the Western Highway, which forms a significant barrier between Miners Rest and Ballarat. Other constraints include land which is subject to flooding and the airport flight paths. There is a buffer of farming land between Miners Rest and the northern edge of the GIA.

Map 39 Northern GIA Land Use

- A newer residential estate known as Macarthur Park is located to the south of Miners Rest and immediately to the west boundary of the Northern GIA.
- A new wetland system and open space reserve has been created along the Burrumbeet Creek Corridor, at the edge of Macarthur Park, abutting the western edge of the Northern GIA. Along with the Northern Common Wetland Reserve, this open space creates a western buffer between Macarthur Park and any future development in the Northern GIA.
- The Western Highway road cutting which forms the southern boundary of the Northern GIA constitutes a significant physical barrier, effectively separating it from the existing northern urban edge of Ballarat.
- The eastern boundary of the Northern GIA is located along Midland Highway, with Industrial 1 Zone (IN1Z) land located around the Western Freeway/ Midland Highway road interchange, and farming land further east.
- Mount Rowan forms a localised landform and landmark, with the higher slopes forming an immediate interface along the northern boundary of the Northern GIA.
- 'Rural living' type allotments are accommodated on the slopes of Mount Rowan, whilst larger rural landholdings within the Farming Zone (FZ) are located to the balance of the northern and western boundary interfaces.
- The Central Highlands Waste Water Treatment Plant extends from the Western Freeway into the middle of the Northern GIA, bounded by Gillies Street to the east.
- To the south of the Northern GIA is Wendouree, an established suburb with a range of industrial, education, commercial and residential uses. The McCains Foods Factory is located on the south / western edge of the Northern GIA.



Map 40 Northern GIA Visual Sensitivity

VIEW SHEDS AND SIGNIFICANT LANDSCAPES

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by Hansen Partnership. Further detailed information is provided in Appendix 3 which contains Hansen Partnership - Ballarat Greenfield Investigation Areas: Landscape Assessment Report.

LANDSCAPE CHARACTER & VALUE

From a combination of fieldwork and desktop assessment, the following landscape character areas were identified in the Northern GIA:

- Plains – Sparsely vegetated and low-lying land north of the Western Freeway in the south western extents of the GIA.
- Rural Pasture – This character area comprises most of the flatter, rural land within the Northern GIA.
- Elevated Pasture – Land on which Mount Rowan is situated.

These landscape character areas were subsequently assigned with a landscape value, the designation of which was formulated through an assessment based on established approaches as outlined in benchmarking documents and Hansen Partnership's professional experience with similar projects.

- High Landscape Value: Elevated Pasture.
- Low Landscape Value: Plains and Rural Pasture.

VISUAL EXPOSURE

Through an analysis of views within and near to the GIA demonstrated in the view shed and views assessment, a picture of visual exposure, or what areas of the study area are more visible than others, was created. For the Northern GIA, general trends of visual exposure included the following:

- Generally, moderate to high visual exposure is present across the study area. This is afforded via distant views across the flatter and mildly undulating terrain of the Northern GIA. Fieldwork revealed vegetation occasionally constrained these views, but views were generally reflective of the view shed assessment.
- Very high visual exposure was identified on the elevated terrain of Mount Rowan, which provided the backdrop to numerous views.

VISUAL SENSITIVITY

Areas of landscape value and visual exposure have been overlaid to explore their visual sensitivity, or the ability of a specific area to accommodate change. Landscapes with a higher visual sensitivity generally have a lower threshold beyond which changes in the landscape start to detrimentally impact on the value/ significance of that landscape. Visually sensitive landscapes for the Northern GIA are as follows:

- Land around and comprising Mount Rowan has been designated with a predominantly very high level of visual sensitivity. This was due to the combination of high value placed on the significant landscape feature, and that it has a very high level of visual exposure due to its elevated nature. Hence, it is visible from a number of viewpoints and forms the backdrop to many views in the Northern GIA.
- High visual sensitivity is present in the central raised area as was visible from numerous viewpoints across the flatter terrain, despite being of relatively low landscape value.
- Predominantly moderate visual sensitivity is present across the western and eastern extents of the study area, with localized patches of high, low and very low. This is predominantly due to the high and moderate visual exposure across much of the study area, as open views are afforded across the flatter terrain and the pasture areas are typically visible from more than one vantage point. This is despite much of the study area having a relatively low landscape value.

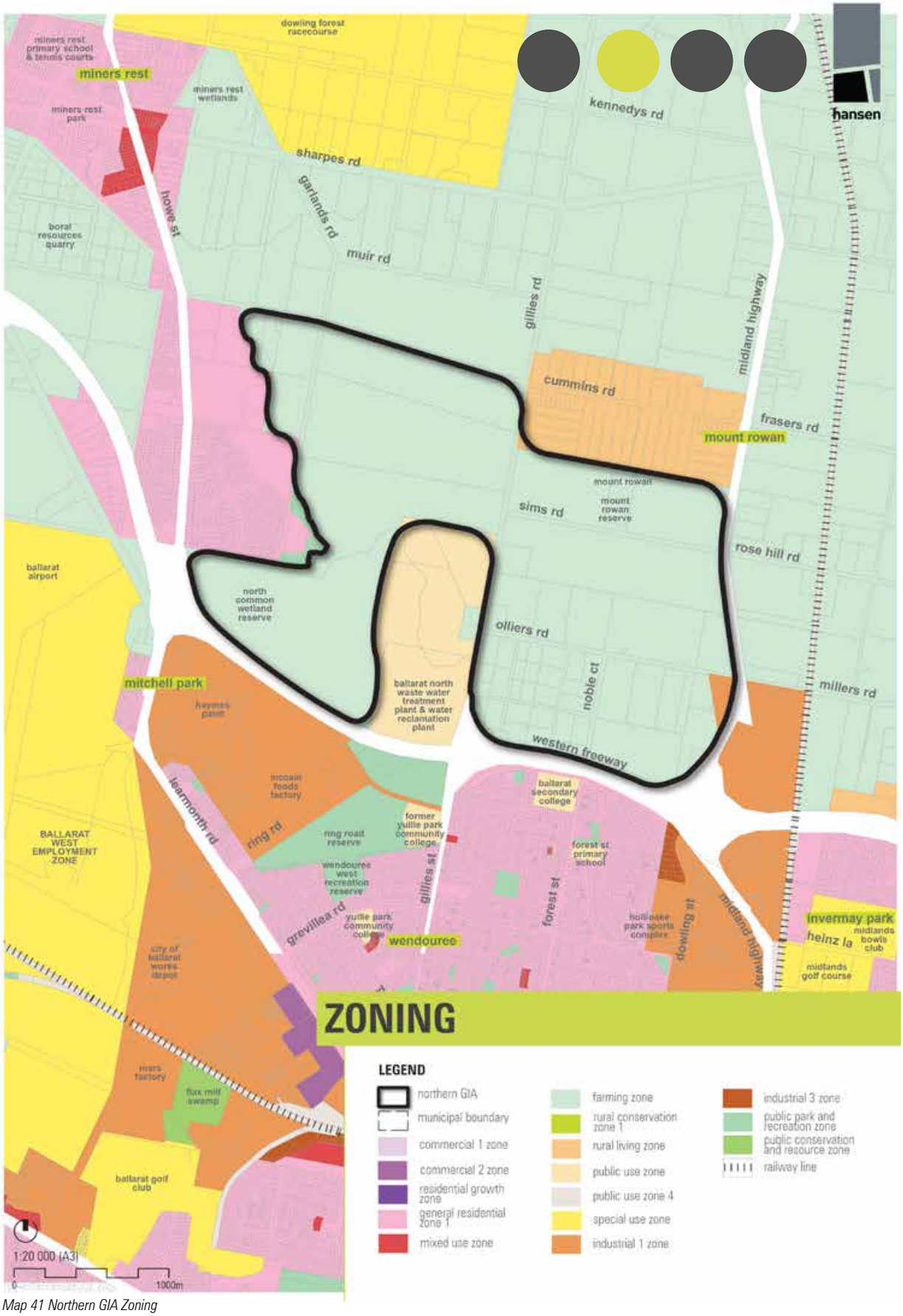
LANDSCAPE ASSESSMENT RECOMMENDATIONS

Landscape Assessment recommendations for the Northern GIA are based on assigned visual sensitivity areas, which are the outcome and synthesis of the landscape assessment. It is acknowledged that this is part of a wider assessment of the suitability of the land within the GIA's for development. However, it is intended that this assessment provides some broad guidance for potential development in these areas on the basis of visual landscape principles.

It is also aimed the following provides a broad framework to assist in potentially enhancing the character of areas which were identified as having a somewhat lower landscape value such as the 'Plains' and 'Rural Pasture' areas.

Recommendations based on the landscape assessment with the aim to maintain and enhance existing high quality or visually sensitive landscape areas include the following:

- Specification of lower density development or little to no development (where possible) in areas assigned with either a 'Very High' or 'High' visual sensitivity rating. This primarily applies to land surrounding Mount Rowan and in the central reaches of the GIA.
- Specification of a height limit for development in or adjacent to 'Very High' or 'High' areas of visual sensitivity, including the mid to higher slopes of Mt Rowan. In particular, consider further study to designate an appropriate development threshold and accompanying built form/ height controls on the land identified as having a very high level of visual sensitivity near and on Mount Rowan. This is to maintain the visual integrity of the significant landscape feature visible in the background of a number of views throughout the Northern GIA.
- Implement a range of built form guidelines that tailor controls suitable to the level of visual sensitivity in a particular area (i.e controls for 'very high' visual sensitivity areas), which focus on reducing the visual impact of development, these could include but not be limited to:
  - Locating of structures / dwellings away from significant view lines, ridgelines or high points. If located within a significant view line, efforts should be made to make the structure inconspicuous.
  - Development that is designed and sited to reflect the natural topography and complement the landscape character of the area.
  - Development that is of a low to medium scale while maintaining a moderate building footprint within a landscaped setting.
- Consideration to designating areas with a 'Very High' or 'High' visual sensitivity rating as public open space or for non-visually obtrusive public facilities as a means of limiting development and hence any associated visual impact in these sensitive areas. Implementation of such also means that significant views obtained from these areas remain in the public realm.
- Protect and enhance areas of significant vegetation as a key, valued character element of the study areas, particularly at roadsides, where it references historic land uses and where groups of well-established native vegetation is present.
- Incorporate significant vegetation into proposed allotments, road reserves or open space areas.



Map 41 Northern GIA Zoning

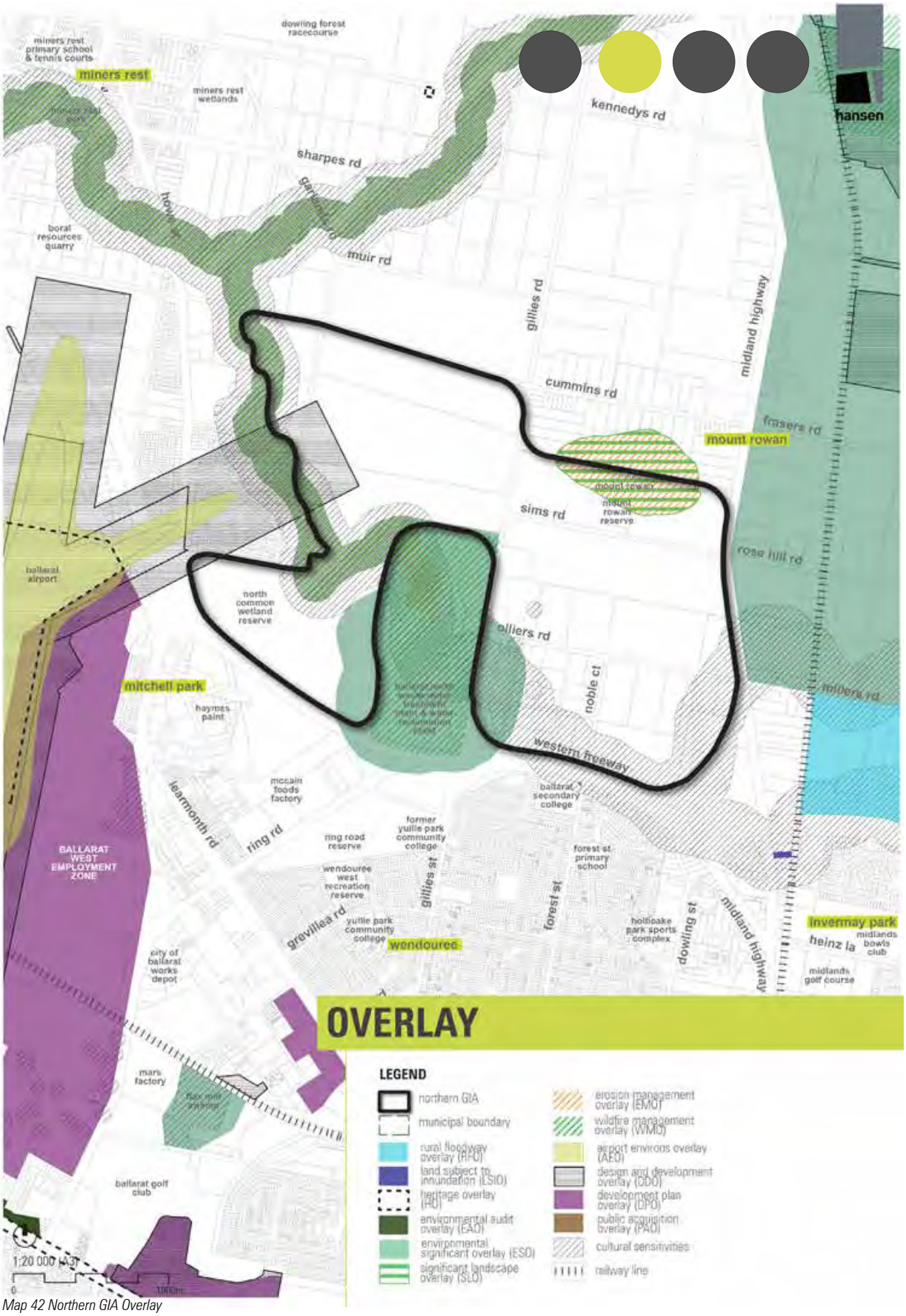
ASSESSMENT OF PLANNING POLICY

The capability of the land to accommodate future urban development has been considered and assessed against the Planning Policy Framework, zones and overlays within the existing Ballarat Planning Scheme, and includes the Ballarat Strategy (2015), implemented by Amendment C194.

CURRENT ZONING

The current zoning of land within the designated Northern GIA is almost exclusively within the Farming Zone (FZ), except for a wedge of Industrial 1 Zone (IN1Z) land fronting Olliers Road and Midland Highway along its eastern boundary. There is also a section of Public Park and Recreation Zone (PPRZ) covering a section of Burrumbeet Creek located on the western boundary at Miners Rest. The above zoning has been illustrated in map 35 to the left.

The current Farming Zone (FZ) controls implement a minimum 40 ha allotment size, which places limitations on further subdivision and potential further fragmentation of the Northern GIA. The Farming Zone (FZ) also has the impact of guiding land use and activity towards farming and agricultural activities, although noting that existing dwellings appear to serve a rural living lifestyle type role.



Map 42 Northern GIA Overlay

CURRENT OVERLAYS

Overlays found within the Northern GIA, and are shown in map 36 to the left, include the following:

- The Erosion Management Overlay (EMO) and Significant Landscape Overlay (SLO) associated with the lower slopes of Mount Rowan.
- Bushfire Management Overlay (BMO), Environmental Significance Overlay, Schedule 4 (ESO4) associated with the buffer for the Central Highlands Waste Water Treatment Plant.
- The Erosion Management Overlay (EMO) and Environmental Significance Overlay, Schedule 2 (ESO2) associated with the protection of the Burrumbeet Creek corridor.
- Design and Development Overlay Schedule 17 and 18 (DDO17, DDO18) associated with building heights surrounding the Ballarat Airport. DDO17 refers to building heights above 5 metres, and DDO18 relates to building heights above 15m, which together seeks to protect the flight path alignment from the encroachment of any tall buildings or structures.

The number of overlay controls found within the Northern GIA serve to highlight some localised issues which would need to be addressed through development layout and building design and siting (as appropriate to the applicable overlay) within any current or future land use and activity.

CULTURAL HERITAGE

Cultural heritage is a relatively important issue for the Northern GIA in comparison to the other GIA's. The Heritage Overlay does not apply to any land within the Northern GIA, however it is present within 500metres of the site boundary. Cultural sensitivity is also relatively high due to areas of Aboriginal cultural sensitivity along the Burrumbeet Creek and several circular parcels of land, approximately 100 metres in diameter across the site (shown in map 36 to the left).

The Northern GIA lies across two Indicative Character areas identified in identified in Mapping Ballarat's Historic Urban Landscape (Context Pty Ltd, 2013). The Mount Rowan Rural Character Area is found on the eastern section and the Wendouree and Miners Rest Urban Character area is found on the western section of the GIA. There are two sites that have been identified on the Heritage Inventory which is relatively high in comparison to the other GIA's. The Mount Rowan Mullock Heap 1 indicates the presence of a former mining site in the east of the GIA near Creswick Rd and the Mount Rowan House remains site is located near the corner of Gillies Road and Olliers Road in the centre of the GIA.

CURRENT POLICY DIRECTION

The Ballarat Planning Scheme has recently been updated (via Amendment C194) to formally implement the recommendations of the Ballarat Strategy (2015), and making the strategy a specific reference document under *Clause 21.10.*

The Ballarat Strategy (2015) functions to guide growth and development and to appropriately manage such change so Ballarat in 2040 has built on its strengths and retained its values and character. More broadly the Ballarat Strategy (2015) identifies and it recognises the opportunities to manage this change to create a greener, more vibrant and connected Ballarat.

At an overall city scale the Ballarat Strategy (2015) seeks the creation of compact and complete neighbourhoods, and includes a framework to encourage urban renewal and infill development to create a variety of housing types, within proximity of public transport and commercial and community services. It also seeks to build upon the mixture of urban and rural areas and seeks to create high amenity environments which area embedded with natural values and biodiversity by adopting an urban forest approach.

Within the context of the Ballarat Panning Scheme *Clause 21.01-3 Land use vision* outlines that: *"the Ballarat Strategy (2015) applies the community values and key principles as a longterm strategic direction for Ballarat towards 2040. It outlines the shared community vision for a greener, more vibrant and connected Ballarat…"*

Clause 21.01-4 Key issues outlines a number of relevant matters under the heading of settlement and housing, including:

- *Accommodating a projected population of about 160,000 people by 2040.*
- *Maintaining a compact settlement form as part of Ballarat's '10 Minute City'.*
- *Identifying and protecting long-term growth opportunities.*
- *Encouraging a variety of housing opportunities to respond to diverse community needs and aspirations for housing.*
- *Providing quality open space as essential for community health.*

More specifically *Clause 21.02-1 Urban Growth* acknowledges that: *"Ballarat is forecast to grow significantly towards 160,000 people by 2040. Most of this increased population is planned to be accommodated through infill in established areas, convenience living close to public transport, urban renewal precincts, and in properly planned greenfield growth areas such as Ballarat West".*

Figure 2 – Housing Framework Plan (Clause 21.02-1) illustrates 4 longer-term greenfield investigation areas, including the three GIA's nominated within the Ballarat Strategy, in addition to the TIGA land which resulted from the Panel Report recommendations on Amendment C194.

Clause 21.02-1 Urban Growth contains an object and strategy which are relevant to the current study, including:

- *Objective 1: To support a pattern of growth which reinforces the '10 Minute City'.*
- *Strategy 1.4 Discourage increased development density in fringe areas, particularly those that are more than walking distance from activity centres.*

Likewise *Clause 21.02-4 Greenfield investigation areas* is specifically relevant to informing the context of the current study. This Clause identifies that:

"The Ballarat West Growth Area is the primary greenfield development area for Ballarat. Medium to long-term greenfield investigation areas (as identified in Figure 2 – Housing Framework Plan) require a more detailed feasibility assessment. Identification as an investigation area does not necessarily indicate strategic support for land use change potential.

Objective 4

To ensure that greenfield development is connected to the existing urban area.

Strategies

4.1 Discourage rezoning of additional greenfield land, which would compete with Ballarat West, until the market requires additional supply.

4.2 Ensure that future greenfield development is focused within roughly an 8km arc from the centre of Ballarat.

4.3 Avoid ad-hoc and unplanned greenfield development.

4.4 Discourage disconnected or 'leap frog' development.

4.5 Minimise the impacts of development on Ballarat's historic urban landscape, the environment and Ballarat's natural resource base.

4.6 Ensure the need for buffers to protect major water and sewerage assets and treatment plants from encroachment by sensitive land uses is taken into account as part of any greenfield investigation".

ASSESSMENT AGAINST BALLARAT STRATEGY

As part of this project it is important to assess each of the GIA's at a high level to see how they would broadly comply with and implement the initiatives if the Ballarat Strategy (2015). Accordingly the following comments are made with regard to the Northern GIA:

Accessibility

- Would be within reasonable proximity of a number of Activity Centres, including: Wendouree MAC, Minders Rest NAC and Northway NAC (Figure 12 Current Activity Centres, Ballarat Strategy (2015)).
- The entire Northern GIA is within the 10 minute drive catchment (Figure 15 The '10 Minute City', Ballarat Strategy (2015)).
- The entire Northern GIA is within the8km radius from Ballarat CBD (Figure 16 Future Greenfield Investigation Areas, Ballarat Strategy (2015)).

Public Transport

- Would not be within reasonable proximity of Future High Frequency Public Transport Corridor (Figure 20 Towards a More Sustainable Transport System, Ballarat Strategy (2015)).

Employment

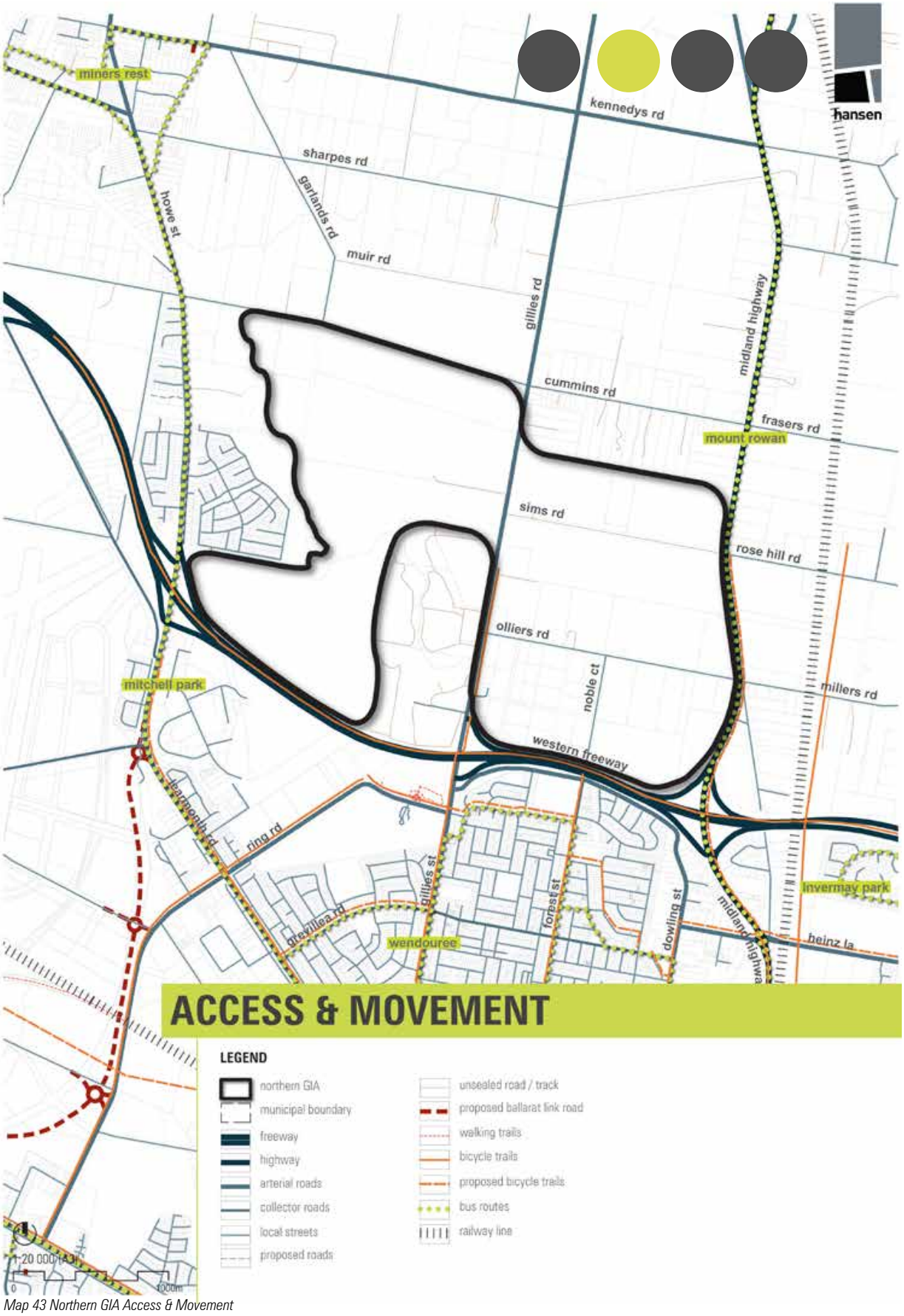
- Would be in close proximity of employment activity associated with industrial zones land on Midland Highway (Figure 13 Industrial Areas, Ballarat Strategy (2015)).
- Would be in close proximity to Ballarat West Employment Zone (Figure 13 Industrial Areas, Ballarat Strategy (2015)).

Landscape Interface

- Would be located adjacent to a small section of rural living land use and activity located at Mt Rowan (Figure 19 Rural Living and Township Areas, Ballarat Strategy (2015)).
- The Northern GIA is nominated as a rural interface area (Figure 30 Rural Interface Areas, Ballarat Strategy (2015))

Neighbourhood Links and Landscaping

- The Northern GIA would have potential to include links to join with proposed neighbourhood link networks (Figure 22 Neighbourhood Links, Ballarat Strategy (2015))
- Western GIA would be located adjacent to the 'Living Corridor' network identified along Burrumbeet Creek (Figure 26 Living Corridors, Ballarat Strategy (2015))



Map 43 Northern GIA Access & Movement

ASSESSMENT OF ACCESSIBILITY

Congestion levels were the most influential factor in differentiating between the GIA's for the accessibility assessment. All of the GIA's have access to employment opportunities and services within a 20 minute private vehicle trip (up to 2041).

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

EXISTING AND PLANNED FUTURE ROAD NETWORK

There is an extensive road network as the site is bounded by the Western Freeway to the south, Midland Highway to the east and is located in close proximity to Ballarat-Maryborough Road (Howe Street). The existing and future roads have been shown in map 37 to the left. Congestion levels are currently relatively high and the assessment of transport forecasts contained within the Ballarat VITM Report indicates that in 2041, the network experiences some levels of congestion along key routes providing access to the site during the AM peak period.

PUBLIC TRANSPORT NETWORK AND FACILITIES

The public transport network and facilities are relatively poor given the proximity of Wendouree Station and Ballarat Station (2.5km and 4.8km respectively). Bus Route 3 operates along the Midland Highway and provides limited catchment that is localised to east of the site. Bus Route 17 operates immediately west of the site, though the catchment for these services only extends marginally into the site. These bus routes have been shown in map 37 to the left.

WALKING AND CYCLING NETWORKS

The Western Freeway presents a significant barrier for walking and on this basis, the majority of walking trips are expected to remain internal to the site. Generally the cycling catchment remains limited, however there is an existing cycle route with facilities along Gillies Road. Cycling has only limited viability for trips to the CBD with the remainder of trips expected to be internal to the site or to the immediately surrounding suburbs. Existing and proposed walking and cycling networks have been shown in map 37 to the left.

ACCESSIBILITY TO EMPLOYMENT AND SERVICES

Based on current planning, the site will have a high level of access to employment and retail services by private vehicle for the foreseeable future, however there will be limited access by public transport. There is an opportunity to provide additional transport choice and increased access to employment and retail services through the provision of additional public transport services and improvements to the bicycle network.

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ASSESSMENT OF DELIVERABILITY

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

NEW TRUNK UTILITY INFRASTRUCTURE

Given that there is no trunk utility infrastructure currently within the GIA significant new trunk mains will be required within the Northern GIA to deliver all services to the area.

STORMWATER

New trunk drainage infrastructure required includes:

- A number of retention basins located throughout the study area. The size and location of individual basins will largely be dependent on the topography and proposed land use of the study area and should be determined in collaboration with civil engineers and town planners.
- Wetlands that will be incorporated into the floor of each retarding basin to improve water quality. The application of this treatment measure ensures that land acquisition cost to meet WSUD requirements can be minimised.
- A network of stormwater drainage pipes that will convey the post-development 10 year ARI event flow to the retention basin.
- Stormwater drainage pipes that will convey the pre-development 100 year ARI event flow from the retention basins to the outfall creeks.

SEWER

The design intent has been for a gravity network, the location of the Ballarat North Water Reclamation Plant (WRP) in the centre of the area in conjunction with the south-west grading of the site have meant that two additional pump stations and rising mains will be required. Furthermore, the existing pump station at the Ballarat North WRP may require upgrading.

The area of the development east of Gillies Road can be served by a gravity fed system. This will require the construction of a new 1km gravity trunk main along Gillies Road to the existing pump station. This pump station has limited capacity and will therefore require upgrades. These upgrades will alter the flow regime to Ballarat North Water Reclamation Plant (WRP) and will require the construction of a flow control facility or wet weather detention asset, both of which require adequate land and odour offset zones.

The topography of the site indicates that a new pump station and rising main may also be required to direct effluent flow from the lower western side of the site to the main gravity trunk main. Central Highlands Water has supported the design conclusion that the effluent generated from the development of the Northern GIA will be directed to the Ballarat North Water Reclamation Plant (WRP). Ballarat North WRP currently has adequate dry weather capacity but insufficient capacity for wet weather peak flows. The development of the Ballarat West Employment Zone (BWEZ) is earmarked to discharge to this plant and may reduce the spare dry weather capacity as well as add additional strain on wet weather capacity over the next five years. Upgrade of the Ballarat North WRP would be necessary to facilitate development of the Northern GIA.

Beyond the financial implications of such an upgrade, legislative issues around Environmental Protection Authority (EPA) licensing reforms also exist. This could result in the need for an extension to the odour buffer zone, causing implications on properties around the treatment plant.

WATER

Water supply to the Northern GIA will originate from the Northern Tanks Zone network, fed via the Ballarat North pump station (Central Highlands Water, 2014). Central Highlands Water have advised that a new pressure zone would need to be developed to service this area. This would involve new tanks boosters and mains as well as the upgrade of the existing Mount Rowan tank and pump station. These assets will require new land area for the authority.

It is expected that connection will be made to the 450mm diameter DICL trunk main along the Western Highway to increase the supply of water to the study area. Trunk water mains do not currently exist within the site and as such, extensive new trunk infrastructure is required along all major roadways. It is expected that approximately 1.0km of new water main pipework within the GIA will be required to enable supply for each of the growth scenarios.

Central Highlands Water have advised that supplying the Northern GIA will likely compromise the level of service provided to the nearby Miners Rest area. This would drive the need for further upgrades to surrounding assets. These upgrades could provide costly and complex due to existing mains passing through highly built up areas and dense bushland reserves.

To reduce demand, Central Highlands Water has indicated a desire to mandate household scale rainwater harvesting and notes the ability of the Ballarat North WRP to provide Class A recycled water. The capacity of this service and support infrastructure needed requires further investigation.

Central Highlands Water has advised that the Ballarat System is capable of sourcing adequate raw water supply for the next 30 to 50 years and that the two treatment plants in the area have sufficient capacity for the next 20 years.

GAS

AusNet Services have advised that the location of the Northern GIA would mean that supply would have to travel across Ballarat resulting in significant pressure reductions. This suggests that significant upgrades and new trunk infrastructure would be required to provide reliable supply to this area.

AusNet Services has advised that two new field regulators are currently being installed to enhance network pressures to ensure capacity for the immediate future. These upgrades do not consider future growth in this area.

ELECTRICITY

Powercor has confirmed that there is limited supply available to the North GIA, however 22kV feeder augmentation works would be required to support significant growth in demand. Such augmentation works are included in Powercor's 10 year forward plan. It is noted that Powercor's longer term plan is to establish a substation in Ballarat West. This substation is proposed to cater for growth in the industrial demand in the area but could also have advantages for the North GIA. It would be anticipated that at least one new 22kV feeder would be required to support the supply of electricity.

TELECOMMUNICATION

Telstra has advised that trunk infrastructure in growth areas will be dictated by developer applications. These protocols are spelt out by both Telstra and NBN Co and are at a cost to the developer.

NEW COMMUNITY INFRASTRUCTURE REQUIRED

The new community infrastructure required for the various scenarios for the Northern GIA has been identified in table 18 below.

CATEGORY	INDICATOR	BENCHMARK	ACCESS DISTANCE	REFERENCE	SCENARIO				PROVIDER	EXISTING FACILITIES	DISTANCE FROM GIA
					1 (8 LOTS PER HA)	2 (12 LOTS PER HA)	3 (15 LOTS PER HA)	4 (20 LOTS PER HA)			
Recreation and Cultural Infrastructure											
Sport and recreation	Provision of recreation areas - active open space	One Level 1 active open space reserve (8 ha per active open space reserve) per 6,000 people	1000 metres for 95% of dwellings	ASRR 2008 GAA 2013	1.4	2.1	2.6	3.4	Local council		
Community centres	Provision of community centres	Level 1 Provision ratios up to 10,000 people		GAA 2009	0.8	1.2	1.5	2.1	Local council	Community Hall	1000 metres
Educational Infrastructure											
Kindergartens	Provision of kindergartens	Provision ratios up to 10,000 people	600 metres	GAA 2009 Barton et al 2010	0.8	1.2	1.5	2.1	Private		
Long day care and occasional care	Provision of long day care and occasional care facilities	Provision ratios up to 10,000 people	600 metres	GAA 2009 Barton et al 2010	0.8	1.2	1.5	2.1	Private		
Primary schools	Provision of government primary schools	1 government primary school per 8,000 to 10,000 people	800 metres	ASRR 2008 Barton et al 2010	0.8	1.2	1.5	2.1	State government	Forest Street Primary School (includes Forest Street Deaf Facility)	580 metres
										Yuille Park P-8 Community College	600 metres
	Provision of non-government primary schools	Provision ratios between 10,000 and 30,000 people	800 metres	GAA 2009 Barton et al 2010	0.4	0.6	0.8	1.0	Private	Our Lady Help of Christians	1000 metres
Healthcare Infrastructure											
GP clinics	Provision of GP clinics	0.34 general practices per 1000 people (Victorian average)		Dept of Health 2011	2.8	4.2	5.2	7.0	Private		
Dental practices	Provision of dentist sites	0.20 dental services per 1000 people (Victorian average)		Dept of Health 2011	1.6	2.5	3.1	4.1	Private		
Aged care	Provision of aged care facilities	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.4	0.6	0.8	1.0	Private		
	Provision of aged care places	88 beds per 1000 people aged 70+		ANAO 2015	73	110	137	183	Private		
Community health centres	Provision of community health centres	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.4	0.6	0.8	1.0	State government		
Hospitals	Hospital beds	3.9 hospital beds per 1000 people (Australian average)		AIHW 2014	32	48	60	80	State government		

Table 10: New Community Infrastructure

Map 44 Northern GIA Land Ownership

LAND OWNERSHIP

The Northern GIA has approximately 30 different land holders, with some parcels or collective ownership of parcels extending outside the GIA boundary. The western side of Gillies Road (within the GIA) is almost collectively owned by three (3) entities, of which the southern wetlands area is Crown Land. An additional four parcels under individual ownership are located in the north-west corner of the GIA.

On the eastern side of Gillies Road, there are a range of ownerships arrangements, including a number of parcels close to the intersection of Gillies Road and the Western Freeway and one lot on the northern boundary which is owned by the City of Ballarat. There are approximately seven (7) larger private land holders which own multiple parcels of land between Gillies Road and Midland Highway.

The map to the left (map 38) illustrates the parcels that have individual ownership, and the collective land parcels (separated by the grey outline), illustrating where multiple land titles are under a single ownership.

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ASSESSMENT OF INFRASTRUCTURE COSTS

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP and Tim Nott Economics. Further detailed information is provided in Appendix 1 & 2 which contains Tim Nott's and ARUP's separate technical reports.

DEVELOPMENT INFRASTRUCTURE COSTS FOR TRUNK INFRASTRUCTURE

DRAINAGE

The engineering estimated costs associated with the drainage trunk infrastructure for the various scenarios in the Northern GIA are stated in table 19 below. The nominated scenarios within the table below relate to the 4 devised lots per hectare scenarios used to test and understand the implications of differing development densities within each of the GIA's.

SEWER AND WATER

As with all of the proposed areas, development of the Northern GIA will drive the need for significant investment in new trunk infrastructure and upgrades to existing infrastructure in the quantum of $40M – $50M. Should this result in the need for a new wastewater treatment plant and re-use facility a further $50M - $80M could be required.

Operational complexities due to the possible creation of multiple pressure zones to supply this GIA will also have ongoing costs.

GAS

While the authorities have not provided specific costs for trunk infrastructure, they have noted that the Northern GIA will require a significant amount of investment to provide supply from the existing City Gate and maintain service levels across the network.

ITEM	SCENARIO 1 (8 LOTS PER HA)	SCENARIO 2 (12 LOTS PER HA)	SCENARIO 3 (15 LOTS PER HA)	SCENARIO 4 (20 LOTS PER HA)
New pipes and pits	$3,454,106.28	$4,669,964.23	$5,280,907.24	$5,391,182.22
Retention Basins / Wetlands	$8,059,581.33	$10,896,583.20	$12,322,116.90	$12,579,425.19
Council Fees	$402,979.07	$544,829.16	$616,105.85	$628,971.26
CAPEX (2015 prices)	**$11,916,666.68**	**$16,111,376.59**	**$18,219,129.99**	**$18,599,578.67**
CAPEX (2040 prices)	**$25,027,572.89**	**$33,837,369.37**	**$38,264,106.58**	**$39,063,130.94**

Table 11: Drainage Trunk Infrastructure Costs

Further details on each of the 4 devised scenarios is provided in the Development Scenarios section of this report. The above table should be read in conjunction with the identified issues with infrastructure provision which is provided under the Assessment of Deliverability sections of this report for each of the relevant GIA's.

ELECTRICITY

Powercor stated that costs associated with supplying this GIA are difficult to provide without a detailed in depth assessment. However, it was noted that costs would vary only slightly between the GIA's being considered and that there was no preference between areas.

TELECOMMUNICATIONS

Telstra has advised that charges for new infrastructure are generally borne by the developer and vary based on: type and size of the development; location; services required by the developer; network type; & relative proximity of Telstra's network with spare capacity.

COMMUNITY INFRASTRUCTURE COSTS

The community infrastructure costs for the various scenarios in the Northern GIA have been identified in table 20 below.

CATEGORY	INDICATOR	UNIT COST	REFERENCE	COST IN SCENARIO			
				SCENARIO 1 (8 LOTS PER HA)	SCENARIO 2 (12 LOTS PER HA)	SCENARIO 3 (15 LOTS PER HA)	SCENARIO 4 (20 LOTS PER HA)
Recreation and Cultural Infrastructure							
Sport and recreation	Provision of recreation areas - active open space	$ 6.75 million	Urban Enterprise, 2014	$6,750,000	$13,500,000	$20,250,000	$20,250,000
Community centres	Provision of community centres	$ 4.4 million	Urban Enterprise, 2014	$4,400,000	$4,400,000	$8,800,000	$8,800,000
Educational Infrastructure							
Kindergartens	Provision of kindergartens	$ 1.3 million	City of Kingston, 2014	$1,300,000	$1,300,000	$2,600,000	$2,600,000
Long day care and occasional care	Provision of long day care and occasional care facilities	$ 4.1 million	ACT Government, 2012 McComish, 2013	$4,100,000	$4,100,000	$8,200,000	$8,200,000
Primary schools	Provision of government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$12,200,000	$12,200,000	$24,400,000	$24,400,000
	Provision of non-government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$-	$12,200,000	$12,200,000	$12,200,000
Healthcare Infrastructure							
GP clinics	Provision of GP clinics	$ 1.4 million	Selesnew, 2008	$4,200,000	$5,600,000	$7,000,000	$9,800,000
Dental practices	Provision of dentist sites	$ 1.4 million	Selesnew, 2008	$2,800,000	$4,200,000	$4,200,000	$5,600,000
Aged care	Provision of aged care facilities	$ 17.9 million	Department of Treasury and Finance, 2014	$-	$17,900,000	$17,900,000	$17,900,000
	Provision of aged care places	$ 595,000 per place	Department of Treasury and Finance, 2014	$43,435,000	$65,450,000	$81,515,000	$108,885,000
Community health centres	Provision of community health centres	$ 50.2 million	Department of Treasury and Finance, 2014	$-	$50,200,000	$50,200,000	$50,200,000
Hospitals	Provision of hospital beds	$ 844,000 per bed	Department of Treasury and Finance, 2015	$27,008,000	$40,512,000	$50,640,000	$67,520,000

Table 12: Community Infrastructure Costs

It has been noted that the indicative healthcare infrastructure may be provided by the public sector. Further the costs identified are relatively similar across the GIAs.

DEVELOPER COSTS FOR LOCAL INFRASTRUCTURE

The developer costs for local infrastructure for the various scenarios in the Northern GIA have been identified in table 21 & 22 below.

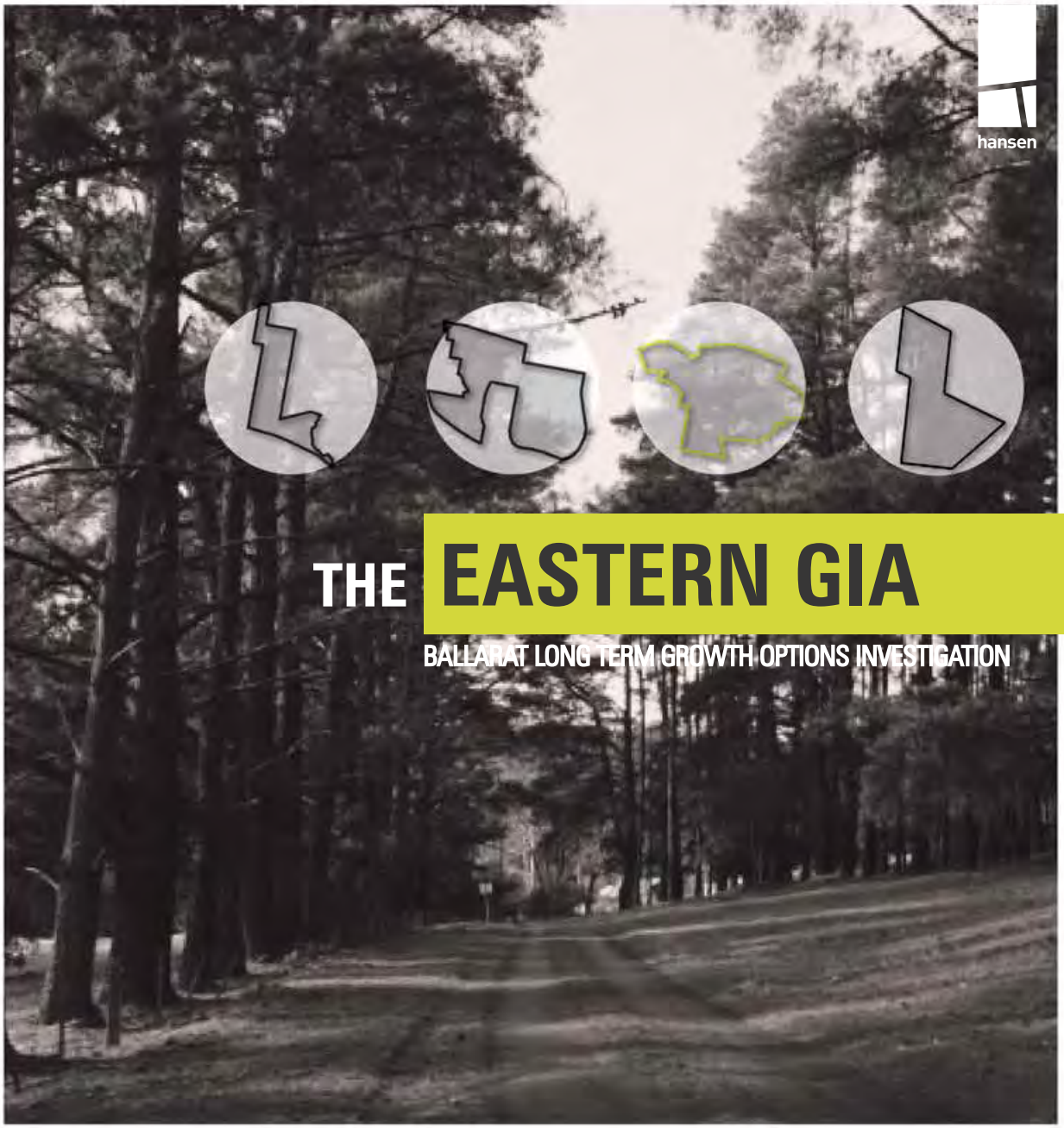
NORTHERN GIA OPTION COMBINED COST ESTIMATE - 2015 PRICES				
	Scenario 1 (8 lots per ha)	Scenario 2 (12 lots per ha)	Scenario 3 (15 lots per ha)	Scenario 4 (20 lots per ha)
Roads	$41,518,500	$45,317,760	$45,317,760	$49,117,020
Water Supply	$14,706,042	$18,649,408	$21,104,361	$25,866,045
Sewer	$9,405,194	$11,179,007	$11,463,942	$13,140,534
Total	$65,629,736	$75,146,175	$77,886,063	$88,123,599

Table 13: Developer Cost Estimates For Local Infrastructure Using 2015 Prices

NORTHERN GIA OPTION COMBINED COST ESTIMATE - 2040 PRICES				
	Scenario 1 (8 lots per ha)	Scenario 2 (12 lots per ha)	Scenario 3 (15 lots per ha)	Scenario 4 (20 lots per ha)
Roads	$87,197,814	$95,177,080	$95,177,080	$103,156,347
Water Supply	$30,885,863	$39,167,783	$44,323,715	$54,324,279
Sewer	$19,752,937	$23,478,328	$24,076,753	$27,597,958
Total	$137,836,614	$157,823,192	$163,577,549	$185,078,584

Table 14: Developer Cost Estimates For Local Infrastructure Using 2040 Prices

The above tables should be read in conjunction with infrastructure provision which is provided under the Assessment of Deliverability sections of this report for each of the relevant GIA's. Further details on each of the 4 devised scenarios is provided in the Development Scenarios section of this report.



THE EASTERN GIA

BALLARAT LONG TERM GROWTH OPTIONS INVESTIGATION

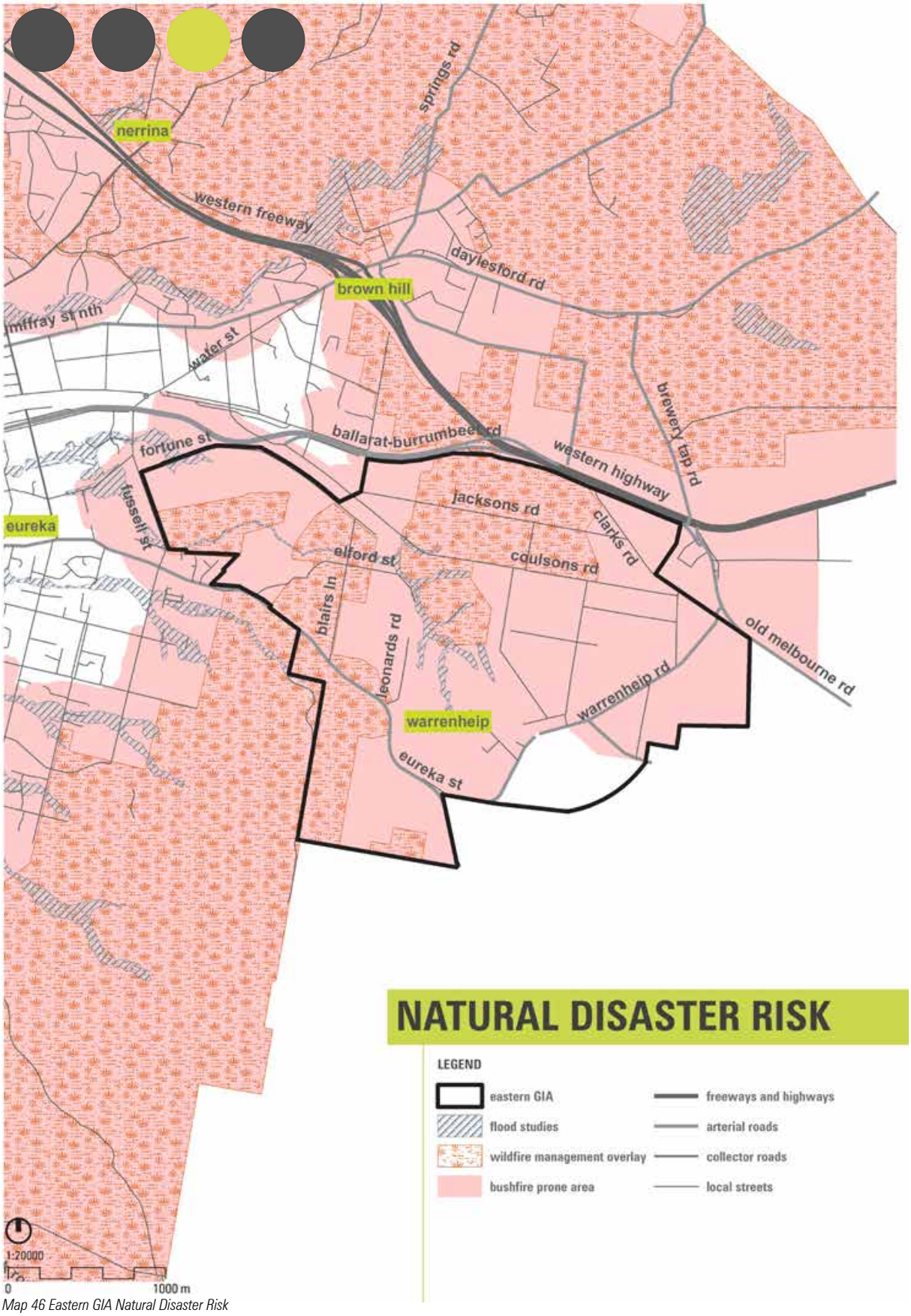
Map 45 Eastern GIA

THE EASTERN GIA

This section of the report will provide a detailed assessment of the technical background analysis relating to the Eastern Greenfield Investigation Area (GIA), to inform the feasibility assessment of each GIA in Ballarat.

The Eastern GIA is:

- Located in Warrenheip including parts of Ballarat East;
- Roughly bound by Fussell Street and the edge of the Canadian State Forest to the west, the municipal boundary to the south, Clarkes Road and Killarney Road to the east and the Western Highway and Ballarat-Burrumbeet Road to the north;
- Intersected through its middle by the railway line; and
- Adjacent to the Moorabool Shire along parts of its south, east and south east boundaries. A small portion of the study area is within the Moorabool Shire, being associated with the former Warrenheip train station and railway line.



Map 46 Eastern GIA Natural Disaster Risk

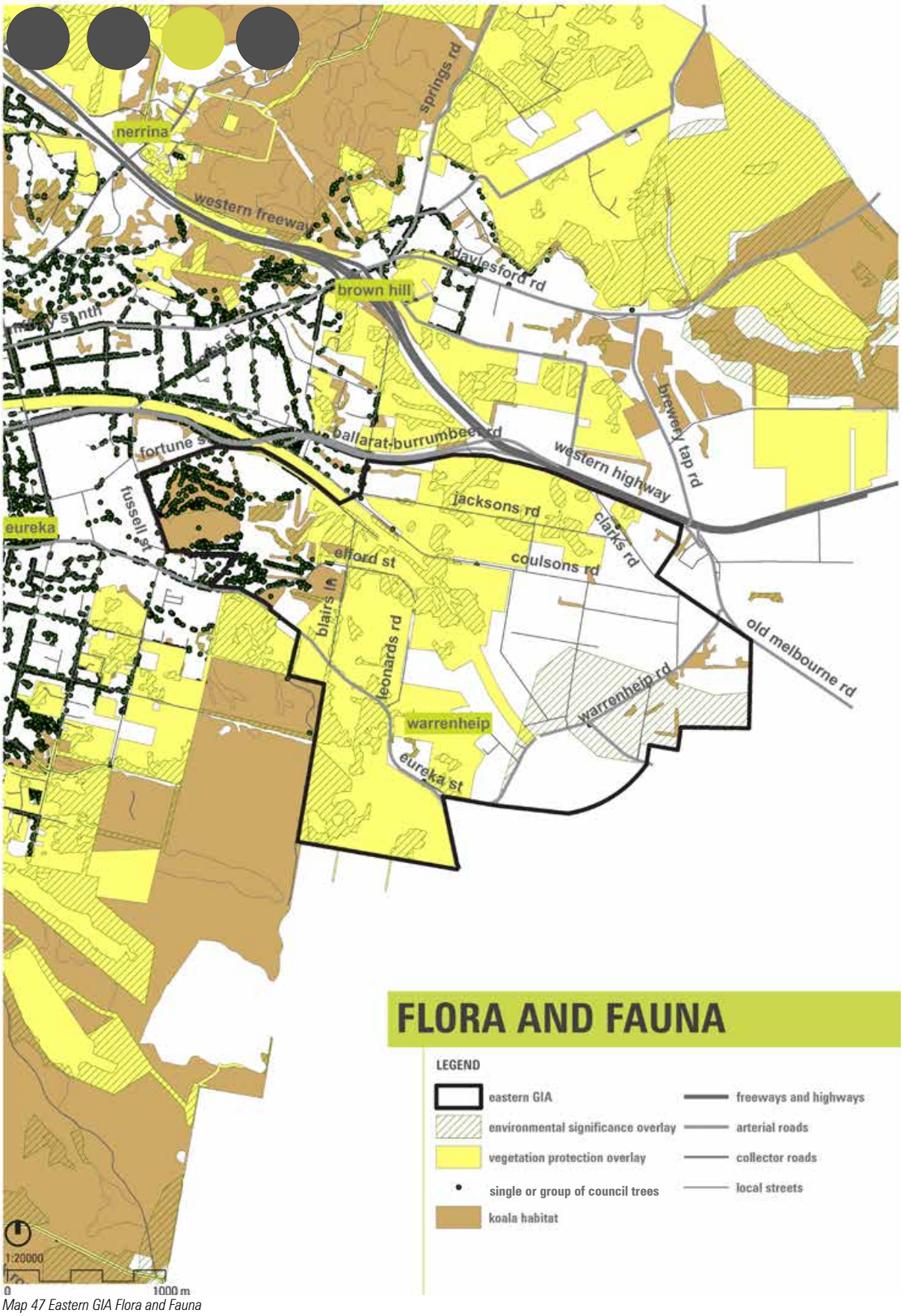
ASSESSMENT OF LAND CAPABILITY

The capability of the land to potentially accommodate future urban development has been considered and assessed from a variety of technical angles and general land use and planning considerations. Planning overlays were particularly important for the feasibility assessment of each site, specifically those related to natural disaster and flora and fauna. There was less variability evident in the noise levels and historical influences such as contamination, mining and geotechnical conditions between the three sites.

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

NATURAL DISASTER RISK

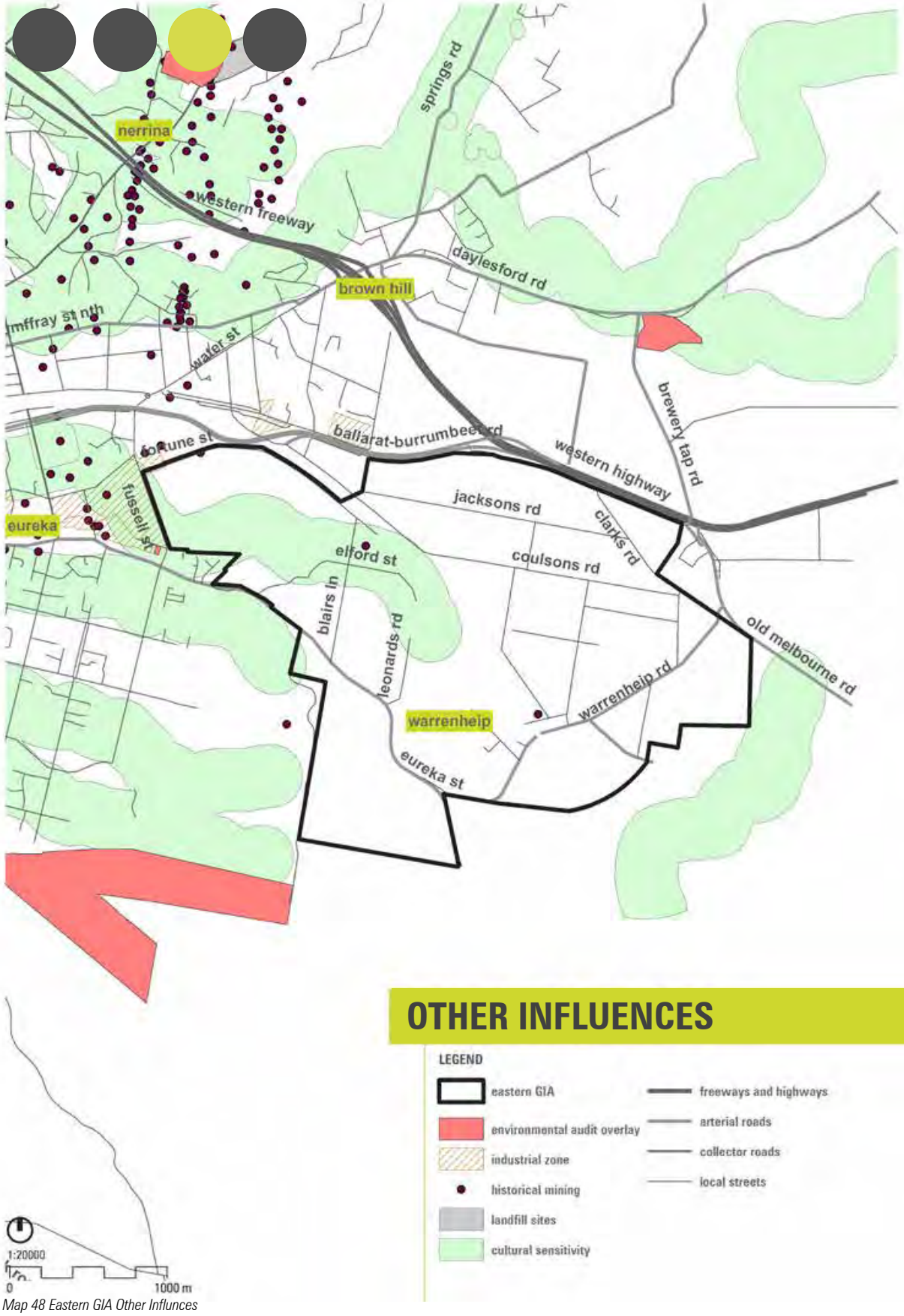
Natural disaster risk is moderate for the Eastern GIA in comparison to the other GIA's. The GIA is entirely within Bushfire Prone Area and the Bushfire Management Overlay (BMO) applies to large areas covering the north, west and south of the GIA (shown in map 40 to the left). Flooding is unlikely to be an issue as no areas within the Eastern GIA impacted by a 100 year flood and the Rural Floodway, Land Subject to Inundation and Erosion Management Overlay does not apply within the GIA Although unlikely, it is nominated that land could still be impacted by a 100 year flood.



Map 47 Eastern GIA Flora and Fauna

PROTECTED FLORA AND FAUNA

Protected flora and fauna is more of an issue for the Eastern GIA in comparison to the other GIA's. The Vegetation Protection Overlay (VPO) applies to almost half the area and the Environmental Significance Overlay (ESO) applies to large portions of the GIA (as shown in map 41 to the left). There are also numerous patches of primary and secondary koala habitats and almost a tenth of the land area is covered by endangered EVCs. According to the EPBC register, there are also several matters of national significance known to occur within a 500 metre buffer of the site. The land in the Eastern GIA has a relatively low Strategic Biodiversity Score, with a maximum score of 35 and the majority below 20. Tree cover to the south-west corner is identified as important and the Eastern GIA is within the Canadian Creek catchment. The Specimen Vale Creek has been identified in the GIA.



Map 48 Eastern GIA Other Influnces

BUFFERS FOR SENSITIVE USES

There are no buffers required for separation from sensitive sites within the Eastern GIA. However, it is noted that there are parcels of industrial zoned land to the adjacent to the west and to the north of the GIA boundary which would require consideration.

NOISE IMPACT

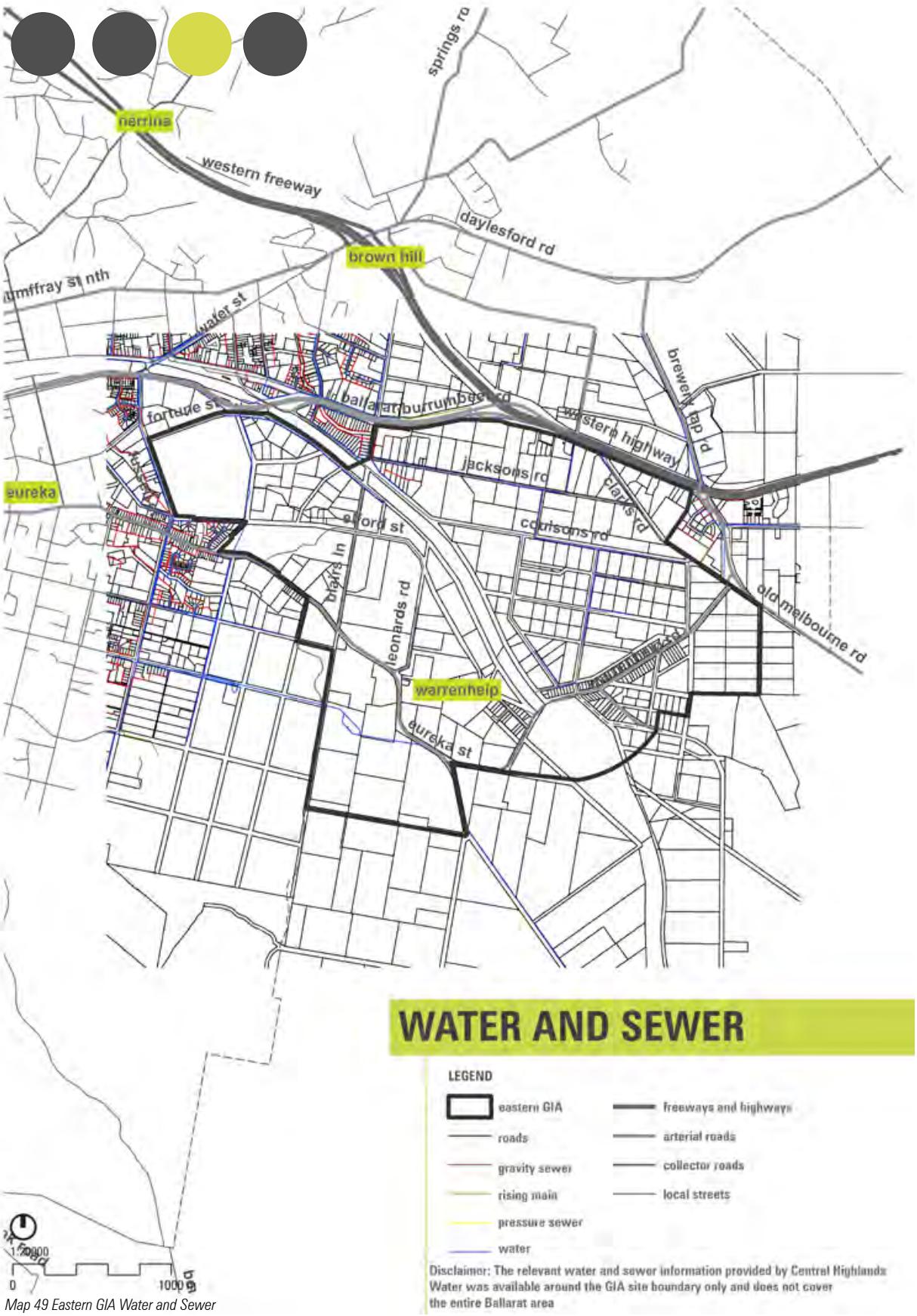
The Eastern GIA is affected by moderate road traffic noise from the Western Freeway and Victoria Street. Mitigation measures required for the GIA would include noise walls and buffer zones. The GIA is not considered to be significantly affected by aircraft or industrial noise, however railway noise from the railway line may impact the site and mitigation measures would need to be considered.

CONTAMINATED SITES & PAST MINING ACTIVITIES

No potentially contaminated land has been identified by an Environmental Audit Overlay (EAO) within the Eastern GIA. However it does apply to land parcels within 300metres of the site boundary. There are two point locations of recorded historical mining activity within the Eastern GIA, to the north-west and south-east of the GIA. Given the intrusive nature of historical mining activities, they could potentially give rise to issues with the geology.

GEOTECHNICAL CONDITIONS

The geotechnical conditions for the Eastern GIA are more favourable than the other GIA's. There is relatively low potential for land instability and the potential for highly reactive heavy clay which can result in widespread cracking and settlement to buildings is relatively low.



Map 49 Eastern GIA Water and Sewer

ACCESS TO EXISTING UTILITY INFRASTRUCTURE

The Eastern GIA area can be considered rural residential in nature with some spill over from the urban development in the north. Consequently, all major utility services are present in some capacity in the study area including:

- Drainage;
- Sewerage (shown on map 43);
- Water Supply (shown on map 43);
- Gas;
- Electricity (Distribution); and
- Telecommunications.

Stormwater drainage predominantly consists of a number of drainage depressions and creeks grading east to west. The extent of formal stormwater drainage infrastructure is largely limited to the higher density rural residential areas surrounding Warrenheip Rd.

There are no trunk sewer mains and smaller reticulation pipes within the GIA, with the exception of a single 500m (approximate) 150mm diameter uPVC pipe, which services the detached homes in the north of the GIA. City of Ballarat has advised that a number of properties are not connected to a sewer reticulation network and instead use a septic treatment system.

Information provided by Central Highlands Water shows that the sewerage network outside the study area is well developed. (Central Highlands Water, 2014). However, these assets are over 50 years old and therefore have increased inflow and infiltration. This limits their capacity in conveying increased upstream wet weather flows. Effluent within the GIA and the surrounding areas is transferred to the Ballarat South Wastewater Treatment Plant (WwTP). Central Highlands Water have stated that this plant currently has limited spare capacity.

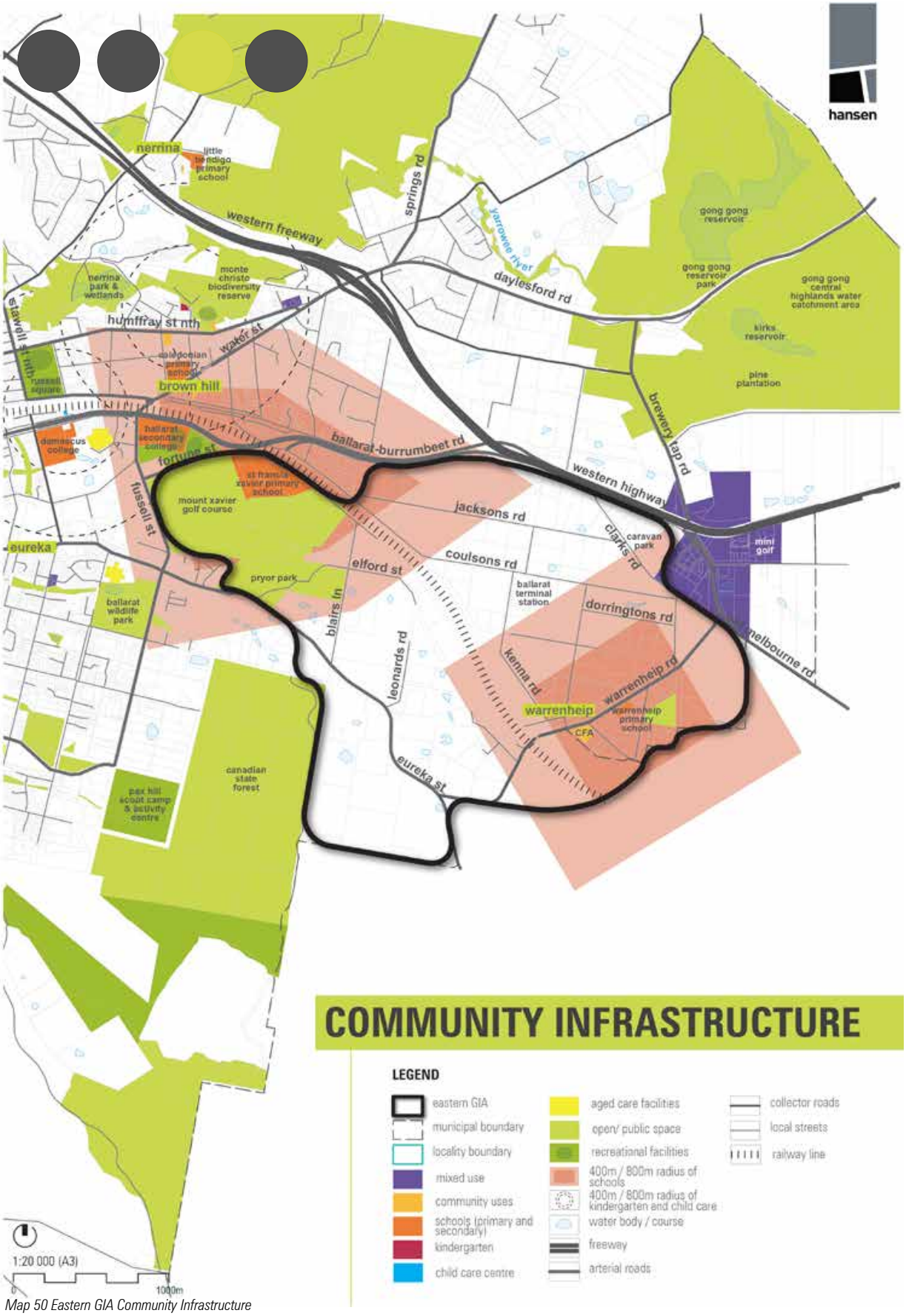
Central Highlands Water provides and manages the existing water supply infrastructure within Ballarat and the outlying areas. The Ballarat water supply is primarily comprised of two headwork systems: the Ballarat System and the Lal Lal System. Potable water to the Eastern GIA and the surrounding areas is supplied from the Ballarat System and delivered via the White Swan/ Warrenheip Zone network. All mains supplying water within this zone originate from the White Swan clear water storage facility and the 30ML Warrenheip Basin. Trunk infrastructure in the Eastern GIA is limited.

Gas is supplied to the Ballarat City Gate, located at the Old Melbourne Road/Warrenheip Road intersection, via the dual Ballan to Ballarat High Pressure Transmission Pipelines. Gas pipes are present along the major roadways within the GIA, namely the Western Freeway, Warrenheip Road, Coulsons Road and Eureka Street, where small amounts of urbanisation exists.

SP AusNet have advised that there is approximately 20% additional capacity to service the existing network but cannot confirm that the current network will be able to service the projected population of Ballarat in 2040 (SMEC, 2014).

Information provided by Powercor is response to a DBYD enquiry show that existing high voltage distribution network in the area consists of 22kV overhead power lines that are largely located in the road reserves of the major roadways. Low voltage reticulation is dispersed widely across the GIA. There is very little underground 22kV high voltage cabling within the study area, and where existent, it is limited to the northern boundary along the Western Highway. Powercor has confirmed that some capacity exists to service this GIA.

The National Broadband Network (NBN) has been rolled out in most of the Eastern GIA. Limited information has been provided with regard to the existing network capacity however it is anticipated that communications providers will upgrade and expand networks in line with regional growth profiles pending developer applications.



Map 50 Eastern GIA Community Infrastructure

ACCESS TO EXISTING COMMUNITY INFRASTRUCTURE

Providing appropriate community facilities within any new growth area is an important consideration. The following provides an understanding of where existing facilities are located in proximity to the Eastern GIA. The community facilities have been mapped to the left (map 44), illustrating their proximity to the GIA. A 400m and 800m radius has been shown from schools, kindergartens, child care centres and commercial precincts to highlight their distance from the GIA. These community facilities have been categorised under the following headings:

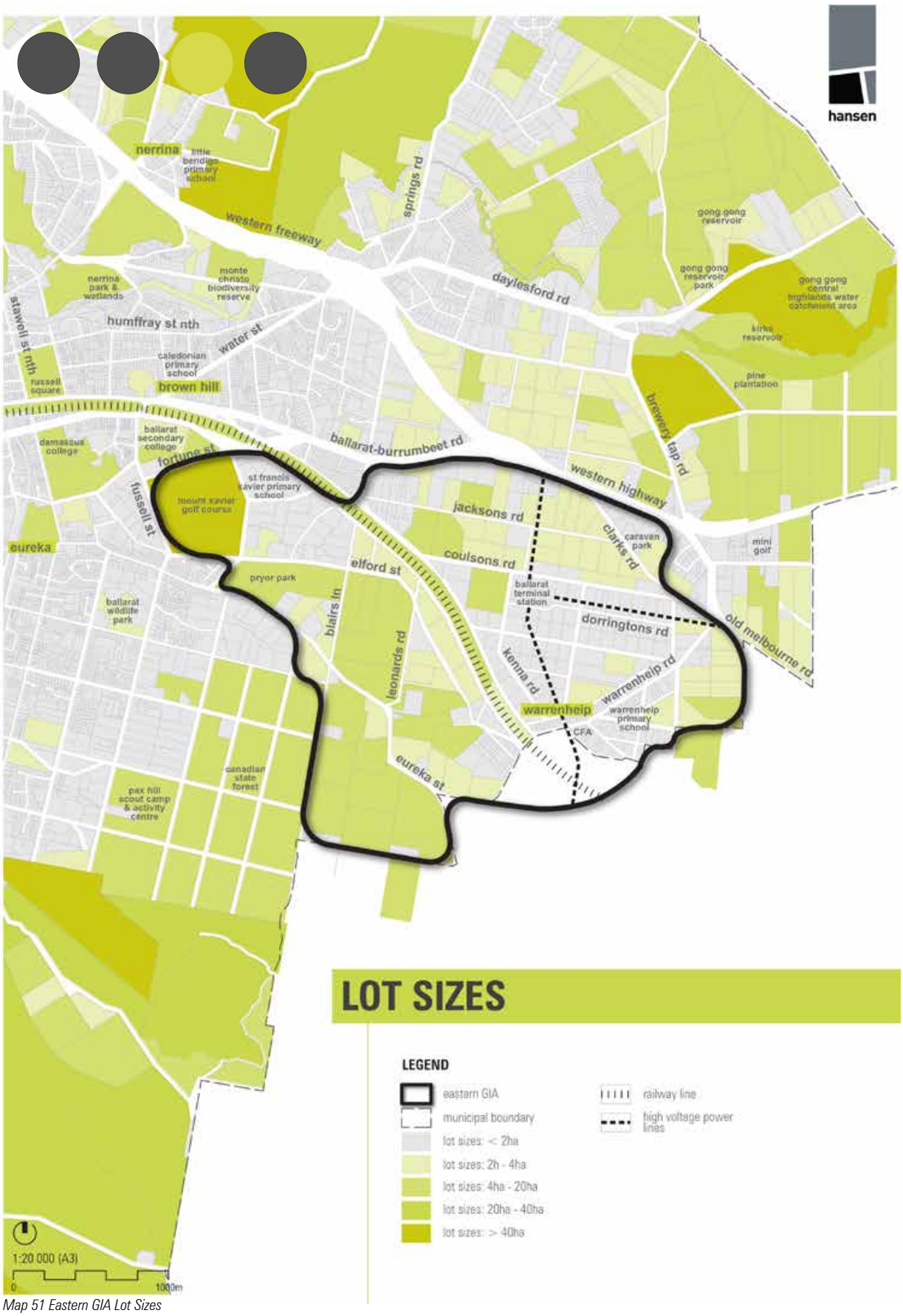
- Recreation/ cultural infrastructure;
- Educational infrastructure; and
- Healthcare infrastructure.

The Eastern GIA contains a number of community services within and immediately surrounding the GIA boundary. This includes five (5) schools, three (3) primary schools and two (2) colleges within a 400-800m radius of the site. There are a range of kindergartens and childcare centres to the north of the GIA within Brown Hill, and a number of recreational facilities within and surrounding the GIA.

The Warrenheip centre is located on the south-eastern side of the GIA, however it provides limited community services including a primary school, memorial hall and tennis courts. Based on consultation processes it is understood these community uses are currently struggling with attendance, resources and funding. While there is no distinct community hub of note to support the Eastern GIA, there are a clustering of community services around the Ballarat-Burrumbeet Road and Fussell Street intersection. However, the Eastern GIA is located closest of the three GIA's to Ballarat CBD and the substantial community and commercial services it provides.

COMMUNITY INFRASTRUCTURE	APPROXIMATE DISTANCE FROM EASTERN GIA BOUNDARY
Recreation/ cultural infrastructure	
Playground and sports field	800m by road
Warrenheip Memorial Hall	Within GIA
Brown Hill Community Hall	800m by road
Pax Hill Scout Camp & Activity Centre	1.6km by road
Russell Square	1.1km by road
Ballarat East Recreation Centre	150m by road
Educational Infrastructure	
Warrenheip Primary School	Within GIA
Caledonian Primary School	680m by road
St Francis Xavier School	Within GIA
Ballarat Secondary College	150m by road
Damascus College	900m by road
Little Bendigo Primary School	3.5km by road
Brown Hill Kindergarten	1.3km by road
Ballarat Little Learners Early Education Centre	940km by road
Healthcare Infrastructure	
Geoffrey Cutter Centre	460m by road
Eureka Village Hostel	370m by road
Begonia Residential Aged Care	830m by road
Hemsley Park Retirement Village	870m by road

Table 15: Existing Community Infrastructure

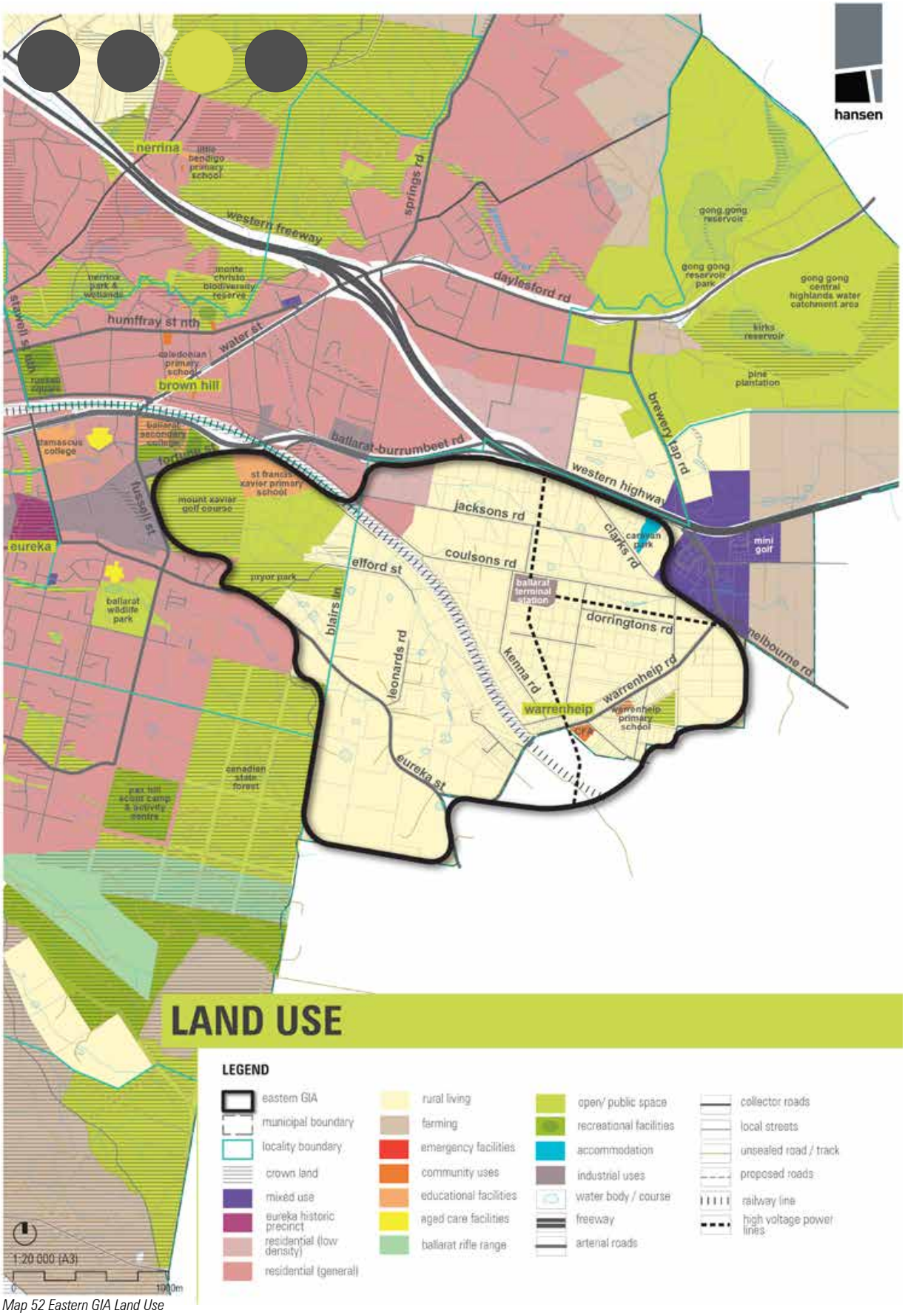


Map 51 Eastern GIA Lot Sizes

CURRENT LAND USES AND LAND FRAGMENTATION

Of the GIA's being investigated the Eastern GIA is the most fragmented in terms of land use and allotment size. This would appear to both be a consequence of its varied and undulating topographic landform, as well as its predominant Rural Living Zone (RLZ) which allows land subdivision down to a minimum of 4ha. The following outlines the current land uses, activities and land fragmentation located within the Eastern GIA, shown on map 45 to the left and 46 overleaf:

- The Eastern GIA accommodates large lot rural living 'lifestyle' type allotments where dwellings are present. Some low density and general residential housing is located on the northern edge of the GIA.
- The Pryor Park reserve is located on the western side of the Eastern GIA.
- While mixed use zoning is allocated to the north-eastern edge of the GIA, only a small caravan park exists within the GIA, with the remainder functioning as rural living lots.
- There are many vacant undeveloped allotments located throughout, some of which have been combined with other allotments to create larger rural lifestyle properties.
- There is limited active farming of land within the Eastern GIA, although community consultation revealed some level of rural/ agricultural activity.
- Other land uses within the Eastern GIA include the St Francis Xavier Primary School and Mount Xavier Golf Course, which are accommodated on a large collection of properties located to the western boundary, and the Warrenheip Primary School located on Warrenheip Road.
- The Ballarat Terminal Station is positioned along Coulsons Road, which is facilitated by large power lines that extend to the east and north of the station, powering Ballarat. The alignment of these power lines will need to be considered if future development is approved for the Eastern GIA, as they currently don't follow property boundaries or road alignments.
- Warrenheip is a small centre located on the south-eastern corner of the Eastern GIA, comprising a range of uses along Warrenheip Road, including the primary school, the Warrenheip Memorial Hall, CFA facilities, tennis courts and oval.
- The subdivision layout within Warrenheip appears to be have finer grain lots than the surrounds, however they are predominately vacant or have amalgamated parcels for rural living.
- The Eastern GIA is broken into two parts, split by the intersection of the railway line which runs diagonally through the site. Land fragmentation changes from the eastern side of the railway line to the western side.
- Land fragmentation is relatively consistent in size on the eastern side of the railway line, ranging between 1ha -4ha with some larger lots between 4ha and 20ha located on the west side of the railway line (as shown in the lot sizes map to the left). The lot sizes are generally a consequence of the minimum allotment size of the Rural Living Zone (RLZ) which applies to the majority of the Eastern GIA.
- The golf course site is the only parcel over 40ha within the GIA.

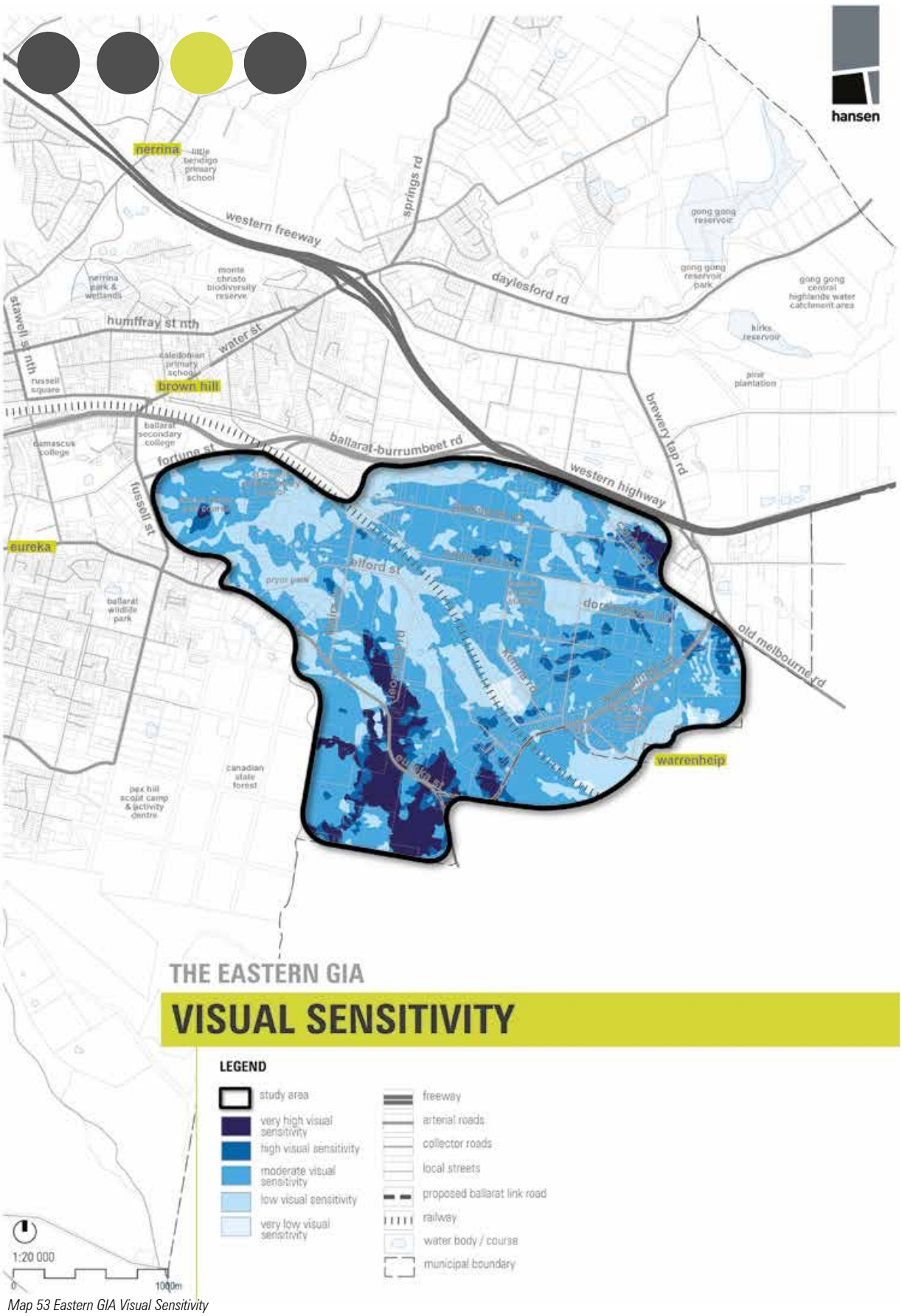


Map 52 Eastern GIA Land Use

EXTERNAL INTERFACES AND SURROUNDING LAND USES

The following outlines the external interfaces and surrounding land uses (shown on map 46 to the left) which inform the current and future context of the Eastern GIA:

- The closest centre to the Eastern GIA is the Ballarat CBD. While Warrenheip provides minimal services, such as a primary school etc., there are no other feeder centres besides the Ballarat CBD.
- The Eureka Historic Precinct is located just west of the Eastern GIA along Eureka Street.
- The site is partially located within the Woodmans Hill Gateway Precinct Master Plan, 2015. This has been discussed further in the Assessment of Planning Policy Framework for the Eastern GIA.
- West of the Eastern GIA is predominately typical residential with some rural living, and a mix of educational facilities, industrial uses (directly east of the north-east corner of the GIA), and some specialty uses such as the Ballarat Wildlife Park and the Pax Hill Scout Camp & Activity Centre.
- The Canadian State Forest bounds the Eastern GIA to the south-west.
- The southern boundary of the GIA, roughly aligns with the boundary between the City of Ballarat and Moorabool Shire Council. A large area of currently disused railway related land is located adjacent to the southern boundary. Land further south of the Eastern GIA is farming land for agricultural purposes.
- A small portion of the land to the east of the Eastern GIA (within the City of Ballarat) accommodates a mix of uses including a service station, mini golf, restaurants, accommodation and other light industrial uses.
- Bounding the Eastern GIA to the north is the Western Highway and Ballarat-Burrumbeet Road. This entrance along the Western Highway is essentially the gateway into Ballarat, when travelling from Melbourne. Further north consists of rural living, low density residential and standard residential, gradually increasing in density closer to the Ballarat CBD.
- Some small patches of industrial exists to the north and south of Ballarat-Burrumbeet Road.
- Brown Hill which is north of the Eastern GIA contains a number of services and facilities that may support future development in the Eastern GIA.



Map 53 Eastern GIA Visual Sensitivity

VIEW SHEDS AND SIGNIFICANT LANDSCAPES

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by Hansen Partnership. Further detailed information is provided in Appendix 3 which contains Hansen Partnership - Ballarat Greenfield Investigation Areas: Landscape Assessment Report.

LANDSCAPE CHARACTER & VALUE

From a combination of fieldwork and desktop assessment, the following landscape character areas were identified in the Eastern GIA:

- Undulating Rural - Land to the west of the GIA with undulating terrain, established native / exotic vegetation and numerous rural allotments.
- Rural Bushland – Land to the north of the GIA with a predominance of established native bushland vegetation set within undulating hills, accompanied by numerous rural allotments and dwellings.
- Bushland – Land to the south west of the GIA, including small areas of bushland set on undulating hills adjacent to the Canadian State Forest.
- Rural Township – Land to the south east of the GIA, including the more developed, semi-rural areas of Warrenheip and the Ballarat Terminal Station.

These landscape character areas were subsequently assigned with a landscape value, the designation of which was formulated through an assessment based on established approaches as outlined in benchmarking documents and Hansen Partnership's professional experience with similar projects. The rationale for the value designation is described in detail in the body of the landscape assessment report.

- High Landscape Value: Bushland.
- Moderate Landscape Value: Undulating Rural and Rural Bushland.
- Low Landscape Value: Rural Township.

VISUAL EXPOSURE

Through an analysis of views within and near to the GIA demonstrated in the view shed and views assessment, a picture of visual exposure, or what areas of the study area are more visible than others, was created. For the Eastern GIA, general trends of visual exposure included the following:

- Areas of very high visual exposure on the elevated plateaus in the eastern and southern extents of the study area.
- Lower visual exposure (generally none to moderate) was afforded to the lower-lying areas, created by the undulating terrain which constricts views to a immediate area.

VISUAL SENSITIVITY

Areas of landscape value and visual exposure have been overlaid to explore their visual sensitivity, or the ability of a specific area to accommodate change. Landscapes with a higher visual sensitivity generally have a lower threshold beyond which changes in the landscape start to detrimentally impact on the value/ significance of that landscape. Visually sensitive landscapes for the Eastern GIA are as follows:

- Very high visual sensitivity afforded to the elevated areas adjoining Eureka Street. This is due to the moderate landscape value associated with the 'Undulating Rural', and to a lesser extent the highly valued 'Bushland', landscape character areas and the high degree of visual exposure on this elevated area.
- Although of relatively low landscape value, areas of 'Rural Township' around Warrenheip were typically identified with a moderate level of visual sensitivity, primarily due to the high visual exposure of the elevated plateaus as visible from numerous vantage points.
- For low lying areas in the north and western extents of the GIA a moderate to low visual sensitivity was afforded, despite the moderate level of landscape value afforded to the 'Undulating Rural' or 'Rural Bushland' areas. This is due to the prevailing low level of overall visual exposure, created by the undulating terrain which serves to constrain views.

LANDSCAPE ASSESSMENT RECOMMENDATIONS

Landscape Assessment recommendations for the Eastern GIA are based on the assigned visual sensitivity areas, which are the outcome and synthesis of the landscape assessment. It is acknowledged that this is part of a wider assessment of the suitability of the land within the GIA's for development. However, it is intended that this assessment provide some broad guidance for potential development in these areas on the basis of visual landscape principles.

The following provides a broad framework to assist in potentially enhancing the character of areas which were identified as having a somewhat lower landscape value such as the 'Rural Township' landscape character area.

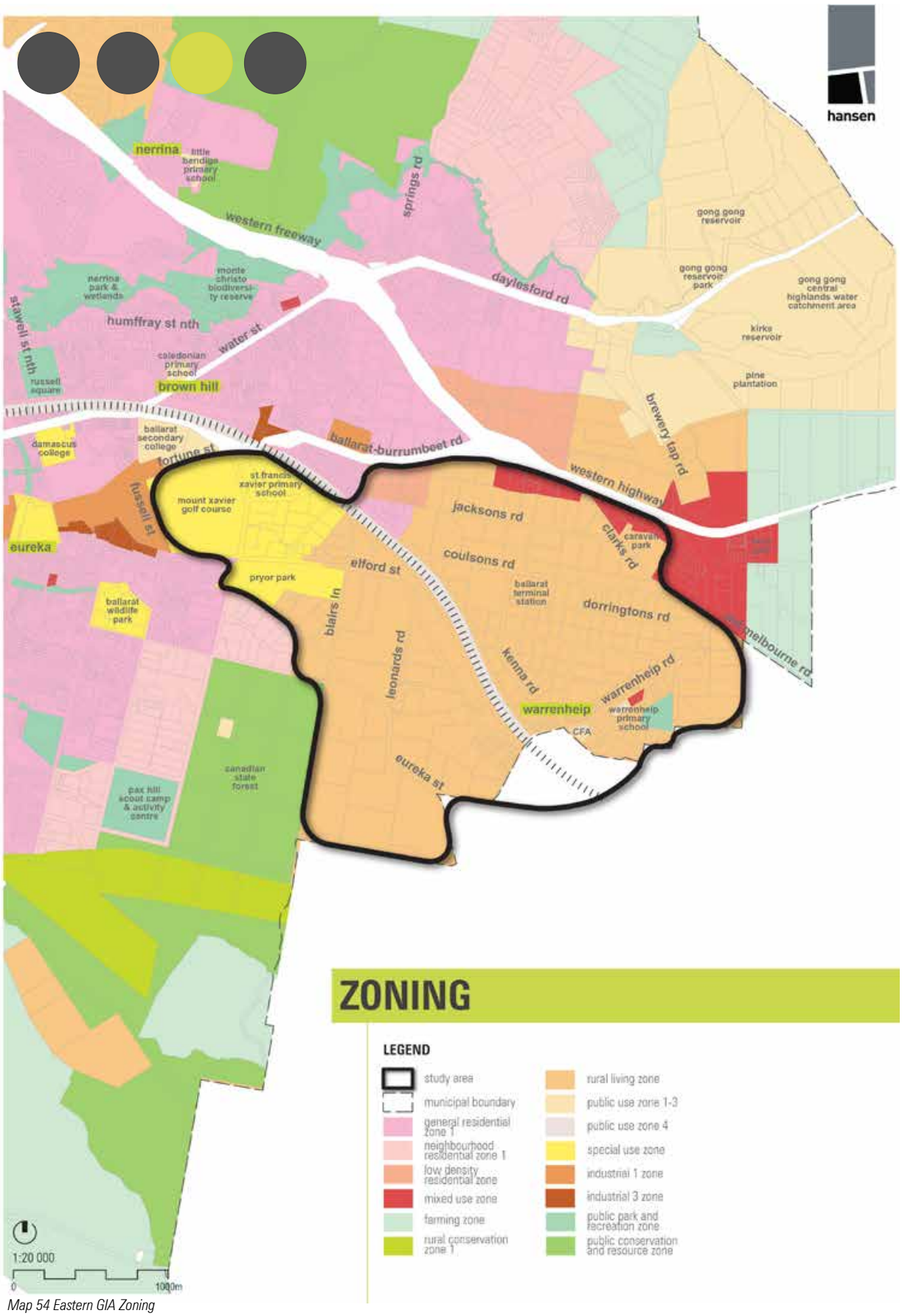
It is important to note that while valued landscapes identified in the Eastern GIA typically have been designated with either a low or moderate visual sensitivity, that they have their own inherent constraints in consideration to potential development, in particular in terms of vegetation, waterways / bodies and topography.

Recommendations based on the landscape assessment aim to maintain and enhance existing high quality or visually sensitive landscape areas include the following:

- Specification of lower density development or little to no development (where possible) in areas assigned with either a 'Very High' or 'High' visual sensitivity rating. This is primarily applied to land surrounding Eureka Street.

- Implement a range of built form guidelines that tailor controls suitable to the level of visual sensitivity in a particular area (i.e controls for 'very high' visual sensitivity areas), which focus on reducing the visual impact of development, these could include but not be limited to:
  - Locating of structures / dwellings away from significant view lines, ridgelines or high points, such as the 'forested ridge' identified in 'Mapping Ballarat's Historic Urban Landscape' (Context Pty Ltd, 2013, p 52-54). If located within a significant view line, efforts should be made to make the structure inconspicuous.
  - Development that is designed and sited to reflect the natural topography and complement the landscape character of the area.
  - Development that is of a low to medium scale while maintaining a moderate building footprint, within a landscaped setting.
- Consideration to designating areas with a 'Very High' or 'High' visual sensitivity rating as public open space or for non-visually obtrusive public facilities as a means of limiting development and hence any associated visual impact in these sensitive areas. Implementation of such also means that significant views in obtained from these areas remain in the public realm.
- Protect and enhance areas of significant vegetation as a key, valued character element of the study areas, particularly at roadsides, where it references historic land uses and where groups of well-established native vegetation is present. Specific consideration should be given to established vegetation within the Eastern GIA, in the 'Undulating Rural', 'Rural Bushland' and 'Bushland' landscape character areas, as this forms part of the 'forested ridge' identified in 'Mapping Ballarat's Historic Urban Landscape' (Context Pty Ltd, 2013, p 52-54). This is important in consideration of maintaining the appearance of the 'forested ridge' from as viewed from Ballarat.
- Incorporate significant vegetation into proposed allotments, road reserves or open space areas.

The capability of the land to accommodate future urban development has been considered and assessed from a variety of angles relating to the current and proposed Planning Policy Framework. The current Planning Policy Framework relating to the existing Ballarat Planning Scheme, zones and overlays. The proposed Planning Policy Framework relates to the prepared but yet to be implemented Ballarat Strategy (2015).



Map 54 Eastern GIA Zoning

ASSESSMENT OF PLANNING POLICY

The capability of the land to accommodate future urban development has been considered and assessed against the Planning Policy Framework, zones and overlays within the existing Ballarat Planning Scheme, and includes the Ballarat Strategy (2015), implemented by Amendment C194.

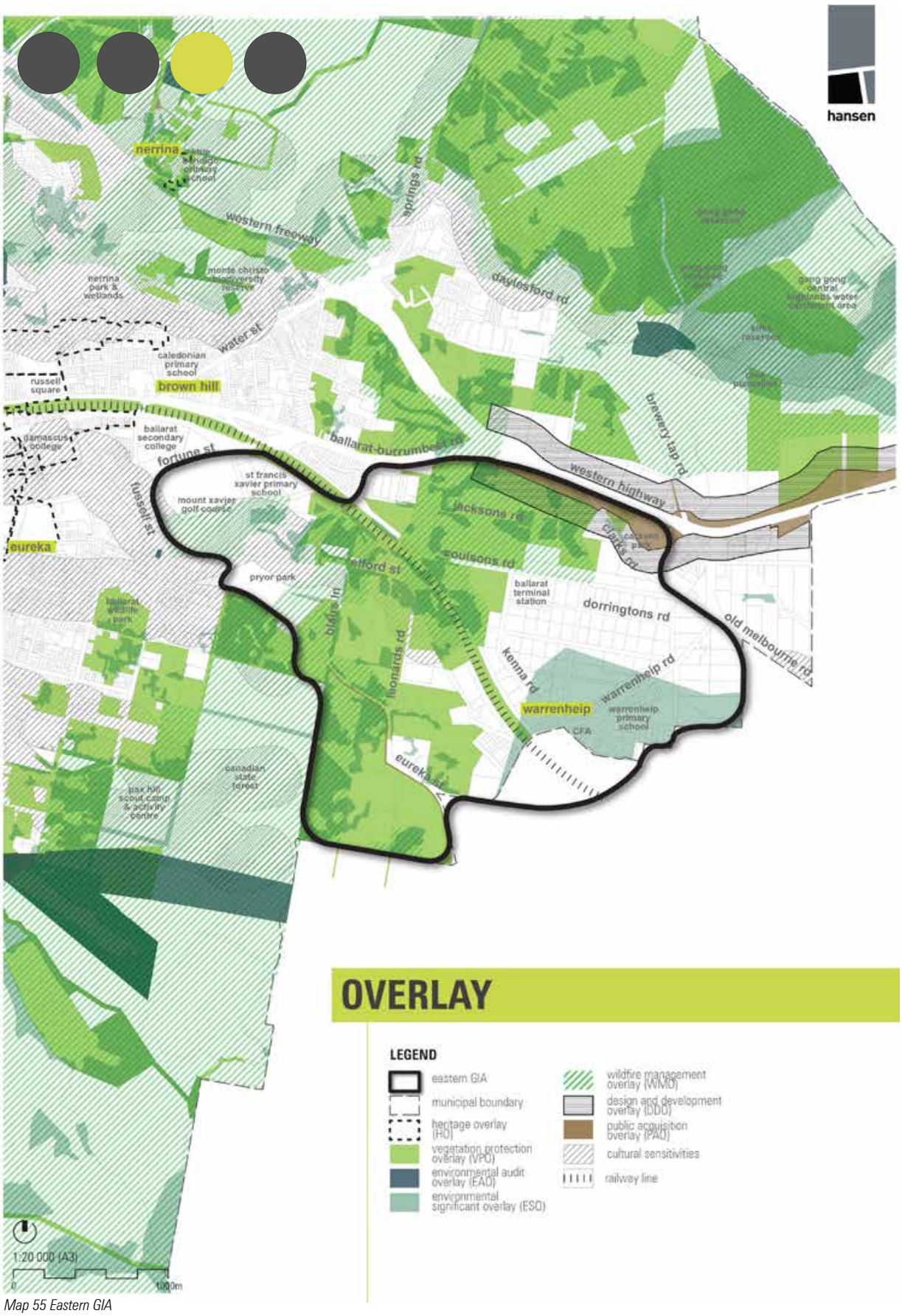
CURRENT ZONING

The current zoning of land within the Eastern GIA includes the following, as shown in the associated zoning map:

- The Special Use Zone Schedule 5 (SUZ5) associated with the St Francis Xavier Primary School located on Fortune Street to the northern boundary.
- The Special Use Zone Schedule 10 (SUZ10) associated with the Mount Xavier Golf Course and Pryor Park, located to the western boundary.
- The small pocket of General Residential Zone (GRZ1) located to the north of the rail corridor (southern side of Jacksons Road).
- The small pocket of Low Density Residential Zone (LDRZ) located to the northern side of Jacksons Road.
- The Mixed Use Zone (MUZ) with land located along sections of the northern boundary to the Western Highway.
- The Mixed Use Zone (MUZ) relating to 5 properties located to the south east side of Warrenheip Road.
- The Public Use Zone Schedule 1 (PUZ1) delineating service and utility designated land located on the corner of Warrenheip Road and Ti-Tree Road.
- The Public Use Zone Schedule 2 (PUZ2) associated with the Warrenheip Primary School located on Warrenheip Road.
- The Public Use Zone Schedule 4 (PUZ4) delineating the existing railway alignment/ rail corridor which bisects the Western GIA.
- The Public Park and Recreation Zone (PPRZ) associated with the open parkland located off Inglis Road in Warrenheip.
- Apart from the above identified zones the balance of the land within the Western GIA is the Rural Living Zone (RLZ).

A section of land technically outside of the City of Ballarat municipal boundary is nominated along the eastern boundary of the Eastern GIA. This area of land is within Moorabool Shire (located to the south of Warrenheip Road), being the site of the former Warrenheip Train Station. This large area of currently undeveloped land is within the Public Use Zone Schedule 4 (PUZ4) and could potentially be developed for rail infrastructure (station, stabling yards etc.).

The current Rural Living Zone (RLZ) controls, implement a minimum 4ha allotment size, which has created a much greater degree of land ownership fragmentation than is present in the Northern and Western GIA's. The continued existence of the minimum 4ha allotment size will clearly limit potential for further subdivision, unless it were sought to amend the minimum allotment size control. The large number of overlay controls within the Eastern GIA serve to highlight the range of specific issues which would require consideration as part of any current or future land use and activity.



Map 55 Eastern GIA

CURRENT OVERLAYS

Overlays found within the Eastern GIA include the following (shown on map 49 to the left):

- The Bushfire Management Overlay (BMO) which applies to the more densely vegetated area located within the Eastern GIA.
- The Environmental Significance Overlay Schedule 3 (ESO3), also referred to as the 'Water Catchment Area' overlay, which applies to land surrounding the original township settlement of Warrenheip.
- The Environmental Significance Overlay Schedule 5 (ESO5), also referred to at the 'Koala and Koala Habitat Protection' overlay, applies to stands of trees and vegetation scattered throughout the Eastern GIA, particularly along the diagonal corridor between the Canadian State Forest and the Gong Gong Reserve Park.
- The Vegetation Protection Overlay Schedule 1 (VPO1) applies to a large band of land extending north to south through the Eastern GIA to protect significant vegetation and habitats.
- The Public Acquisition Overlay (PAO) which applies to land located along section of the northern boundary to the Western Highway relates to road construction or road widening under VicRoads.
- Design and Development Overlay, Schedule 2 (DDO2) relates to a small section of land, south of Western Highway which deals with the noise implications of the road re-alignment.

CULTURAL HERITAGE

The Heritage Overlay (HO) does not apply to any land within the Eastern GIA. The Eastern GIA is located within the Creswick and Canadian Forested Ridge Rural Character area identified in Mapping Ballarat's Historic Urban Landscape (Context Pty Ltd, 2013). Further, there is one site within the Eastern GIA that has been identified on the Heritage Inventory, under the Victorian Heritage Act 1995. This is the site of the Jenkins Barn/Dairy, located in the north of the GIA near the corner of Clarks Rd and Western Highway. The cultural sensitivities within the Eastern GIA have been shown in map 49 to the left.

CURRENT POLICY DIRECTION

The Ballarat Planning Scheme has recently been updated (via Amendment C194) to formally implement the recommendations of the Ballarat Strategy (2015), and making the strategy a specific reference document under *Clause 21.10*.

The Ballarat Strategy (2015) functions to guide growth and development and to appropriately manage such change so Ballarat in 2040 has built on its strengths and retained its values and character. More broadly the Ballarat Strategy (2015) identifies and it recognises the opportunities to manage this change to create a greener, more vibrant and connected Ballarat.

At an overall city scale the Ballarat Strategy (2015) seeks the creation of compact and complete neighbourhoods, and includes a framework to encourage urban renewal and infill development to create a variety of housing types, within proximity of public transport and commercial and community services. It also seeks to build upon the mixture of urban and rural areas and seeks to create high amenity environments which area embedded with natural values and biodiversity by adopting an urban forest approach.

Within the context of the Ballarat Panning Scheme *Clause 21.01-3 Land use vision* outlines that: *"the Ballarat Strategy (2015) applies the community values and key principles as a longterm strategic direction for Ballarat towards 2040. It outlines the shared community vision for a greener, more vibrant and connected Ballarat…"*

Clause 21.01-4 Key issues outlines a number of relevant matters under the heading of settlement and housing, including:

- *Accommodating a projected population of about 160,000 people by 2040.*
- *Maintaining a compact settlement form as part of Ballarat's '10 Minute City'.*
- *Identifying and protecting long-term growth opportunities.*
- *Encouraging a variety of housing opportunities to respond to diverse community needs and aspirations for housing.*
- *Providing quality open space as essential for community health.*

More specifically *Clause 21.02-1 Urban Growth* acknowledges that: *"Ballarat is forecast to grow significantly towards 160,000 people by 2040. Most of this increased population is planned to be accommodated through infill in established areas, convenience living close to public transport, urban renewal precincts, and in properly planned greenfield growth areas such as Ballarat West".*

Figure 2 – Housing Framework Plan (Clause 21.02-1) illustrates 4 longer-term greenfield investigation areas, including the three GIA's nominated within the Ballarat Strategy, in addition to the TIGA land which resulted from the Panel Report recommendations on Amendment C194.

Clause 21.02-1 Urban Growth contains an object and strategy which are relevant to the current study, including:

- *Objective 1: To support a pattern of growth which reinforces the '10 Minute City'.*
- *Strategy 1.4 Discourage increased development density in fringe areas, particularly those that are more than walking distance from activity centres.*

Likewise *Clause 21.02-4 Greenfield investigation areas* is specifically relevant to informing the context of the current study. This Clause identifies that:

"The Ballarat West Growth Area is the primary greenfield development area for Ballarat. Medium to long-term greenfield investigation areas (as identified in Figure 2 – Housing Framework Plan) require a more detailed feasibility assessment. Identification as an investigation area does not necessarily indicate strategic support for land use change potential.

Objective 4

To ensure that greenfield development is connected to the existing urban area.

Strategies

4.1 Discourage rezoning of additional greenfield land, which would compete with Ballarat West, until the market requires additional supply.

4.2 Ensure that future greenfield development is focused within roughly an 8km arc from the centre of Ballarat.

4.3 Avoid ad-hoc and unplanned greenfield development.

4.4 Discourage disconnected or 'leap frog' development.

4.5 Minimise the impacts of development on Ballarat's historic urban landscape, the environment and Ballarat's natural resource base.

4.6 Ensure the need for buffers to protect major water and sewerage assets and treatment plants from encroachment by sensitive land uses is taken into account as part of any greenfield investigation".

OTHER STRATEGIC PROJECTS

The Woodmans Hill Gateway Precinct Master Plan, 2015 prepared by Aurecon, partially comprises the northern area of the Eastern GIA. It includes the Mixed Use Zone (MUZ), Rural Living Zone (RLZ) and Farming Zone (FZ) on the northern and southern sides of the Western Freeway which forms the primary 'Gateway' to Ballarat from Melbourne. This Master Plan proposes to back zone some of the Mixed Use Zone (MUZ) land on the southern side of the freeway to Rural Living Zone (RLZ). It also identifies areas on the northern side of the freeway, currently zoned Rural Living (RLZ), to be rezoned to Mixed Use (MUZ), accommodation future development and to better interface with the future freeway alignment.

Other modifications and extension to the existing Design and Development Overlay (DDO) have been identified to include 'key sites' on both the northern and southern side of the freeway, as shown in the issues and opportunities map. The gateway into Ballarat will be focused around the land on the northern side of the freeway, extending to Kokoda Street, and Jamieson Street, while including the area around the Old Melbourne Road intersection along the freeway.

PREVIOUS POLICY DIRECTIONS

A Structure Plan was prepared for Warrenheip in 1995 by John Bennett & Associates for the City of Ballarat. Whilst the Structure Plan was prepared its findings and recommendations were not formally implemented through a Planning Scheme Amendment, thus causing the document to become outdated. Although the findings and recommendations of the study are now effectively redundant, a summary is provided below as historic background. As part of its finding and recommendations four potential development options were presented, which can be summarised as follows:

- Option 1:
  - Proposed nine stages of residential development to accommodate higher densities of around 500m2, except for land south of Ti Tree Road which drains to the Lal Lal catchment to be included in a Rural Zone.
  - Identified an anticipated lot yield of 4,400 lots.
- Option 2:
  - Proposed six stages of residential development to accommodate higher densities of around 500m2.
  - Nominated vegetated land on the western and south western areas to be included in a low density/rural residential zone to maintain the physical separation with East Ballarat, a buffer to the Canadian Forest and a lower density interface with the rural land in the Lal Lal catchment.

- Identified an anticipated lot yield of 3,040 lots.

- Option 3:
  - Proposed seven stages of residential development to accommodate higher densities of around 500m2.
  - Nominated mainly vegetated land south of Navigators Road to be included in a low density/rural residential zone to maintain a buffer to the Canadian Forest and a lower density interface with the rural land in the Lal Lal catchment.
  - Identified an anticipated lot yield of 3,795 lots.
- Option 4:
  - Proposed four stages of residential development to all accommodate higher densities of around 500m2.
  - Nominated mainly vegetated land on the western, north western and south western areas to be included in a low density/rural residential zone to maintain the physical separation with East Ballarat, recognise the importance of maintaining areas of native vegetation in larger lots, maintain a buffer to the Canadian Forest and introduce a lower density interface with the rural land in the Lal Lal catchment.
  - Identified an anticipated lot yield of 1,815 lots.

Of the four nominated options, the Structure Plan highlighted a preference for Option 3, but also highlighted that most anticipated development would not occur until 2005. On this basis no land rezoning was recommended to be undertaken at the time, nor was undertaken in the following years, thus resulting in the Structure Plan becoming obsolete.

ASSESSMENT AGAINST BALLARAT STRATEGY

As part of this project it is important to assess each of the GIA's at a high level to see how they would broadly comply with and implement the initiatives Of the Ballarat Strategy (2015). Accordingly the following comments are made with regard to the Eastern GIA:

Accessibility

- The closest activity centre for the Eastern GIA is Ballarat CBD PAC, approximately 5-6 km to the west (Figure 12 Current Activity Centres, Ballarat Strategy (2015)).
- The majority of the Eastern GIA within the 10 minute drive catchment (Figure 15 The '10 Minute City', Ballarat Strategy (2015)).
- The entire Eastern GIA is within the8km radius from Ballarat CBD (Figure 16 Future Greenfield Investigation Areas, Ballarat Strategy (2015)).
- The Eastern GIA would have benefit of improved road connections through the upgrade of Yankee Flat Road (Figure 23 Improved Road Connections, Ballarat Strategy (2015)).

Public Transport

- Would be within close proximity of Future High Frequency Public Transport Corridor designated, in addition to Warrenheip being designated as a potential future transport hub and park and ride investigation area, associated with the reestablishment of the Warrenheip Train Station (Figure 20 Towards a More Sustainable Transport System, Ballarat Strategy (2015)).

Employment

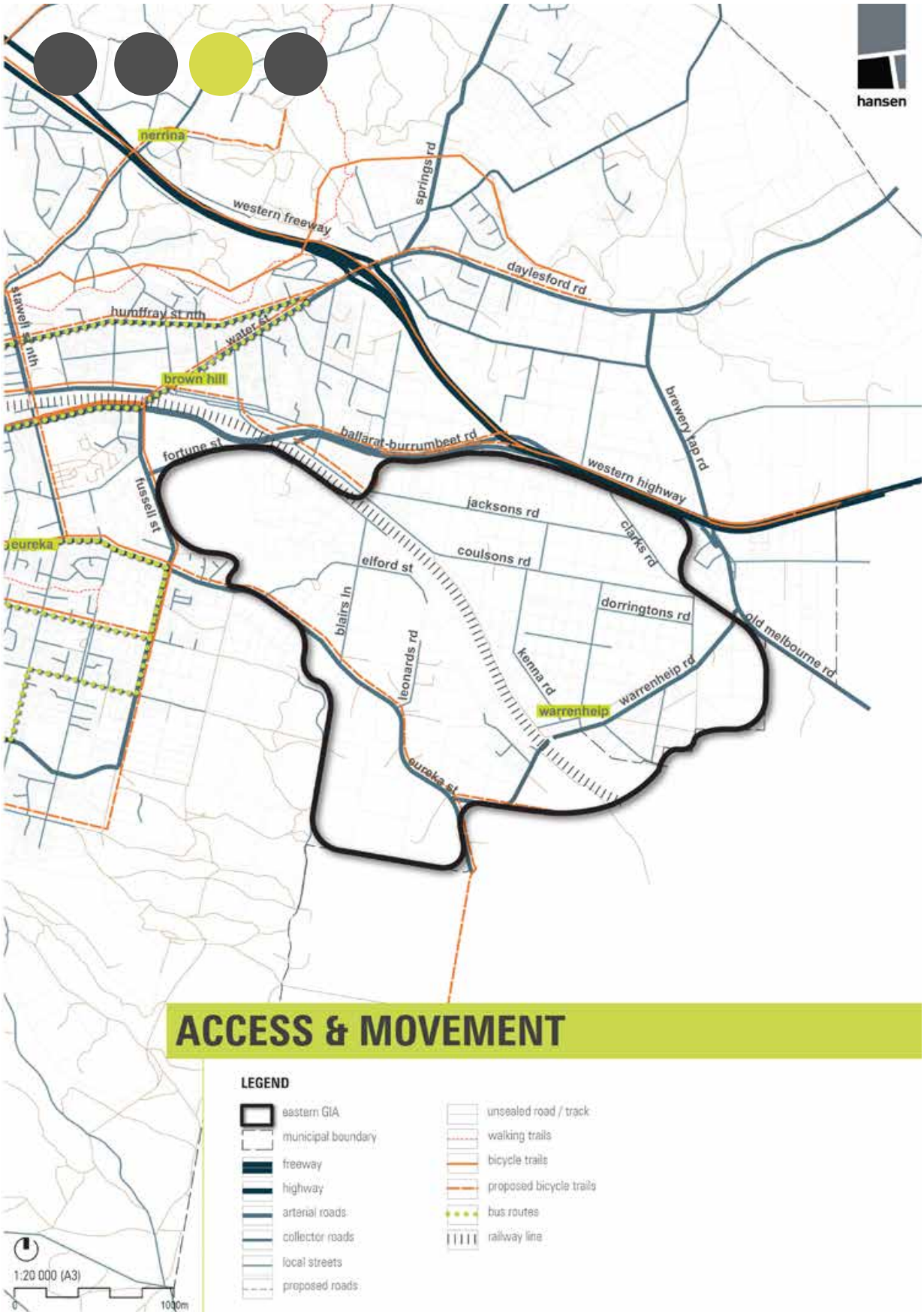
- Would be isolated from the main employment clusters of Ballarat (Figure 13 Industrial Areas, Ballarat Strategy (2015)).
- Direct road access to Ballarat West Employment Zone would be facilitated via the Western Freeway (Figure 13 Industrial Areas, Ballarat Strategy (2015)).

Landscape Interface

- The majority of the Eastern GIA is identified as accommodating existing rural living land use and activity (Figure 19 Rural Living and Township Areas, Ballarat Strategy (2015)).
- A small section to the east of the Eastern GIA is nominated as a rural interface area (Figure 30 Rural Interface Areas, Ballarat Strategy (2015))

Neighbourhood Links and Landscaping

- The Eastern GIA is isolated from being able to facilitate direct links with proposed neighbourhood link networks (Figure 22 Neighbourhood Links, Ballarat Strategy (2015)).
- Part of the Eastern GIA are identified to facilities 'Living Corridor' tree/ vegetation network (Figure 26 Living Corridors, Ballarat Strategy (2015))



Map 56 Eastern GIA Access & Movement

ASSESSMENT OF ACCESSIBILITY

Congestion levels were the most influential factor in differentiating between the GIA's for the accessibility assessment. All of the GIA's have access to employment opportunities and services within a 20 minute private vehicle trip (up to 2041).

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

EXISTING AND PLANNED FUTURE ROAD NETWORK

The site is bounded by the Western Freeway and Ballarat-Burrumbeet Road (Victoria Street) to the north and the key roads that bisect the site include Eureka Street and Warrenheip Road. A public acquisition overlay applies to the north-eastern section of the site and is understood to provide for a future upgrade of the Western Freeway in the vicinity of Brewery Tap Road. The existing and future roads have been shown in map 50 to the left. Congestion levels are relatively low and the assessment of transport forecasts contained within the Ballarat VITM Report indicates that in 2041, the network experiences some levels of congestion along key routes providing access to the site during the AM peak period. It is also worth noting that the existing rail corridor presents a barrier to providing access from the site to the external road network with the existing crossing points limited to Victoria Street and Warrenheip Road.

PUBLIC TRANSPORT NETWORK AND FACILITIES

The closest point of the site is located approximately 7.0km from Wendouree Station and approximately 3.0km from Ballarat Station and the Melbourne to Ballarat rail line bisects the site. Bus Route 8 and 9 operate along Fussell Street and provides a catchment that is localised to east of the site.

Bus Route 7 operates immediately west of the site, though catchment for these services does not extend into the site. There is an opportunity to extend the existing Bus Route 8 and 9 as well as reroute Bus Route to operate within the site. There is also an opportunity to plan for a new station to be provided within the site. The existing bus routes have been shown in map 50 to the left.

WALKING AND CYCLING NETWORKS

The site is generally located at least 2.5km from the Ballarat CBD. Accordingly, walking trips expected to remain either internal to the site or be limited to the immediate surrounding suburbs. The distance to the CBD is such that these trips are particularly conducive to cycling. However, the existing rail corridor limits permeability within the site and would create a barrier to walking and cycling. There are existing cycling routes along Victoria Street and Eureka Street and there are opportunities to extend the existing cycling routes to further within the site to maximise connectivity to the CBD and provide additional rail crossing treatments for pedestrian and cyclists to improve permeability within the site. Existing and proposed cycle and walking networks have been shown in map 50 to the left.

ACCESSIBILITY TO EMPLOYMENT AND SERVICES

Based on current planning, the site will have a high level of access to employment and retail services by private vehicle for the foreseeable future, however there is negligible access by public transport. The employment distribution forecasts outlined in the Ballarat VITM report suggest that more jobs will be located in the west of Ballarat in the future. The site will have good private vehicle access to these jobs due to the proximity and access to the Western Freeway which effectively provides a bypass of the Ballarat CBD. There is an opportunity to provide additional transport choice and increased access to employment and retail services through the provision of additional public transport services and improvements to the bicycle network.

ASSESSMENT OF DELIVERABILITY

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP. Further detailed information is provided in Appendix 2 which contains ARUP's Ballarat Greenfield Investigations Areas Review: Part A - Analysis Report.

NEW TRUNK UTILITY INFRASTRUCTURE

Given that there is no trunk utility infrastructure currently within the GIA significant new trunk mains will be required within the Western GIA to deliver all services to the area.

STORMWATER

The new trunk drainage infrastructure required includes:

- A number of retention basins located throughout the study area. The size and location of individual basins will largely be dependent on the topography and proposed land use of the study area and should be determined in collaboration with civil engineers and town planners.
- Wetlands that will be incorporated into the floor of each retarding basin to improve water quality. The application of this treatment measure ensures that land acquisition cost to meet WSUD requirements can be minimised.
- A network of stormwater drainage pipes that will convey the post-development 10 year ARI event flow to the retention basin.
- Stormwater drainage pipes that will convey the pre-development 100 year ARI event flow from the retention basins to the outfall creeks.

Detailed modelling of the performance of the proposed wetlands has not been conducted as part of this study. Consequently, while the design and cost evaluation assumes that WSUD requirements can be satisfied with the wetlands and green spaces, it is noted that additional tertiary water treatment may be required.

SEWER

While it is likely that this GIA can be serviced by a gravity network, multiple connection points to the existing system may be required. It is noted that there is a lack of peak wet weather capacity in the aging downstream network and significant upgrades will need to be undertaken or peak flows will need to be contained within the GIA which would require space for detention networks. Upgrade of downstream networks will be complex due to existing mains passing through highly built up areas and Ballarat CBD.

The additional effluent produced as a result of the development of the Eastern GIA is expected to be transferred for treatment to the Ballarat South Wastewater Treatment Plant (WwTP). Central Highlands Water has confirmed that this plant has capacity limitations and would require upgrade or detention space to manage wet weather peak flows. Similarly to the Northern GIA, the buffer zone and discharge licence of the Ballarat South WwTP could need to be reviewed. It is possible that development in this growth area would drive the need for a new wastewater treatment plant.

WATER

Due to the age and condition of the existing infrastructure in central Ballarat and lack of spare Peak Day Demand capacity, significant upgrades are required to the system external to the Eastern GIA. It is noted that there are existing level of service issues in the eastern extremity of Ballarat, along the western edge of this GIA. These issues would be exacerbated by the additional demand of this growth area therefore requiring further upgrades to the existing network. These upgrades could prove costly and complex due to existing mains passing through highly built up areas.

Central Highlands Water has advised that the Ballarat System is capable of sourcing adequate raw water supply for the next 30 to 50 years and that the two treatment plants in the area have sufficient capacity for the next 20 years.

GAS

AusNet Services have advised that the Eastern GIA could be supplied by the existing City Gate given its close proximity to this area. With regard to infrastructure required in the longer term, AusNet Services has advised that two new field regulators are currently being installed to enhance network pressures to ensure capacity for the immediate future. These upgrades do not consider future growth in this area.

ELECTRICITY

Powercor has confirmed that there is limited supply available to the Eastern GIA, however 22kV feeder augmentation works would be required to support significant growth in demand. Such augmentation works are included in Powercor's 10 year forward plan.

It is noted that Powercor's longer term plan is to establish a substation in Ballarat West. This substation is proposed to cater for growth in the industrial demand in the area but could also have advantages for the Eastern GIA. It would be anticipated that at least one new 22kV feeder would be required to support the supply of electricity

TELECOMMUNICATION

Telstra has advised that trunk infrastructure in growth areas will be dictated by developer applications. These protocols are spelt out by both Telstra and NBN Co and are at a cost to the developer.

NEW COMMUNITY INFRASTRUCTURE REQUIRED

The new community infrastructure required for the various scenarios for the Eastern GIA has been identified in table 16 to the right.

CATEGORY	INDICATOR	BENCHMARK	ACCESS DISTANCE	REFERENCE	SCENARIO				PROVIDER	EXISTING FACILITIES	DISTANCE FROM GIA
					1 (8 LOTS PER HA)	2 (12 LOTS PER HA)	3 (15 LOTS PER HA)	4 (20 LOTS PER HA)			
Recreation and Cultural Infrastructure											
Sport and recreation	Provision of recreation areas - active open space	One Level 1 active open space reserve (8 ha per active open space reserve) per 6,000 people	1000 metres for 95% of dwellings	ASRR 2008 GAA 2013	1.5	2.2	2.8	3.7	Local council	Playground and sports field	800 metres
Community centres	Provision of community centres	Level 1 Provision ratios up to 10,000 people		GAA 2009	0.9	1.3	1.7	2.2	Local council	Community Hall	Within GIA
										Brown Hill Community Hall	800 metres
Educational Infrastructure											
Kindergartens	Provision of kindergartens	Provision ratios up to 10,000 people	600 metres	GAA 2009 Barton et al 2010	0.9	1.3	1.7	2.2	Private		
Long day care and occasional care	Provision of long day care and occasional care facilities	Provision ratios up to 10,000 people	600 metres	GAA 2009 Barton et al 2010	0.9	1.3	1.7	2.2	Private		
Primary schools	Provision of government primary schools	1 government primary school per 8,000 to 10,000 people	800 metres	ASRR 2008 Barton et al 2010	0.9	1.3	1.7	2.2	State government	Warrenheip Primary School	Within GIA
										Caledonian Primary School	580 metres
	Provision of non-government primary schools	Provision ratios between 10,000 and 30,000 people	800 metres	GAA 2009 Barton et al 2010	0.4	0.7	0.8	1.1	Private	St Francis Xavier School	Within GIA
Healthcare Infrastructure											
GP clinics	Provision of GP clinics	0.34 general practices per 1000 people (Victorian average)		Dept of Health 2011	3.0	4.5	5.7	7.5	Private		
Dental practices	Provision of dentist sites	0.20 dental services per 1000 people (Victorian average)		Dept of Health 2011	1.8	2.7	3.3	4.4	Private		
Aged care	Provision of aged care facilities	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.4	0.7	0.8	1.1	Private	Geoffrey Cutter Centre	200 metres
										Eureka Village Hostel	310 metres
										Begonia Residential Aged Care	440 metres
										Hemsley Park Retirement Village	620 metres
	Provision of aged care places	88 beds per 1000 people aged 70+		ANAO 2015	79	119	148	198	Private		
Community health centres	Provision of community health centres	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.4	0.7	0.8	1.1	State government		
Hospitals services	Hospital beds	3.9 hospital beds per 1000 people (Australian average)		AIHW 2014	35	52	65	86	State government		

Table 16: New Community Infrastructure

Map 57 Eastern GIA Land Ownership

LAND OWNERSHIP

The Eastern GIA has the largest amount of land owners, and the greatest amount of land fragmentation of the four GIA's. However, the Eastern GIA also has the largest quantity of multiple land titles under a single ownership. There appears to be a number of pockets where there is individual land ownerships, including the land on either side of Eureka Street, south of Elford Street, and the land between Jacksons Road and Coulsons Road. The remainder has a mix of individual and combined land ownerships. While the area surrounding Warrenheip, east of the railway line appears to be subdivided down to smaller lots (less than 1ha), a large number of consolidated land ownerships remain. There are small portions of Crown land within the Eastern GIA including parts of the railway line land, Mount Xavier Golf Course, Pryor Park and the Warrenheip Primary School and reserve. VicRoads also own a number of parcels south of Western Highway for the potential realignment of the road.

The map to the left (map 51) illustrates the parcels that have individual ownership, and the collective land parcels (separated by the grey outline), illustrating where multiple land titles are under a single ownership. Where a collective ownership of parcels is dissected by the GIA boundary, the full extent of the ownership of land is shown.

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ASSESSMENT OF INFRASTRUCTURE COSTS

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP and Tim Nott Economics. Further detailed information is provided in Appendix 1 & 2 which contains Tim Nott's and ARUP's separate technical reports.

DEVELOPMENT INFRASTRUCTURE COSTS FOR TRUNK INFRASTRUCTURE

DRAINAGE

The costs associated with the drainage trunk infrastructure for the various scenarios in the Eastern GIA are stated in table 17 below. The nominated scenarios within the table below relate to the 4 devised lots per hectare scenarios used to test and understand the implications of differing development densities within each of the GIA's.

SEWER AND WATER

As with all of the proposed areas, development of the Eastern GIA will drive the need for significant investment in new trunk infrastructure and upgrades to existing infrastructure in the quantum of $40M – $50M. Should this result in the need for a new wastewater treatment plant and re-use facility a further $50M - $80M could be required. It should be noted that the need to convey sewer flows from this GIA across currently built up areas may introduce further complexities and in turn costs for any related upgrades. Operational complexities due to the possible creation of multiple pressure zones to supply this GIA will also have ongoing costs.

GAS

While the authorities have not provided specific costs for trunk infrastructure, they have noted that the Eastern GIA will require significantly less investment due to its proximity to the City Gate.

ITEM	SCENARIO 1 (8 LOTS PER HA)	SCENARIO 2 (12 LOTS PER HA)	SCENARIO 3 (15 LOTS PER HA)	SCENARIO 4 (20 LOTS PER HA)
New pipes and pits	$ 3,830,700.00	$ 5,296,000.00	$ 5,828,800.00	$ 6,406,800.00
Retention Basins / Wetlands	$ 8,938,400.00	$ 12,357,300.00	$ 13,600,600.00	$ 14,949,200.00
Council Fees	$ 447,000.00	$ 617,900.00	$ 680,100.00	$ 747,500.00
CAPEX (2015 pricing)	**$ 13,216,100.00**	**$ 18,271,200.00**	**$ 20,109,400.00**	**$ 22,103,400.00**
CAPEX (2040 pricing)	**$ 27,756,490.00**	**$ 38,373,313.00**	**$ 42,233,975.00**	**$46,421,864.00**

Table 17: Drainage Trunk Infrastructure Costs

Further details on each of the 4 devised scenarios is provided in the Development Scenarios section of this report. The above table should be read in conjunction with the identified issues with infrastructure provision which is provided under the Assessment of Deliverability sections of this report for each of the relevant GIA's.

ELECTRICITY

Powercor stated that costs associated with supplying this GIA are difficult to provide without a detailed in depth assessment. However, it was noted that costs would vary only slightly between the GIA's being considered and that there was no preference between areas.

TELECOMMUNICATIONS

Telstra has advised that trunk infrastructure in growth areas will be dictated by developer applications. These protocols are spelt out by both Telstra and NBN Co and are at a cost to the developer.

COMMUNITY INFRASTRUCTURE COSTS

The community infrastructure costs for the various scenarios in the Eastern GIA have been identified in table 18 below.

Table 18: Community Infrastructure Costs

CATEGORY	INDICATOR	UNIT COST	REFERENCE	COST IN SCENARIO			
				SCENARIO 1 (8 LOTS PER HA)	SCENARIO 2 (12 LOTS PER HA)	SCENARIO 3 (15 LOTS PER HA)	SCENARIO 4 (20 LOTS PER HA)
Recreation and Cultural Infrastructure							
Sport and recreation	Provision of recreation areas - active open space	$ 6.75 million	Urban Enterprise, 2014	$13,500,000	$13,500,000	$20,250,000	$27,000,000
Community centres	Provision of community centres	$ 4.4 million	Urban Enterprise, 2014	$4,400,000	$4,400,000	$8,800,000	$8,800,000
Educational Infrastructure							
Kindergartens	Provision of kindergartens	$ 1.3 million	City of Kingston, 2014	$1,300,000	$1,300,000	$2,600,000	$2,600,000
Long day care and occasional care	Provision of long day care and occasional care facilities	$ 4.1 million	ACT Government, 2012 McComish, 2013	$4,100,000	$4,100,000	$8,200,000	$8,200,000
Primary schools	Provision of government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$12,200,000	$12,200,000	$24,400,000	$24,400,000
	Provision of non-government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$-	$12,200,000	$12,200,000	$12,200,000
Healthcare Infrastructure							
GP clinics	Provision of GP clinics	$ 1.4 million	Selesnew, 2008	$4,200,000	$7,000,000	$8,400,000	$11,200,000
Dental practices	Provision of dentist sites	$ 1.4 million	Selesnew, 2008	$2,800,000	$4,200,000	$4,200,000	$5,600,000
Aged care	Provision of aged care facilities	$ 17.9 million	Department of Treasury and Finance, 2014	$-	$17,900,000	$17,900,000	$17,900,000
	Provision of aged care places	$ 595,000 per place	Department of Treasury and Finance, 2014	$47,005,000	$70,805,000	$88,060,000	$117,810,000
Community health centres	Provision of community health centres	$ 50.2 million	Department of Treasury and Finance, 2014	$-	$50,200,000	$50,200,000	$50,200,000
Hospitals	Provision of hospital beds	$ 844,000 per bed	Department of Treasury and Finance, 2015	$29,540,000	$43,888,000	$54,860,000	$72,584,000

It has been noted that the indicative healthcare infrastructure may be provided by the public sector. Further the costs identified are relatively similar across the GIAs.

DEVELOPER COSTS FOR LOCAL INFRASTRUCTURE

The developer costs for local infrastructure for the various scenarios in the Eastern GIA have been identified in table 19 & 20 below.

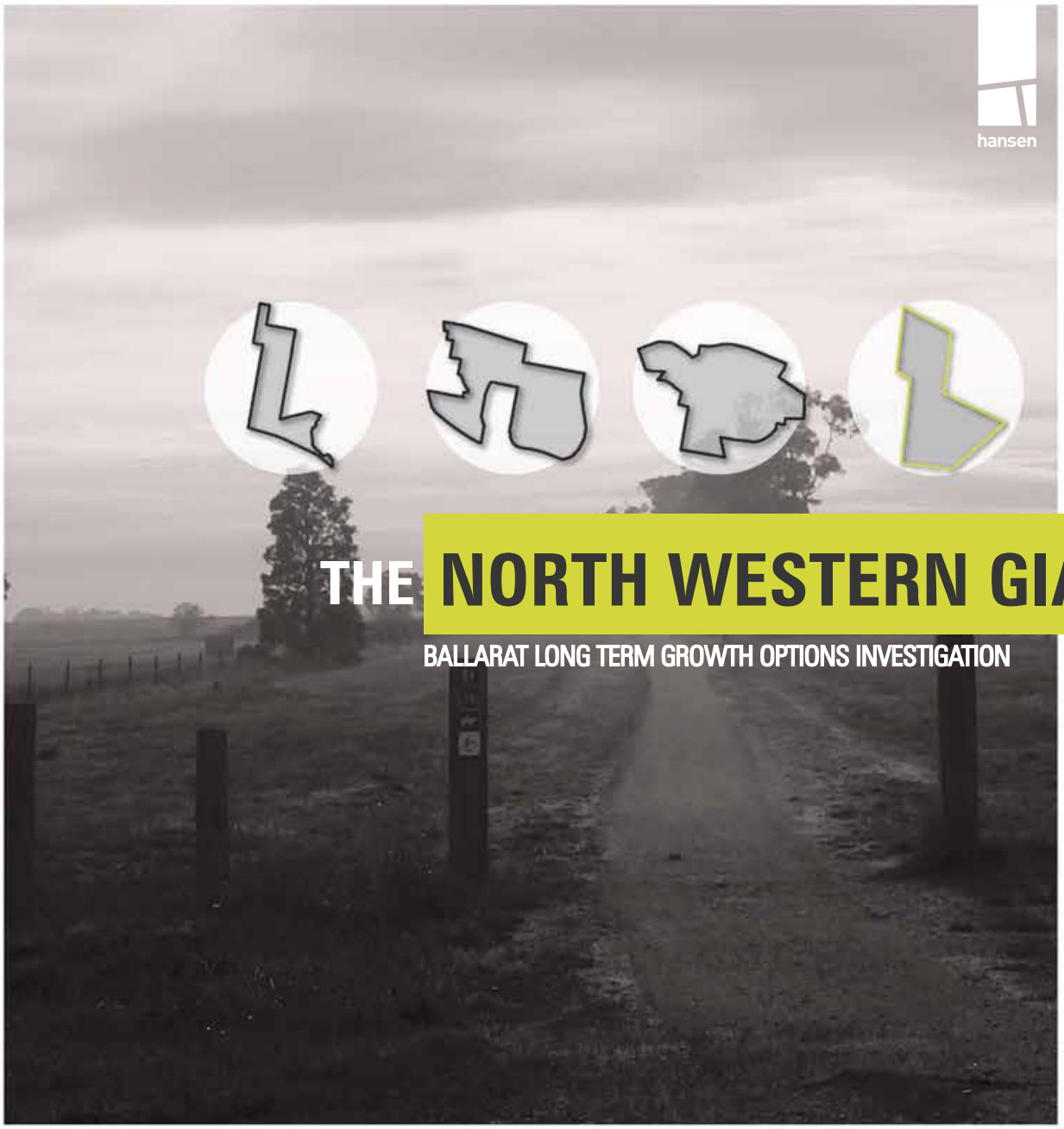
EASTERN GIA OPTION COMBINED COST ESTIMATE - 2015 PRICES				
	Scenario 1 (8 lots per ha)	Scenario 2 (12 lots per ha)	Scenario 3 (15 lots per ha)	Scenario 4 (20 lots per ha)
Roads	$42,482,855	$47,443,000	$47,443,000	$52,455,913
Water Supply	$14,933,566	$19,346,025	$21,999,234	$27,305,403
Sewer	$10,025,508	$11,793,113	$12,181,175	$14,088,151
Total	**$67,441,930**	**$78,582,138**	**$81,623,410**	**$93,849,466**

Table 19: Developer Cost Estimates For Local Infrastructure Using 2015 Prices

EASTERN GIA OPTION COMBINED COST ESTIMATE - 2040 PRICES				
	Scenario 1 (8 lots per ha)	Scenario 2 (12 lots per ha)	Scenario 3 (15 lots per ha)	Scenario 4 (20 lots per ha)
Roads	$89,223,168	$99,640,543	$99,640,543	$110,168,742
Water Supply	$31,363,713	$20,197,417	$46,203,142	$57,347,241
Sewer	$21,055,732	$24,768,083	$25,583,098	$29,588,158
Total	**$141,642,613**	**$144,606,043**	**$171,426,783**	**$197,104,141**

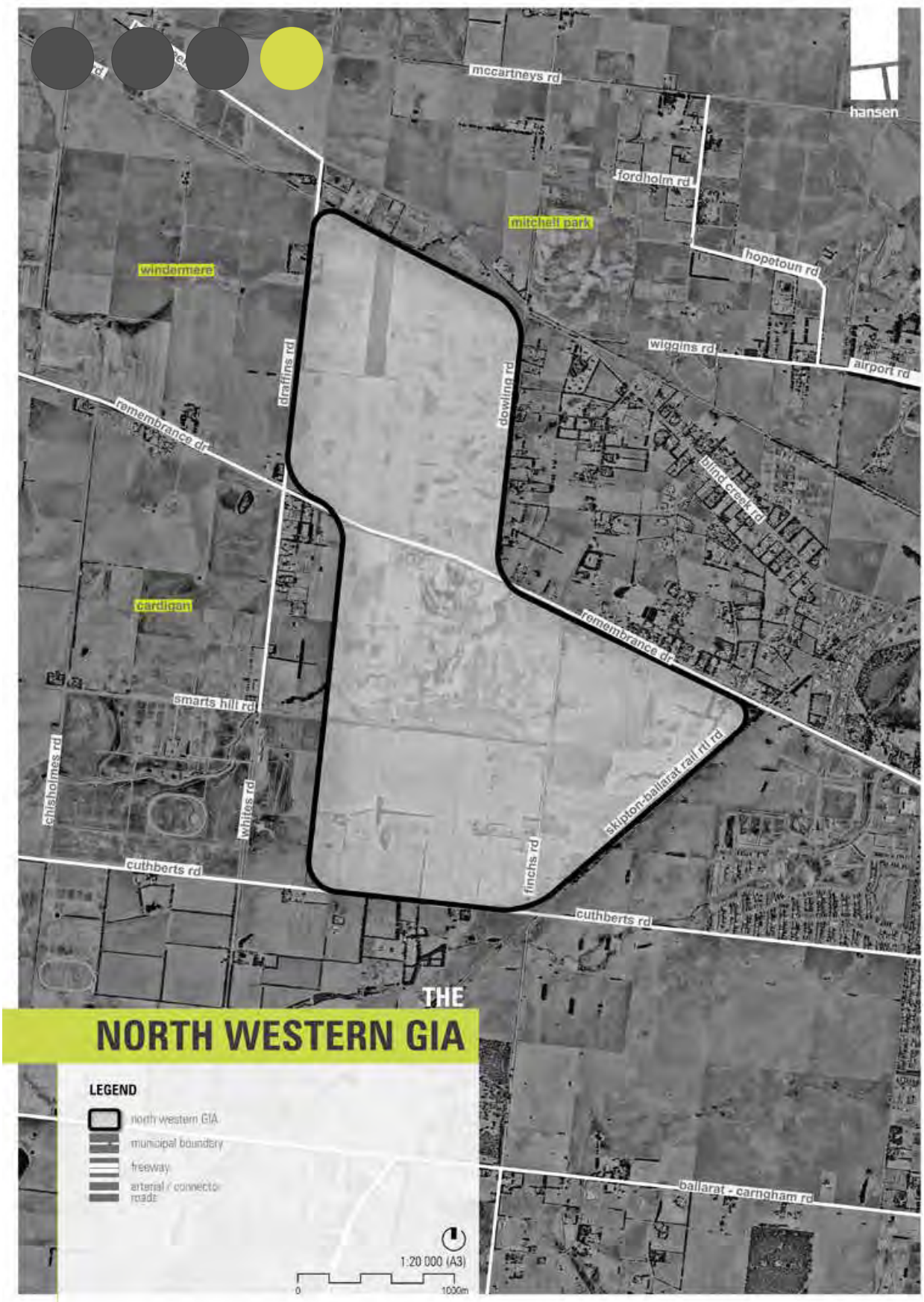
Table 20: Developer Cost Estimates For Local Infrastructure Using 2040 Prices

The above tables should be read in conjunction with the identified issues with infrastructure provision which is provided under the Assessment of Deliverability sections of this report for each of the relevant GIA's. Further details on each of the 4 devised scenarios is provided in the Development Scenarios section of this report.



THE NORTH WESTERN GIA

BALLARAT LONG TERM GROWTH OPTIONS INVESTIGATION



Map 58 North Western GIA

NORTH WESTERN GIA

This section of the report will provide a detailed assessment of the technical background analysis relating to the North Western Greenfield Investigation Area (GIA), to inform the feasibility assessment of each GIA in Ballarat.

The North Western GIA is:

- Irregular in shape and located to the west of Ballarat in parts of Lucas and Cardigan.
- Broadly divided through its middle by Remembrance Drive.
- Roughly bounded by the railway alignment to the north, Dowling Road/ Ballarat-Skipton Rail Trail to the east, Cuthberts Road to the south and partially bounded by Draffins Road to the west.
- Land to the south of Remembrance Drive is located adjacent to the Lucas Estate Alfredton West Precinct (i.e. east side of Ballarat-Skipton Rail Trail).
- Land to the north of Remembrance Drive is located adjacent to an existing Rural Living Zone (RLZ) land.

As the Northern GIA was not nominated within the Ballarat Strategy as a growth investigation area, rather was designated as one through the Planning Panel Report for the implementation of the Ballarat Strategy (Amendment C194), the background context of this land is briefly outlined.

Within the Panel Report for Amendment C194 the North Western GIA was referred to as The 'TIGA land', and noted to consist of two large land parcels, including:

- a 575 hectare site at 614 Cuthberts Road, Cardigan, owned by TIGA (Ballarat) Pty. Ltd. &
- a 39 hectare site at 146 Draffins Road, Cardigan, owned by Ivan and Maria Kovacic.

For clarity, the TIGA land has also previously been known as and referred to as the Lake Federation Resort and later as the Ballarat Resort.

To ensure consistency with the naming of the other GIA's the TIGA land is referred to within this report at the North Western GIA.

The Northern Western GIA is included within three zones, including the Farming Zone (FZ) and Special Use Zone - Schedule 5 (SUZ5) and the Comprehensive Development Zone – Schedule 1 (CDZ1). The FZ and SUZ5 land relates to two separate properties on the southern side of Remembrance Drive, while the balance of the North Western GIA in zoned CDZ1.

The CDZ1 was formalised in April, 2005 via Amendment C64 and contains a site specific schedule functions to facilitate development, however was drafted to include a 'sunset' clause, where the schedule control expired if the development was not substantially commenced within 3 years of the date of the schedule. Noting that the development of the land was not commenced within this period, the schedule control lapsed in April, 2008, meaning there is no currently actively planning control to facilitate development, despite the development being within the CDZ1.

It is also noted that the November, 2004 Planning Panel report on Amendment C64 went as far to state: *"The Panel believes that if the development is abandoned, the Ballarat Planning Scheme should be amended so that the land reverts to the Rural Zone*" (page 83).

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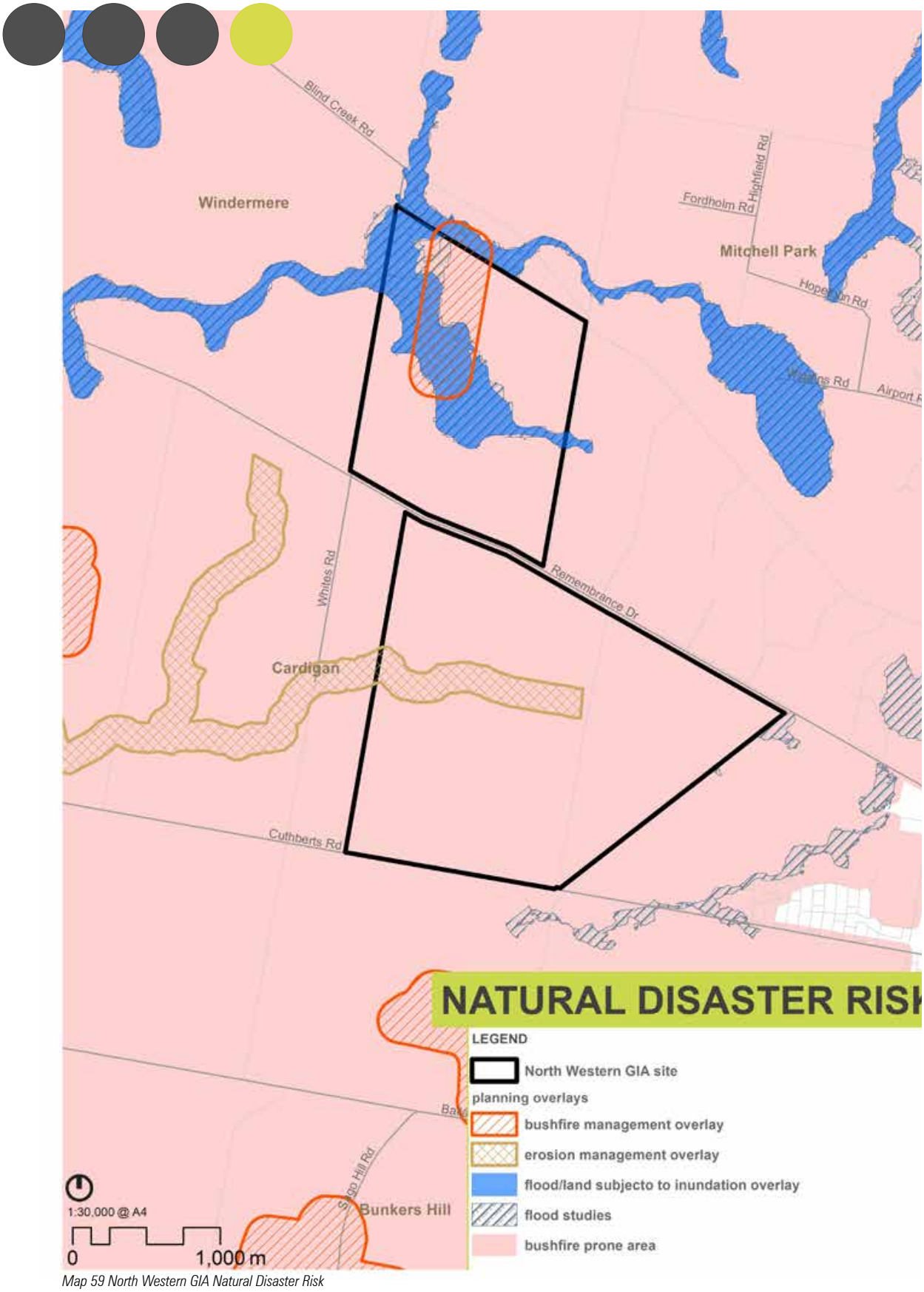
Over the period of 2008-2011 TIGA (Ballarat) Pty. Ltd. sought to vary the previously approved development concept and implement a new schedule under the CDZ1 via Amendment C121. During the processing and consideration of Amendment C121 it included the involvement of the then Planning Minister who appointment a Priority Development Panel to assist in the consideration of the matter. Following the completion of the Priority Development Plan Report the Planning Minister advised in October, 2010 that the Amendment C121 was not supported due to a range of high level strategic considerations, although did acknowledge that: *"I am of the view that there is the potential for the subject land to accommodate future urban uses"*. Subsequent to the Planning Minister's advice in March, 2011 Council determined to formally abandon Amendment C121. Noting the above only provides an abridged summary of the lengthy planning history relating to the TIGA land, additional background detail is summarised within the Panel Report for Amendment C194.

During the panel process for Amendment C194 the Panel was presented with detailed background information and expect evidence in relation to the TIGA land. While the Panel highlighted that while it made no findings about the relative merits of potential growth options of the TIGA land, it nominated that it should be designated as a Growth Investigation Area and be assessed and ranked against the other 3 GIA's designated within the Ballarat Strategy.

In recognition of this specific Planning Panel recommendation, the TIGA land has now been designated as the fourth GIA, with the analysis, findings and recommendations of the January, 2016 report now having been updated to assess and rank each of the 4 GIA's namely the: Eastern, Western, Northern and North Western GIA's.



Map 59 North Western GIA Natural Disaster Risk

ASSESSMENT OF LAND CAPABILITY

The capability of the land to potentially accommodate future urban development has been considered and assessed from a variety of technical angles and general land use and planning considerations. Planning overlays were particularly important for the feasibility assessment of each of site, specifically those related to natural disaster and flora and fauna. There was less variability evident in the noise levels and historical influences such as contamination, mining and geotechnical conditions between the three sites.

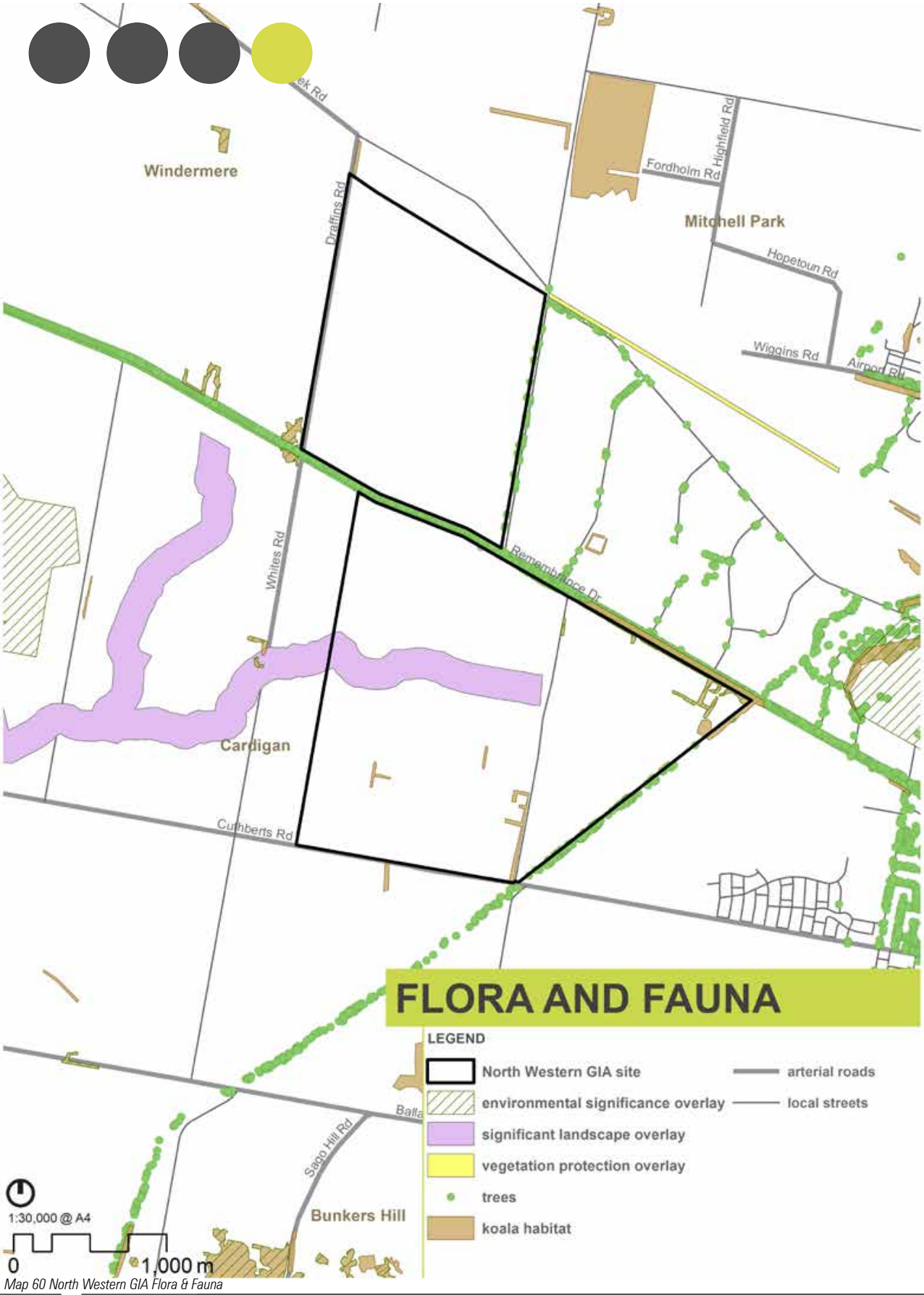
Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 4 which contains ARUP's Ballarat Greenfields Investigation Areas Review – North Western Update Report.

NATURAL DISASTER RISK

The Bushfire Management Overlay applies to a specific site with an existing tree plantation, where the associated fire risk would be removed once the plantation is harvested. However the Bushfire Prone Area applies to the whole site. Historically, there have been no recorded fires on the site since 1900.

This flood study and Land Subject to Inundation Overlay (LSIO) area aligns with a remnant creek which has been significantly degraded due to rural activity in the area.

The Erosion Management Overlay (EMO) affects a small portion of land within the North Western site in the vicinity of a remnant creek, north of Smart Hill Road between Whites and Finches Road. The purpose of this overlay is to protect areas prone to erosion by minimising land disturbance.

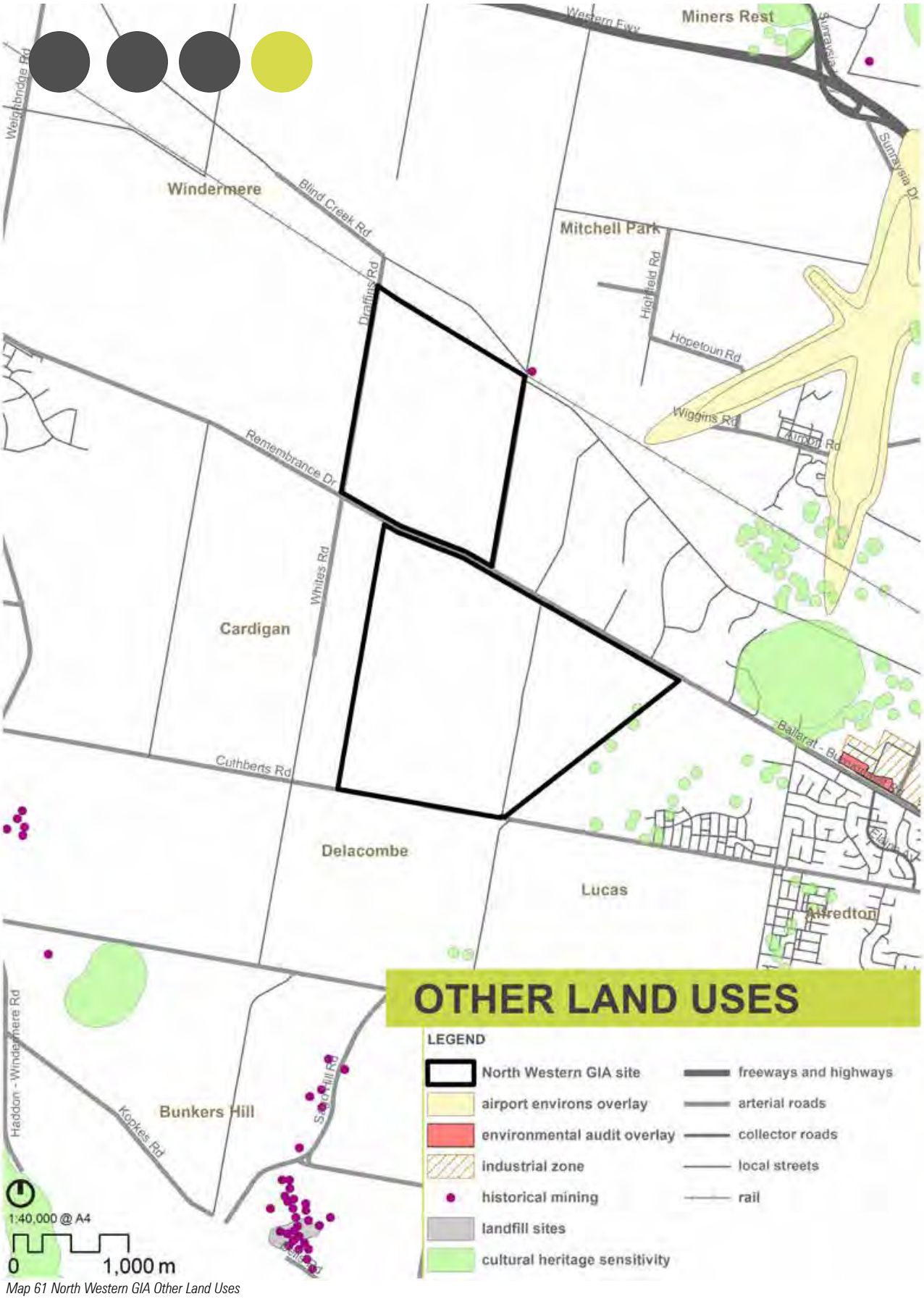


Map 60 North Western GIA Flora & Fauna

PROTECTED FLORA AND FAUNA

There are some elements of flora and fauna which require consideration within the North Western GIA. The Environmental Significance Overlay (ESO) affects a strip of land in the eastern corner, between Old Western Highway and the Skipton-Ballarat Trail, and is subject to Schedule 5 of the overlay (Koala and Koala Habitat Protection), which is intended to prevent development within proximity of koala populations.

With regard to flora a mosaic of Plains Grassy Woodland, Plains Grassland, Plains Grassy Wetlands and Aquatic Herbland Ecological Vegetation Classes (EVCs), are noted to be concentrated mainly in the south eastern part of the site, between Finch's Road and the Ballarat-Skipton Rail Trail. These vegetation types found in the Victorian Volcanic Plain Bioregion are endangered and have a threatened species rating of high or very high. Removal of this vegetation is likely to trigger the need for a planning permit and potentially offsets.



Map 61 North Western GIA Other Land Uses

BUFFERS FOR SENSITVE USES

There are no buffers required for separation from sensitive sites for the North Western GIA.

NOISE IMPACT

The North Western GIA is located under the Ballarat Aerodrome primary runway 18/36 flight tracks and will be impacted by aircraft noise, with the maximum event noise levels due to aircraft flyover predicted to be up to 85dB(A). The North Western GIA is affected by road traffic noise from Remembrance Drive (arterial road) and Cuberts Road (sub-arterial). Based on year 2031 traffic estimates and VicRoads requirements, there is no specific requirement for noise mitigation. Boundary fencing and building layout should consider road traffic noise to minimise impact. Noise from industrial is not estimated to impact on the GIA.

Noise from the Serviceton railway line is expected to exceed the Investigation threshold provided in the Passenger Rail Noise Policy. On this basis, residential dwellings adjacent to the railway line may require noise mitigation such as: buffer zones or landscaping; building treatment to meet internal noise levels; or noise barriers.

Overall noise emissions is relatively high for the North Western GIA in comparison to the previously assessed GIA's as the land is impacted by rail, road and aircraft noise.

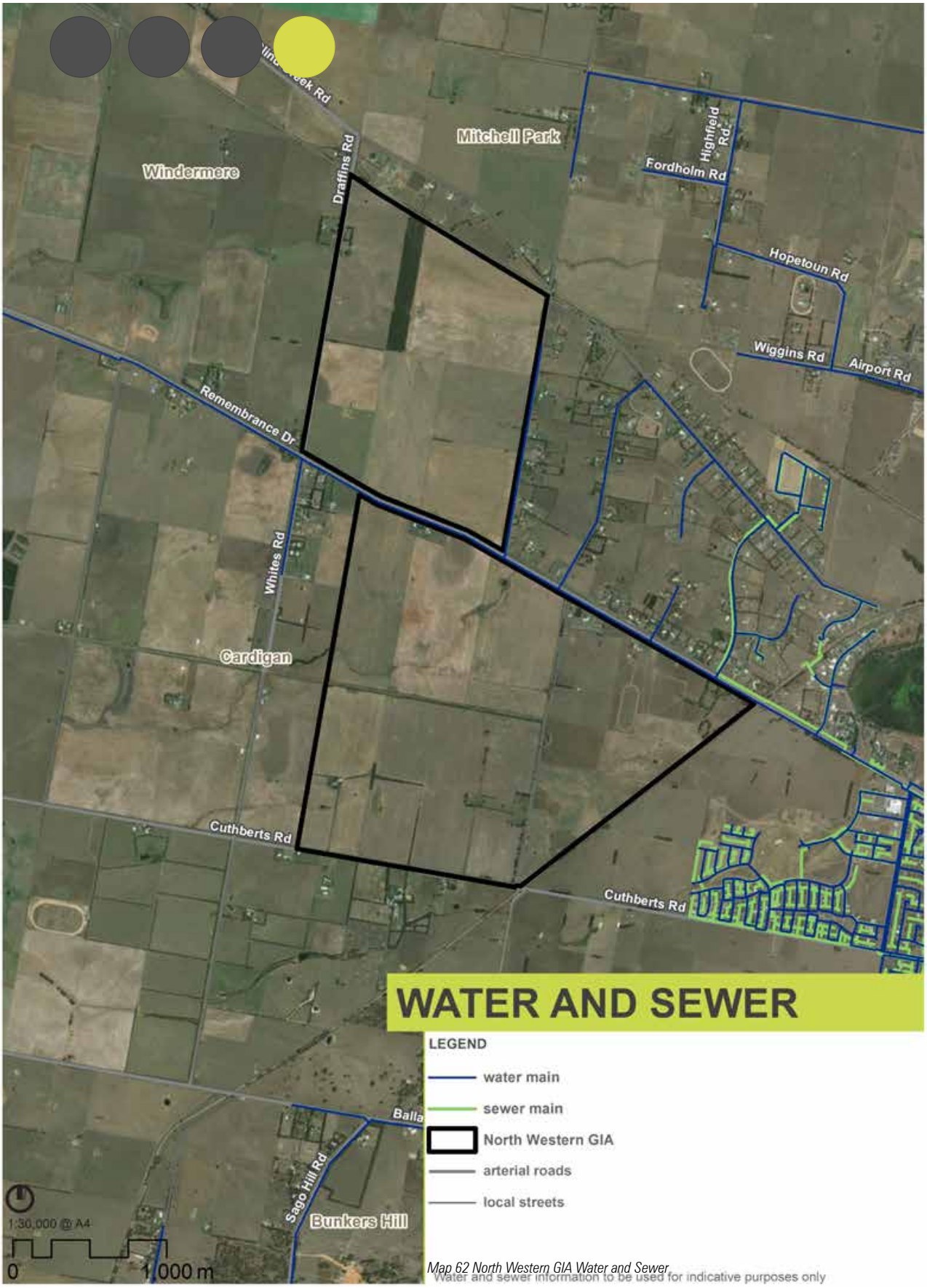
CONTAMINATED SITES & PAST MINING ACTIVITIES

No potentially contaminated land has been identified by an Environmental Audit Overlay (EAO) within the North Western GIA. Further, historical mining activities and expired licenses and leases have not been identified on the site, although there is one site located very close to the boundary, near the corner of Dowling Road and Blind Creek Road, just north of the railway line. Given the intrusive nature of historical mining activities, they could potentially give rise to issues with the geology.

With regard to expired mining licenses and leases a mineshaft is located at the north east corner of the site (site ID 377047), however it is current condition is unknown.

GEOTECHNICAL CONDITIONS

Based on topographical contours and geology, the potential for land instability over the North Western GIA is generally considered to be very low. Areas of localised instability may occur, particularly adjacent to the colluvial deposits in existing creeks and waterways. Land instability risk should be able to be managed through good practice for development on sloping sites.



Map 62 North Western GIA Water and Sewer

Water and sewer information to be used for indicative purposes only

ACCESS TO EXISTING UTILITY INFRASTRUCTURE

The North Western GIA is predominantly comprised of undeveloped farming and grazing land. The major utility services present in some capacity include:

- Water Supply (shown in map 56);
- Electricity (Distribution); and
- Telecommunications.

Land use planning and drainage management for the North Western GIA are the responsibilities of the City of Ballarat. At present, this authority has no drainage assets with the North Western GIA. The northern part of the GIA is located within the Burrumbeet Creek Catchment which drains to Lake Burumbeet via a number of small creeks. Outside of these natural overland flow paths, formal stormwater infrastructure does not currently exist within the GIA.

There is currently no existing sewer infrastructure within the GIA. In the event that this study area is developed, future infrastructure will be provided and managed by Central Highlands Water. A gravity sewer network has been established to south east of the North Western site to service the Ballarat West PSP growth area. This network currently terminates approximately 850 metres from the North Western site boundary. Effluent within the surrounding areas is transferred to the Ballarat South Wastewater Treatment Plant (WwTP). The Ballarat South WwTP is licensed for an Average Daily Flow of 35 ML/day (SMEC, 2014). Central Highlands Water have stated that this plant currently had limited spare capacity.

Central Highlands Water provides and manages the existing water supply infrastructure within Ballarat and the outlying areas. Potable water to the North Western site and the surrounding areas is derived from the Ballarat System and delivered via the Ballarat Central Zone network. All mains supplying water within this zone originate from the White Swan clear water storage facility and the 9ML Wilson Street tank.

APA Group Transmission is responsible for the high gas pressure transmission assets and AusNet Services is responsible for the distribution supply assets. AusNet Services has not provided asset information for this size area but have advised that there is approximately 20% additional capacity to service the existing network but cannot confirm that the current network will be able to service the projected population of Ballarat in 2040.

AusNet Services operates and maintains the Ballarat Terminal Station (BATS) and the electrical transmission lines that feed into the zone substations. The BATS is located in Warrenheip, in the east of Ballarat. Powercor is the electrical network distributor for the western Ballarat and power is supplied from the Ballarat South (BAS) zone substation. The electrical network within the North Western site is currently largely underdeveloped. The existing high voltage distribution network in the study areas consists of 22kV overhead power lines that are predominantly located within the road reserves of Cardigan School Road, Dowling Road, Remembrance Drive, Draffins Road and Cuthberts Road. High voltage underground cabling does not exist within the site.

Optus and Telstra are the main distributors of communication services to residential and commercial customers within the North Western site. Telstra assets currently exist along Cuthberts Road, Finchs Road, Old Western Highway, Dowling Road and Draffins Road. Optus has a major optic fibre asset that runs through the southern section of the North Western site. This asset enters the site along Cuthberts Road before running north along Finchs Road and west along Smarts Hill Road. The National Broadband Network (NBN) has been rolled out in most of Remembrance Drive. Limited information has been provided with regard to the existing network capacity however it is anticipated that communications providers will upgrade and expand networks in line with regional growth profiles pending developer applications.

Map 63 North Western GIA Community Infrastructure

ACCESS TO EXISTING COMMUNITY INFRASTRCUTURE

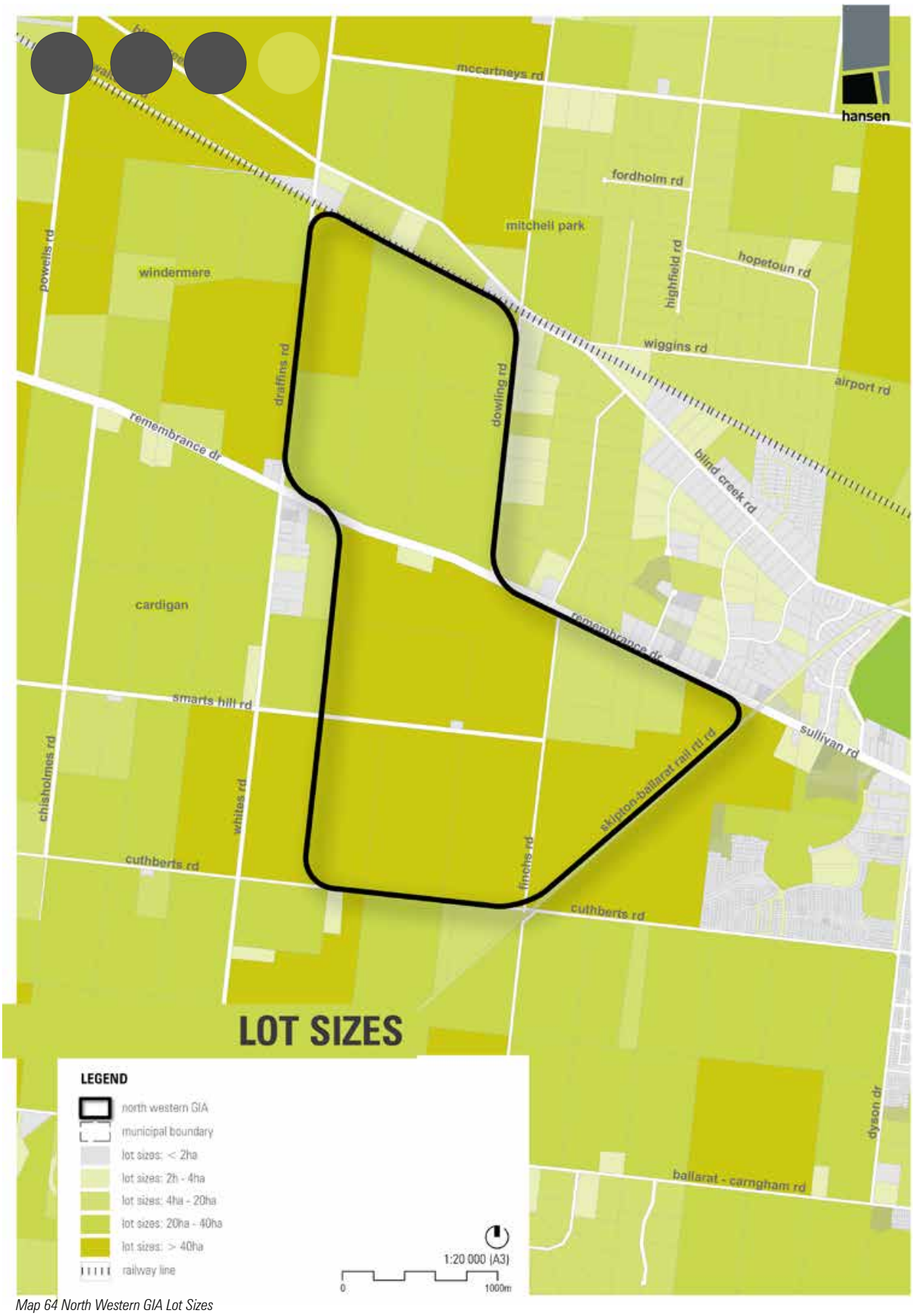
Providing appropriate community facilities within any new growth area is an important consideration. The following table 21 provides an understanding of where existing facilities are located in proximity to the North Western GIA boundary. These community facilities have been categorised under the following headings:

COMMUNITY INFRASTRUCTURE	APPROXIMATE DISTANCE FROM NORTH WESTERN GIA BOUNDARY
Recreation/ cultural infrastructure	
Alfredton Recreation Reserve	3.5km by road
Educational Infrastructure	
Alfredton Early Learning & Kinder	2.5km by road
Goodstart Early Learning Alfredton	2.5km by road
Alfredton Primary School	2.5km by road
Siena Catholic Primary School	1km by road
Ballarat High School	5km by road
Healthcare Infrastructure	
Alfredton Medical Centre	4km by road
Ballarat Family Dental`	1.5km by road

Table 21: Existing Community Infrastructure

The closest existing community hub is located in Alfredton, approximately 2.5km east of the North Western GIA.
This community hub includes 2 primary schools, 2 child care centres, a kindergarten and a recreation reserve.
A new shopping centre precinct (Coltman Plaza- Lucas) is currently being developed on the corner of Sturt Street and Dyson Drive which is 1km east of the eastern boundary of the North Western GIA.

With regard to the Strategic Biodiversity Score measures the majority of the site has a relatively low value, below 20. The northern, eastern and western boundaries as well as parts of Remembrance Drive have moderate Strategic Biodiversity Score, with values between 20 and 45. Portions of the centre have a score of 0.



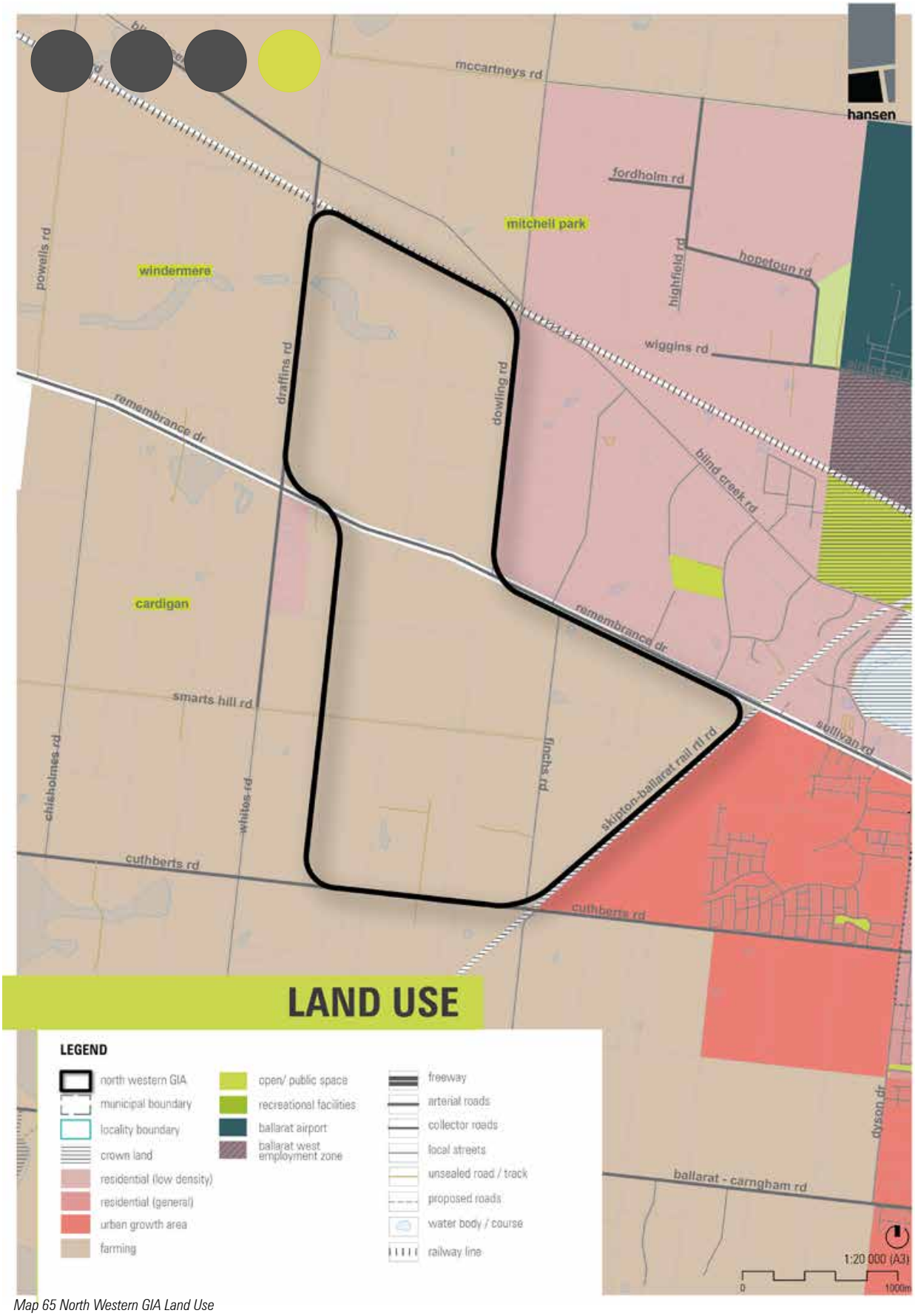
Map 64 North Western GIA Lot Sizes

CURRENT LAND USES AND LAND FRAGMENTATION

Of the GIA's being investigated, the North Western GIA is comparable to the Western GIA by constituting relatively open, flat broad hectare farming/ rural land. Although the overall GIA is made up of approximately 14 land parcels, the land is owned by only four parties, meaning it is the least fragmented of all of the GIA's being investigated.

Based on the land holdings being of a larger rural scale, and typically speaking there are no physical barriers or landform constraints to future development extending into the Western GIA from the Ballarat West Growth Area. The following outlines the current land uses, activities and land fragmentation located within the Western GIA, which have been shown on map 58 to the left and map 59: land use overleaf:

- A commercial tree plantation operation is currently accommodated on a large land parcel located towards the northern boundary of the North Western GIA.
- A creek line with noted potential for erosion is located on North Western GIA land to the north of Remembrance Drive.

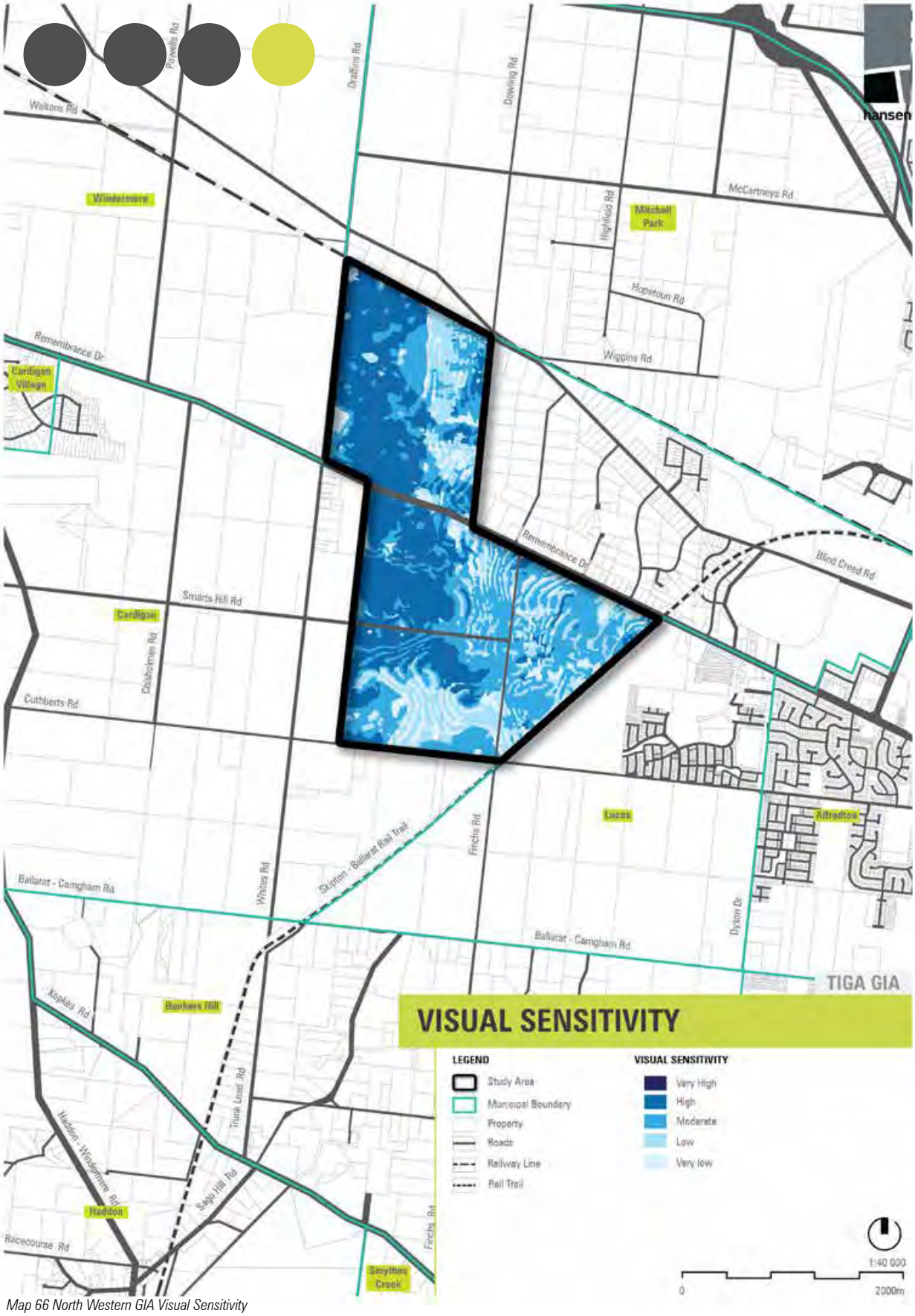


Map 65 North Western GIA Land Use

EXTERNAL INTERFACES AND SURROUNDING LAND USES

The following outlines the external interfaces and surrounding land uses (as shown on map 59 to the left) which inform the current and future context of the North Western GIA:

- Noting that Remembrance Drive bisects the North Western GIA, the land accommodates a substantial road frontage to a major VicRoads controlled roadway within the Road Zone Category 1 (RDZ1). The road corridor is also included within the Heritage Overlay Schedule 154 (HO154) which relates to the designation of the historic Ballarat Avenue of Honour.
- An existing railway reserve/ line abuts the northern boundary of the site, with land located beyond constitutes vacant broad hectare rural land which is located within the Farming Zone (FZ).
- Land located to the west and south-west of the North Western GIA, broadly constitutes vacant broad hectare rural land which is located within the Farming Zone (FZ). Predominantly this adjacent land remains undeveloped and rural in character, except for a small Low Density Residential Zone (LDRZ) subdivision located on the south east corner of Remembrance Drive and Whites Road.
- North of Remembrance Drive adjacent land to the east and north east constitutes larger lot residential properties within the Rural Living Zone (RLZ).
- Along the southern side of Remembrance Drive the North Western GIA land surrounds two small land parcels which are respectively within the Farming Zone (FZ) and Special Use Zone Schedule 5 (SUZ5).



Map 66 North Western GIA Visual Sensitivity

VIEW SHEDS AND SIGNIFICANT LANDSCAPES

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by Hansen Partnership. Further detailed information is provided in Appendix 5 which contains Hansen Partnership - Ballarat Greenfield Investigation Areas: North Western Landscape Assessment Report.

LANDSCAPE CHARACTER & VALUE

From a combination of fieldwork and desktop assessment, the following landscape character areas were identified in the North Western GIA:

- The 'Plains' landscape character area comprises gently sloping terrain with expansive grassed grazing lands, typical of the wider Burrumbeet Plains. Canopy vegetation is generally sparse, but where present it is typically established exotic or native windbreaks along property boundaries and roadsides, with some scattered native vegetation in paddocks present. The Ballarat Avenue of Honour runs through the center of the study area from east to west along Remembrance Drive, and forms a significant feature of mature canopy trees. The adjacent plains provide a rural character setting for the Avenue. Elements such as scattered agricultural infrastructure, livestock, post-and-wire fencing, occasional small scale dwellings, sheds and agricultural facilities, help to reinforce a distinctively active and functioning rural landscape character set within a gently sloping to undulating landscape. Recreational access is encouraged into and around the study area through the Remembrance Drive shared trail and Skipton - Ballarat Rail Trail. The combination of sparse vegetation and low grazing land typically allows open views when within or adjacent to the character area. Drainage lines and waterways can also be seen, but they are not a visually dominant character element.

VISUAL EXPOSURE

Through an analysis of views within and near to the North Western GIA demonstrated in the view shed and views assessment, a picture of visual exposure, or what areas of the study area are more visible than others, was created. For the North Western GIA, general trends of visual exposure included the following:

- Terrain in the North Western GIA typically slopes from being higher in the east of the study area to lower in the west of the study area, over a height variation of approximately 50 meters. Overall the terrain varies from consistently gentle slopes to gently undulating. The terrain allows for localised open views within the study area. The extent of views are contained by gently grading landform, as demonstrated by the view shed mapping.
- The sparse vegetation in the study area means that views are typically open across fields, and then contained by gently grading landform or field boundary vegetation of mature canopy trees or shelter belt planting. As such the views demonstrated in the view shed mapping are generally consistent with observed views from the site inspection.
- The western portion of the study area displays a very high to moderate visual exposure, afforded by gently sloping terrain. The eastern portion of the study area displays moderate to limited visual exposure determined by more elevated terrain relative to levels within the study area.

VISUAL SENSITIVITY

Areas of landscape value and visual exposure have been overlaid to explore their visual sensitivity, or the ability of a specific area to accommodate change. Landscapes with a higher visual sensitivity generally have a lower threshold beyond which changes in the landscape start to detrimentally impact on the value/significance of that landscape. Visually sensitive landscapes for the North Western GIA are as follows:

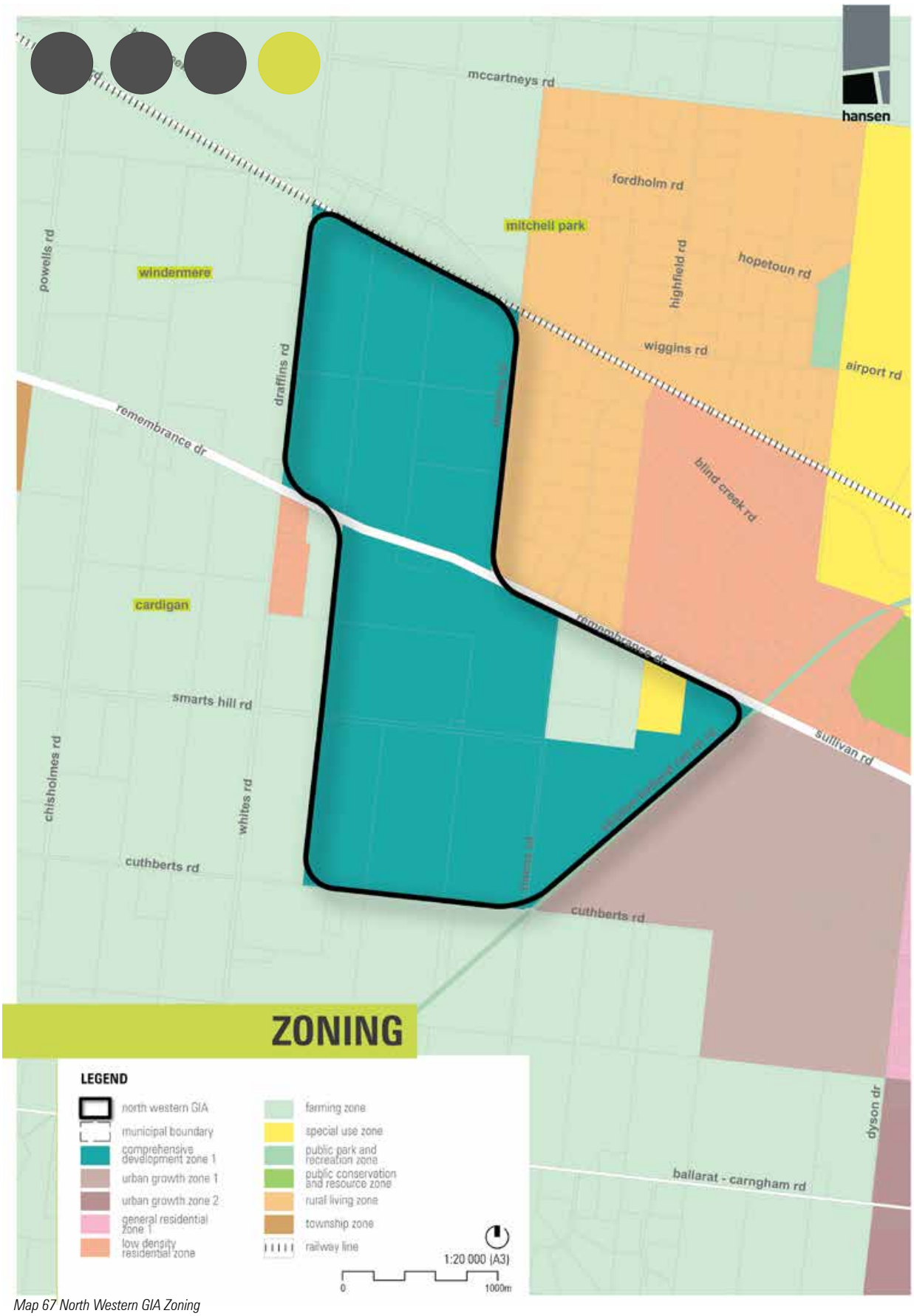
- Visual sensitivity across the study area ranges from very low to high.

- Visual sensitivity is consistent with the pattern of visual exposure, as the whole study area is the Plains landscape character which has been classed as having low landscape value.
- High visual sensitivity is present across the western portion of the study area, due to gently sloping terrain.
- Patchy limited to high visual sensitivity is present across the eastern portion of the study area, determined by more elevated terrain relative to levels within the study area.
- The majority of the study area has at least some visual sensitivity, which is in line with the open character and topography of the landscape.
- It should also be noted that there were no areas of very high visual sensitivity identified in the study area, due to the low landscape value, with an overall predominance of high and moderate visual sensitivity.

LANDSCAPE ASSESSMENT RECOMMENDATIONS

Landscape Assessment recommendations for the North Western GIA are assigned based on the landscape assessment with the aim to preserve and enhance the existing landscape character or visually sensitive landscape areas include the following:

- Recognition of the rural setting that the study area provides for the Ballarat Avenue of Honour running through the centre of the study area, and preservation of this setting as a key valued element of the study area.
- Recognition of the green edge that the study area currently provides for the edge of Ballarat, and the setting afforded to the recreational route of the Skipton - Ballarat Rail Trail. However, noting that to the east of the Skipton - Ballarat Rail Trail, this land is zoned Urban Growth Zone and will be developed in the future.
- If development is to occur then implement a range of built form guidelines that tailor controls suitable to the level of visual sensitivity in a particular area (i.e controls for high visual sensitivity areas), which focus on reducing the visual impact of development, these could include but not be limited to:
  - Locating of structures / dwellings away from significant view lines.
  - Development that is designed and sited to reflect the natural topography and complement the landscape character of the area.
  - Development that is of a low to medium scale while maintaining a moderate building footprint within the landscape setting.
- Consideration of designating areas with a high visual sensitivity rating as public open space or for non-visually obtrusive public facilities as a means of limiting development and hence any associated visual impact in these sensitive areas.
- Consideration of the existing landscape character of the area as a guide to the selection of vegetation and the layout of private gardens and public spaces.
- Encourage the maintenance and protection of vegetation cover in the wider study area so it may be strengthened over time. This is to be achieved with the establishment of additional landscaping where applicable of locally appropriate native (ideally) and non-invasive exotic species.
- Development of overtly visible, large-scale utility installations should be avoided. Utilities should ideally be located underground so as to not interfere with existing and proposed landscape features, in particular established vegetation.
- Car parking, formed driveways, access tracks and roads should be visually recessive within the landscape.



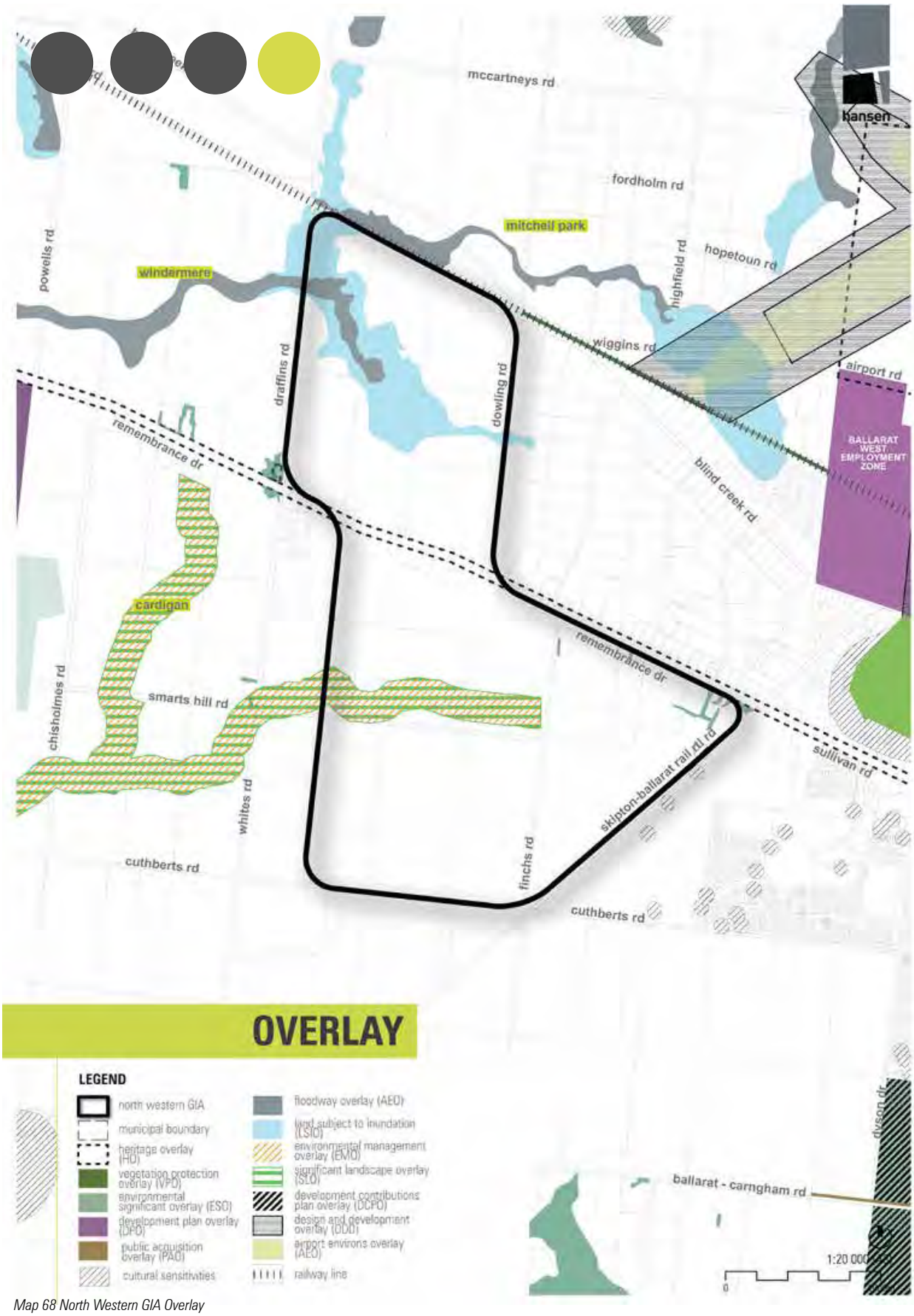
Map 67 North Western GIA Zoning

ASSESSMENT OF PLANNING POLICY

The capability of the land to accommodate future urban development has been considered and assessed against the Planning Policy Framework, zones and overlays within the existing Ballarat Planning Scheme, and includes the Ballarat Strategy (2015), implemented by Amendment C194.

CURRENT ZONING

The North Western land is currently zoned as the Comprehensive Development Zone – Schedule 1 (CDZ). A site specific control under the Comprehensive Development Zone (CDZ) functions to facilitate development of an integrated resort comprising residential, commercial, tourism related and recreational facilities, however due to its drafting the schedule control expired as the development was not substantially commenced within 3 years of the date of the schedule.



Map 68 North Western GIA Overlay

CURRENT OVERLAYS

Overlays found within the North Western GIA include the following (shown on map 62):

- Erosion Management Overlay (EMO) which applies to along a watercourse located to the north of Smarts Hill Road & west of Finchs Road.
- Significant Landscape Overlay (SLO) which applies to the same extent of land covered by the Erosion Management Overlay (EMO) described above.
- The Environmental Significance Overlay Schedule 5 (ESO5) applies to a number of stands of trees located to the south side of Remembrance Drive and west of the Ballarat Skipton Rail Trail.
- Although not within the land designated as the North Western GIA, the Heritage Overlay Schedule 154 (HO154) applies to the full extent of the Remembrance Drive road corridor and relates to the Ballarat Avenue of Honour.

CULTURAL HERITAGE

Cultural heritage is of specific influence to the North Western GIA, noting that the Heritage Overlay Schedule 154 (HO154) applies to the full extent of the Remembrance Drive road corridor (relates to the Ballarat Avenue of Honour).

There are no Victorian Heritage Inventory (VHI) sites in the North Western site.

Mapping Ballarat's Historic Urban Landscape outlines the character of the landscapes within Ballarat and notes the North Western GIA lies wholly in one Indicative Character area, Burrumbeet Plains. Burrumbeet Plains is characterised by very flat, large pastoral areas. It has an extensive agricultural landscape with little tree cover, large rectangular grazing paddocks and networks of small creeks and drainage channels. The area has some isolated residential development along Remembrance Drive, with older farmsteads, boundary walls and hedges. The 22 kilometre Ballarat Avenue of Honour runs through the area and creates a prominent landscape feature with great social value.

There are also areas of Aboriginal cultural sensitivity within the North Western site including the Ballarat Skipton Rail Trail and four circular parcels of land, approximately 100 metres in diameter, adjoining the trail. Desktop research from 2008 noted that no Aboriginal Cultural Heritage sites registered within the study area. However given the strong possibility that Aboriginal Cultural Heritage material will occur in the area, a voluntary CHMP should be undertaken.

CURRENT POLICY DIRECTION

The Ballarat Planning Scheme has recently been updated (via Amendment C194) to formally implement the recommendations of the Ballarat Strategy (2015), and making the strategy a specific reference document under Clause 21.10.

The Ballarat Strategy (2015) functions to guide growth and development and to appropriately manage such change so Ballarat in 2040 has built on its strengths and retained its values and character. More broadly the Ballarat Strategy (2015) identifies and it recognises the opportunities to manage this change to create a greener, more vibrant and connected Ballarat.

At an overall city scale the Ballarat Strategy (2015) seeks the creation of compact and complete neighbourhoods, and includes a framework to encourage urban renewal and infill development to create a variety of housing types, within proximity of public transport and commercial and community services. It also seeks to build upon the mixture of urban and rural areas and seeks to create high amenity environments which area embedded with natural values and biodiversity by adopting an urban forest approach.

Within the context of the Ballarat Panning Scheme Clause 21.01-3 Land use vision outlines that: *"the Ballarat Strategy (2015) applies the community values and key principles as a longterm strategic direction for Ballarat towards 2040. It outlines the shared community vision for a greener, more vibrant and connected Ballarat…"*

Clause 21.01-4 Key issues outlines a number of relevant matters under the heading of settlement and housing, including:

- *"Accommodating a projected population of about 160,000 people by 2040.*
- *Maintaining a compact settlement form as part of Ballarat's '10 Minute City'.*
- *Identifying and protecting long-term growth opportunities.*
- *Encouraging a variety of housing opportunities to respond to diverse community needs and aspirations for housing.*
- *Providing quality open space as essential for community health".*

More specifically Clause 21.02-1 Urban Growth acknowledges that: "Ballarat is forecast to grow significantly towards 160,000 people by 2040. Most of this increased population is planned to be accommodat through infill in established areas, convenience living cl to public transport, urban renewal precincts, and in pro planned greenfield growth areas such as Ballarat West

Figure 2 – Housing Framework Plan illustrates 4 longer-term greenfield investigation areas, including the three GIA's nominated within the Ballarat Strategy, in additio to the TIGA land which resulted from the Panel Report recommendations on Amendment C194.

Clause 21.02-1 Urban Growth contains an object and strategy which are relevant to the current study, includ

- *Objective 1: To support a pattern of growth wh reinforces the '10 Minute City'.*
- *Strategy 1.4 Discourage increased developme density in fringe areas, particularly those that a more than walking distance from activity centr*

Likewise Clause 21.02-4 Greenfield investigation areas specifically relevant to informing the context of the cur study.

This Clause identifies that: *"The Ballarat West Growth A is the primary greenfield development area for Ballarat. Medium to long-term greenfield investigation areas (as identified in Figure 2 – Housing Framework Plan) requir a more detailed feasibility assessment. Identification as investigation area does not necessarily indicate strategi support for land use change potential.*

- *Objective 4: To ensure that greenfield develop is connected to the existing urban area.*

STRATEGIES

4.1 Discourage rezoning of additional greenfield land, which would compete with Ballarat West, until the market requires additional supply.

4.2 Ensure that future greenfield development is focused within roughly an 8km arc from the centre of Ballarat.

4.3 Avoid ad-hoc and unplanned greenfield development.

4.4 Discourage disconnected or 'leap frog' development.

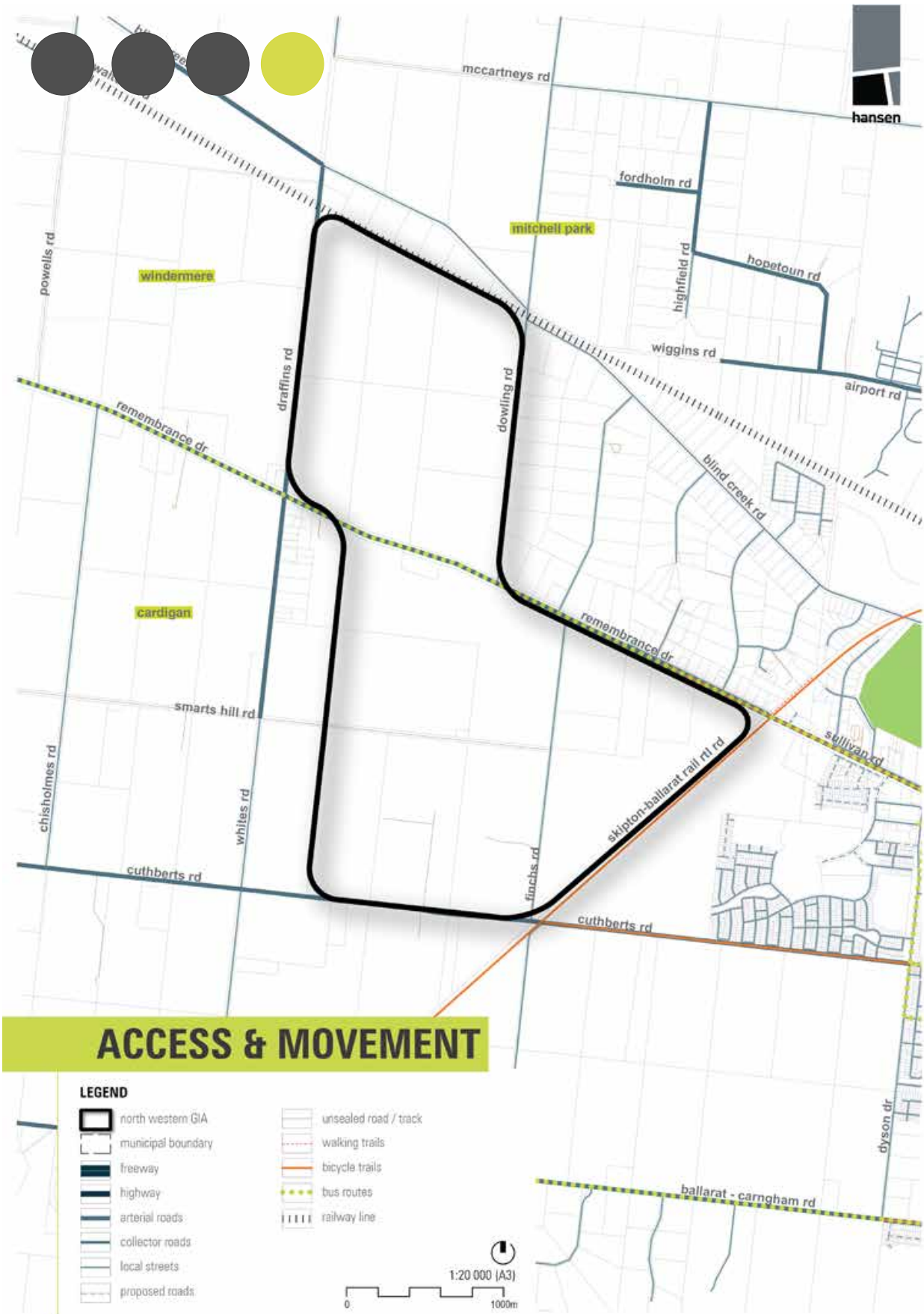
4.5 Minimise the impacts of development on Ballarat's historic urban landscape, the environment and Ballarat's natural resource base.

4.6 Ensure the need for buffers to protect major water and sewerage assets and treatment plants from encroachment by sensitive land uses is taken into account as part of any greenfield investigation

Noting that Figure 2 – Housing Framework Plan includes the TIGA land as a GIA, it is noted that there is an anomaly within Clause 21.02-7 Housing diversity, as it contains a specific reference to the TIGA land as the 'Lake Federation Resort', where Strategy 7.4 states:

"Support the development of the Lake Federation Resort".

This would appear to be an unintended drafting anomaly which as followed on from the Panel Report recommendations regarding the TIGA land.



Map 69 North Western GIA Access & Movement

ASSESSMENT OF ACCESSIBILITY

Congestion levels were the most influential factor in differentiating between the GIA's for the accessibility assessment. All of the GIA's have access to employment opportunities and services within a 20 minute private vehicle trip (up to 2041).

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP. Further detailed information is provided in Appendix 4 which contains ARUP's Ballarat Greenfields Investigation Areas Review – North Western Update Report.

EXISTING AND PLANNING FUTURE ROAD NETWORKS

Remembrance Drive completely bisects the site from east to west. The northern section of the site is bound by Draffins Road to the west, Dowling Road to the east, while to the north it is bound by the Melbourne to Ararat Railway line, preventing a direct road connection in this direction. The southern section of the site is bound by Cutherberts Road to the south and is in close proximity the Whites Road to the west. VicRoads is the responsible roads authority for Remembrance Drive, while Ballarat City Council are responsible for all other surrounding roads.

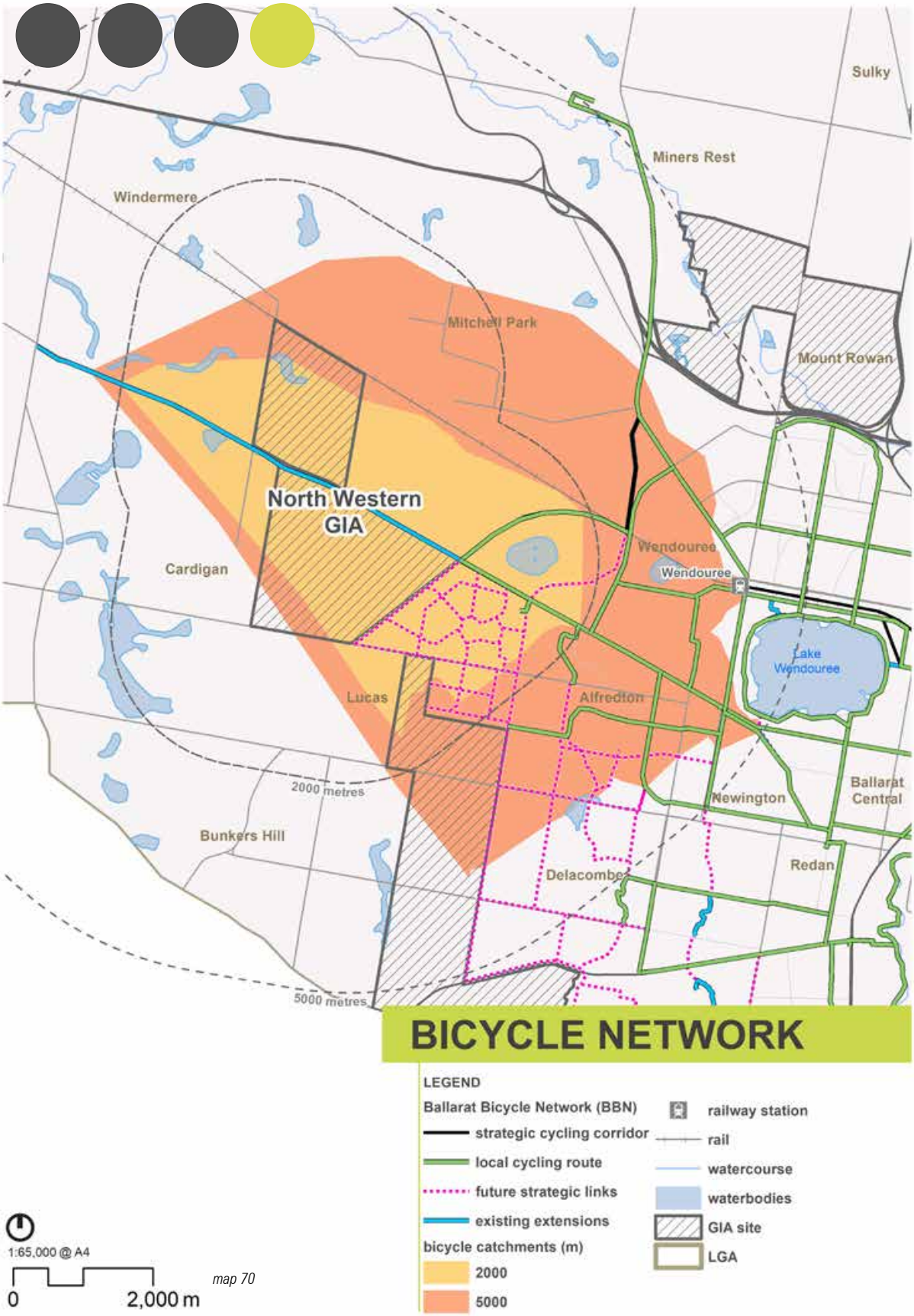
The assessment of transport forecast contained in the VITM Report indicates that in the near term (2021), the road network providing access to the site will operate well within available capacity during the AM peak period. Only a low level of congestion is noted at the confluence of Sturt Street and Cuthberts Road. Longer term transport forecasts indicate that by 2041, the road network will experience low to medium levels of congestion along routes providing access to the site during the AM peak period.

Low to medium levels of congestion is predicted to occur on Remembrance Drive / Sturt Street from Ring Road towards the Ballarat Town Centre. Low to medium levels of congestion is predicted to occur on Cuthberts Road from Dyson Drive to Sturt Street. A review of the forecast land use assumptions made for the analysis presented in the Ballarat VITM report shows that only a limited number households within the site area, far below the low development scenario, are included in the 2041 forecast. Inclusion of additional levels of development at the site would exacerbate the noted congestion issues.

PUBLIC TRANSPORT NETWORKS AND FACILITIES

The closest point of the site is located approximately 4.5km from Wendouree Station and approximately 8km from Ballarat Station. There are no existing bus services with any catchment within the site boundary. The closest service is Route 10, which stops approximately 1.2km from the closest point of the site. To provide the site with connectivity to the Ballarat bus network, there is opportunity to extend Route 10 and 26. Lengthening of either route by at least 6km would be required to provide reasonable coverage of the site, with a corresponding increase in vehicles assigned to the route should the existing service frequency be maintained.

There is potential opportunity to plan for a new railway station at the northern boundary of the site. However, the viability of such a station would likely be limited as its catchment would only cover a small part of the site and the existing train service frequency is low.



Map 70 North Western GIA Bicycle Network

WALKING AND CYCLING NETWORKS

The centre of the site is located at least 9 kilometres from the Ballarat CBD, as such both walking and cycling will have only limited viability for these trips. The majority of walking and cycling trips are expected to remain internal to the site or to the immediate nearby suburbs.

There are no existing dedicated bicycle facilities between the site and the Ballarat CBD. The Ballarat-Skipton Rail Trail, which provides an unsealed dedicated cycleway, borders the south east edge of the site. However, the trail terminates at Ring Road and does not provide a complete connection to the CBD. An unsealed shared path is provided along the south side of Remembrance Drive. This path also terminates before the CBD at Dyson Drive, becoming a standard pedestrian footpath on which cycling is not permitted for anyone over the age of 12. As such, any route for this trip would require travel along a roadway without dedicated cycling facilities for at least part of the trip. However VicRoads and Ballarat City Council cycling planning documents include extension of cycling facilities along Remembrance Drive / Sturt Street and Cuthberts Road, which would provide a direct bicycle connection between the site and the Ballarat CBD.

ACCESSIBILITY TO EMPLOYMENT AND SERVICES

Based on current planning, the site will have a high level of access to employment and retail services by private vehicle for the foreseeable future. It is expected that between 90% and 100% of employment opportunities and retail services will be able to be accessed within a 20 minute private vehicle trip from now until the year 2041.

Based on current planning, the site will have negligible access to employment or retail services by public transport for the foreseeable future. It is expected that there will be limited employment opportunities and retail services that will be able to be accessed by public transport within a 20 minute public trip both now and until the year 2041.

The employment distribution forecasts outline in the Ballarat VITM report suggests that more jobs will be located in the west of Ballarat in the future. On this basis, there is an opportunity to provide increased public transport services with these locations of employment (e.g. Ballarat West Employment Zone) While access by private vehicle is high, there is an opportunity to provide additional transport choice and increased access to employment and retail services through the provision of additional public transport services.

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ASSESSMENT OF DELIVERABILITY

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertaken by ARUP. Further detailed information is provided in Appendix 4 which contains ARUP's Ballarat Greenfields Investigation Areas Review – North Western Update Report.

NEW TRUNK UTILITY INFRASTRUCTURE

Given that there is no trunk utility infrastructure currently within the GIA it is anticipated that significant new trunk mains will be required within the North Western GIA to deliver all services to the area.

STORMWATER

New trunk drainage infrastructure required includes:

- A number of retention basins located throughout the study area. The size and location of individual basins will largely be dependent on the topography and proposed land use of the study area and should be determined in collaboration with civil engineers and town planners.
- Wetlands that will be incorporated into the floor of each retarding basin to improve water quality. The application of this treatment measure ensures that land acquisition cost to meet WSUD requirements can be minimised.
- A network of stormwater drainage pipes that will convey the post development 10 year ARI event flow to the retention basin.
- Stormwater drainage pipes that will convey the pre-development 100 year ARI event flow from the retention basins to the outfall creeks.

Detailed modelling of the performance of the proposed wetlands has not been conducted as part of this study. Consequently, while the design and cost evaluation assumes that WSUD requirements can be satisfied with the wetlands and green spaces, it is noted that additional tertiary water treatment may be required.

SEWER

Extensive new trunk infrastructure will be required to service the North Western GIA. The topography of the site presents two options: gravity feed to Cardigan Wastwater Treatment Plant (WwTP) or a series of sewer pump stations that conveys flows to either the Ballarat South WwTP.

It is also noted that due to the lack of peak wet weather capacity in the downstream network, if significant downstream upgrades are not undertaken, peak flows will need to be contained within the GIA which would require space for detention networks.

As Cardigan WwTP is a small localised asset, significant upgrades would be required to service this GIA. These upgrades would also require regulatory approvals and have an impact upon the plants odour buffer zone and therefore surrounding residents.

It should also be noted that tapping into the Ballarat South WwTP would require flows to travel up to 25km resulting in high construction and operational costs.

Central Highlands Water has confirmed that this plant has capacity limitations and would require upgrade or detention space to manage wet weather peak flows.

Similarly to the Cardigan WwTP, the buffer zone and discharge licence of the Ballarat South WwTP would need to be reviewed.

It is possible that most effective solution would be to commission a new wastewater treatment facility to service this growth area.

WATER

Central highlands water has advised that the existing trunk main in Remembrance Drive does not have the capacity to service the entire GIA. It may be possible to extend the mains proposed as part of the Ballarat West Urban Growth Zone development to service the North Western GIA however significant new infrastructure will still be required. Development in this area may trigger the need for new pressure zones which increases the operation complexities of the area.

It is notes that the ring Road water main upgrade is planned to address current level of service deficiencies in the nearby Alfredton area. This main would need to be upsized to service the North Western GIA.

Central Highlands Water has advised that the Ballarat System is capable of sourcing adequate raw water supply for the next 30 to 50 years and that the two treatment plants in the area have sufficient capacity for the next 20 years.

GAS

AusNet Services have advised that the location of the North Western GIA would mean that supply would have to travel across Ballarat resulting in significant pressure reductions. This suggests that significant upgrades and new trunk infrastructure would be required to provide reliable supply to this area.

Long term infrastructure requirements AusNet Services has advised that two new field regulators are currently being installed to enhance network pressures to ensure capacity for the immediate future. These upgrades do not consider future growth in this area.

ELECTRICITY

Powercor has confirmed that there is limited supply available to the North Western GIA, however 22kV feeder augmentation works would be required to support significant growth in demand. Such augmentation works are included in Powercor's 10 year forward plan.

It is noted that Powercor's longer term plan is to establish a substation in Ballarat West. This substation is proposed to cater for growth in the industrial demand in the area but could also have advantages for the North Western GIA.

It is likely that the following infrastructure works would be required to support the GIA:

- New transmission lines to supply the existing Ballarat Terminal Station (BATS) or a new terminal station;
- New sub-transmission lines to fed the Ballarat West (BAW) zone substation;
- New 22kV feeders from BAW zone substations to the GIA
- New electricity distribution network within the GIA.

It would be anticipated that at least one new 22kV feeder would be required to support the supply of electricity.

TELECOMMUNICATION

Telstra has advised that trunk infrastructure in growth areas will be dictated by developer applications. These protocols are spelt out by both Telstra and NBN Co and are at a cost to the developer.

NEW COMMUNITY INFRASTRUCTURE REQUIRED

The new community infrastructure required for the various scenarios for the Western GIA has been identified in table 22 below.

CATEGORY	INDICATOR	BENCH-MARK	ACCESS DISTANCE	REFER-ENCE	NUMBER REQUIRED UNDER SCE-NARIO				PROVIDER	EXISTING FACILITIES	DISTANCE FROM GIA
					1 8 LOTS PER HECT-ARE	2 12 LOTS PER HECT-ARE	3 15 LOTS PER HECT-ARE	4 20 LOTS PER HECT-ARE			
1 Recreation and Cultural Infrastructure											
1.1 Sport and recreation	Provision of recreation areas - active open space	One Level 1 active open space reserve (8 ha per active open space reserve) per 6,000 people	1000 metres for 95% of dwellings	ASRR 2008 GAA 2013	1.5	2.2	2.8	3.7	Local council		
1.4 Community centres	Provision of community centres	Level 1 Provision ratios up to 10,000 people		GAA 2009	0.9	1.3	1.7	2.2	Local council		
2 Educational Infrastructure											
2.1 Kindergartens	Provision of kindergartens	Provision ratios up to 10,000 people	600 metres	GAA 2009 Barton et al 2010	0.9	1.3	1.7	2.2	Private	Alfredton Early Learning & Kinder	Approx. 2.5km
2.2 Long day care and occasional care	Provision of long day care and occasional care facilities	Provision ratios up to 10,000 people	600 metres	GAA 2009 Barton et al 2010	0.9	1.3	1.7	2.2	Private	Goodstart Early Learning Alfredton	Approx. 2.5km
2.3 Primary schools	Provision of government primary schools	1 government primary school per 8,000 to 10,000 people	800 metres	ASRR 2008 Barton et al 2010	0.9	1.3	1.7	2.2	State government	Alfredton Primary School	Approx. 2.5km
	Provision of non-government primary schools	Provision ratios between 10,000 and 30,000 people	800 metres	GAA 2009 Barton et al 2010	0.4	0.7	0.8	1.1	Private	Siena Catholic Primary School	Approx.1km

CATEGORY	INDICATOR	BENCH-MARK	ACCESS DISTANCE	REFER-ENCE	NUMBER REQUIRED UNDER SCE-NARIO				PROVIDER	EXISTING FACILITIES	DISTANCE FROM GIA
					1 8 LOTS PER HECT-ARE	2 12 LOTS PER HECT-ARE	3 15 LOTS PER HECT-ARE	4 20 LOTS PER HECT-ARE			
2.4 Secondary schools	Provision of government secondary schools	1 government secondary school per 25,000 to 30,000 people	1200 metres	ASRR 2008 Barton et al 2010	0.3	0.5	0.6	0.8	State government	Ballarat High School	Approx. 5km
3 Healthcare Infrastructure											
3.1 GP clinics	Provision of GP clinics	0.34 general practices per 1000 people (Victorian average)		Dept of Health 2011	3.0	4.5	5.7	7.5	Private	Alfredton Medical Centre	Approx. 4km
3.3 Dental practices	Provision of dentist sites	0.20 dental services per 1000 people (Victorian average)		Dept of Health 2011	1.8	2.7	3.3	4.4	Private	Ballarat Family Dental	Approx. 1.5km
	Provision of aged care facilities	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.4	0.7	0.8	1.1	Private		
	Provision of aged care places	88 beds per 1000 people aged 70+		ANAO 2015	79	119	148	198	Private		
3.5 Community health centres	Provision of community health centres	Provision ratios between 10,000 and 30,000 people		GAA 2009	0.4	0.7	0.8	1.1	State government		
3.6 Hospitals	Hospital beds	3.9 hospital beds per 1000 people (Australian average) (Australian average)		AIHW 2014	35	52	65	86	State government		

Table 22: New Community Infrastructure

Map 71 North Western GIA Land Ownership

LAND OWNERSHIP

Noting that the North Western GIA consists of approximately 14 land parcels, the land ownership of these parcels is highly consolidated, with only four land owners holding the entirety of the North Western GIA.

As such a large consolidated parcel of 575 hectare site known as 614 Cuthberts Road, Cardigan is owned by TIGA (Ballarat) Pty. Ltd., while a smaller land parcel of approximately 39 hectare site located at 146 Draffins Road, Cardigan is owned by Ivan and Maria Kovacic. Two other land parcels of 40 hectares and 11 hectares are located to the southern side of Remembrance Drive and are separately owned. The land ownership map to the left (map 65) illustrates this land ownership pattern.

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ASSESSMENT OF INFRASTRUCTURE COSTS

Commentary throughout the following section predominantly consists of an abridged summary of the more detailed investigation and analysis undertake by ARUP and Tim Nott Economics. Further detailed information is provided in Appendix 1 & 2 which contains Tim Nott's and ARUP's separate technical reports.

DEVELOPMENT INFRASTRUCTURE COSTS

DRAINAGE

The costs associated with the drainage trunk infrastructure for the various scenarios in the North Western GIA are stated in table 23 below. The nominated scenarios within the table below relate to the 4 devised lots per hectare scenarios used to test and understand the implications of differing development densities within each of the GIA's.

TELECOMMUNICATIONS

Telstra has advised that charges for new infrastructure are generally borne by the developer and vary based on: type and size of the development; location; services required by the developer; network type; and relative proximity of Telstra's network with spare capacity

SEWER AND WATER

As with all of the proposed areas, development of the North Western GIA will drive the need for significant investment in new trunk infrastructure and upgrades to existing infrastructure in the quantum of $40M – $50M. Should this result in the need for a new wastewater treatment plant and re-use facility a further $50M - $80M could be required. Operational complexities due to the possible creation of multiple pressure zones to supply this GIA will also have ongoing costs. Central highlands Water have also advised that this growth area presented the highest per lot development cost.

GAS

While the authorities have not provided specific costs for trunk infrastructure, they have noted that the North Western GIA will require a significant amount of investment to provide supply from the existing City Gate and maintain service levels across the network.

ELECTRICITY

Powercor stated that costs associated with supplying this GIA are difficult to provide without a detailed in depth assessment. However, it was noted that costs would vary only slightly between the GIA's being considered and that there was no preference between areas.

ITEM	SCENARIO 1 (8 LOTS PER HA)	SCENARIO 2 (12 LOTS PER HA)	SCENARIO 3 (15 LOTS PER HA)	SCENARIO 4 (20 LOTS PER HA)
New pipes and pits	$4,800,000	$6,400,000	$7,100,000	$7,200,000
Retention Basins / Wetlands	$11,100,000	$15,000,000	$16,500,000	$18,200,000
Council Fees	$600,000	$700,000	$800,000	$900,000
CAPEX (2015 prices)	$16,400,000	$22,200,000	$24,400,000	$27,000,000
CAPEX (2040 pricing)	$ 34,400,000.00	$ 46,600,000.00	$51,300,000	$56,600,000.00

Table 23: Drainage Trunk Infrastructure Costs

Further details on each of the 4 devised scenarios is provided in the Development Scenarios section of this report. The above table should be read in conjunction with the identified issues with infrastructure provision which is provided under the Assessment of Deliverability sections of this report for each of the relevant GIA's.

CATEGORY	INDICATOR	UNIT COST	REFERENCE	COST IN SCENARIO			
				SCENARIO 1 (8 LOTS PER HECTARE)	SCENARIO 2 (12 LOTS PER HECTARE)	SCENARIO 3 (15 LOTS PER HECTARE)	SCENARIO 4 (18 LOTS PER HECTARE)
1 Recreation and Cultural Infrastructure							
1.1 Sport and recreation	Provision of recreation areas - active open space	$ 6.75 million	Urban Enterprise, 2014	$13,500,00	$13,500,00	$20,250,00	$27,000,000
1.4 Community centres	Provision of community centres	$ 4.4 million	Urban Enterprise, 2014	$4,400,000	$4,400,000	$8,800,000	$8,800,000
2 Educational Infrastructure							
2.1 Kindergartens	Provision of kindergartens	$ 1.3 million	City of Kingston, 2014	$1,300,000	$1,300,000	$2,600,000	$2,600,000
2.2 Long day care and occasional care	Provision of long day care and occasional care facilities	$ 4.1 million	ACT Government, 2012 McComish, 2013	$4,100,000	$4,100,000	$8,200,000	$8,200,000
2.3 Primary schools	Provision of government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$12,200,000	$12,200,000	$24,400,000	$24,400,000
	Provision of non-government primary schools	$ 12.2 million	Department of Treasury and Finance, 2015	$ 12,200,000	$12,200,000	$12,200,000	$12,200,000
2.4 Secondary schools	Provision of government secondary schools	$ 20 million	Department of Treasury and Finance, 2014	$ -	$20,000,000	$20,000,000	$20,000,000
3 Healthcare Infrastructure							
3.1 GP clinics	Provision of GP clinics	$ 1.4 million	Selesnew, 2008	$4,200,000	$7,000,000	$8,400,000	$11,200,000
3.3 Dental practices	Provision of dentist sites	$ 1.4 million	Selesnew, 2008	$2,800,000	$4,200,000	$4,200,000	$5,600,000

CATEGORY	INDICATOR	UNIT COST	REFERENCE	COST IN SCENARIO			
				SCENARIO 1 (8 LOTS PER HECTARE)	SCENARIO 2 (12 LOTS PER HECTARE)	SCENARIO 3 (15 LOTS PER HECTARE)	SCENARIO 4 (18 LOTS PER HECTARE)
3.4 Aged care	Provision of aged care facilities	$ 17.9 million	Department of Treasury and Finance, 2014	$ -	$17,900,000	$17,900,000	$17,900,000
	Provision of aged care places	$ 595,000 per place	Department of Treasury and Finance, 2014	$47,005,000	$70,805,000	$88,060,000	$117,810,000
3.5 Community health centres	Provision of community health centres	$ 50.2 million	Department of Treasury and Finance, 2014	$ -	$50,200,000	$50,200,000	$50,200,000
3.6 Hospitals	Provision of hospital beds	$ 844,000 per bed	Department of Treasury and Finance, 2015	$29,540,000	$43,888,000	$54,860,000	$72,584,000

Table 24: Community Infrastructure Costs

COMMUNITY INFRASTRUCTURE COSTS

The new community infrastructure required to provide for the future residents of the North Western GIA was determined based on benchmark recommendations for the provision o f facilities. The requirements were determined under four population projection scenarios. Existing facilities in adjacent areas have been documented, as this may reduce the requirement for new community infrastructure.

The community infrastructure cost for the various scenarios in the North Western GIA have been identified in the table 24.

The demand for community infrastructure is driven by the population and the associated costs are influenced by which scenario is implemented. It has been noted that the indicative healthcare infrastructure may be provided by the public sector. Further the costs identified are relatively similar across the GIA's given the influence of population.

DEVELOPER COSTS FOR LOCAL INFRASTRUCTURE

The developer costs for local infrastructure for 2015 and 2040 scenarios in the North Western GIA have been identified in Table 25 and Table 26

North Western GIA combined cost estimate - 2015 prices				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Roads	$48,700,000	$53,900,000	$53,900,000	$58,800,000
Water Supply	$17,300,000	$22,100,000	$24,900,000	$30,600,000
Sewer	$11,100,000	$13,000,000	$13,700,000	$15,700,000
Total	$77,100,000	$89,000,000	$92,500,000	$105,100,000

Table 25: Combined Cost Estimate – 2015 Prices

North Western GIA combined cost estimate - 2040 prices				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Roads	$ 102,400,000	$ 113,300,000	$ 113,300,000	$ 123,500,000
Water Supply	$ 36,300,000	$ 46,300,000	$ 52,400,000	$ 64,300,000
Sewer	$ 23,300,000	$ 27,300,000	$ 28,700,000	$ 33,000,000
Total	$ 162,000,000	$ 186,900,000	$ 194,400,000	$ 220,800,000

Table 26: Combined Cost Estimate – 2040 Prices

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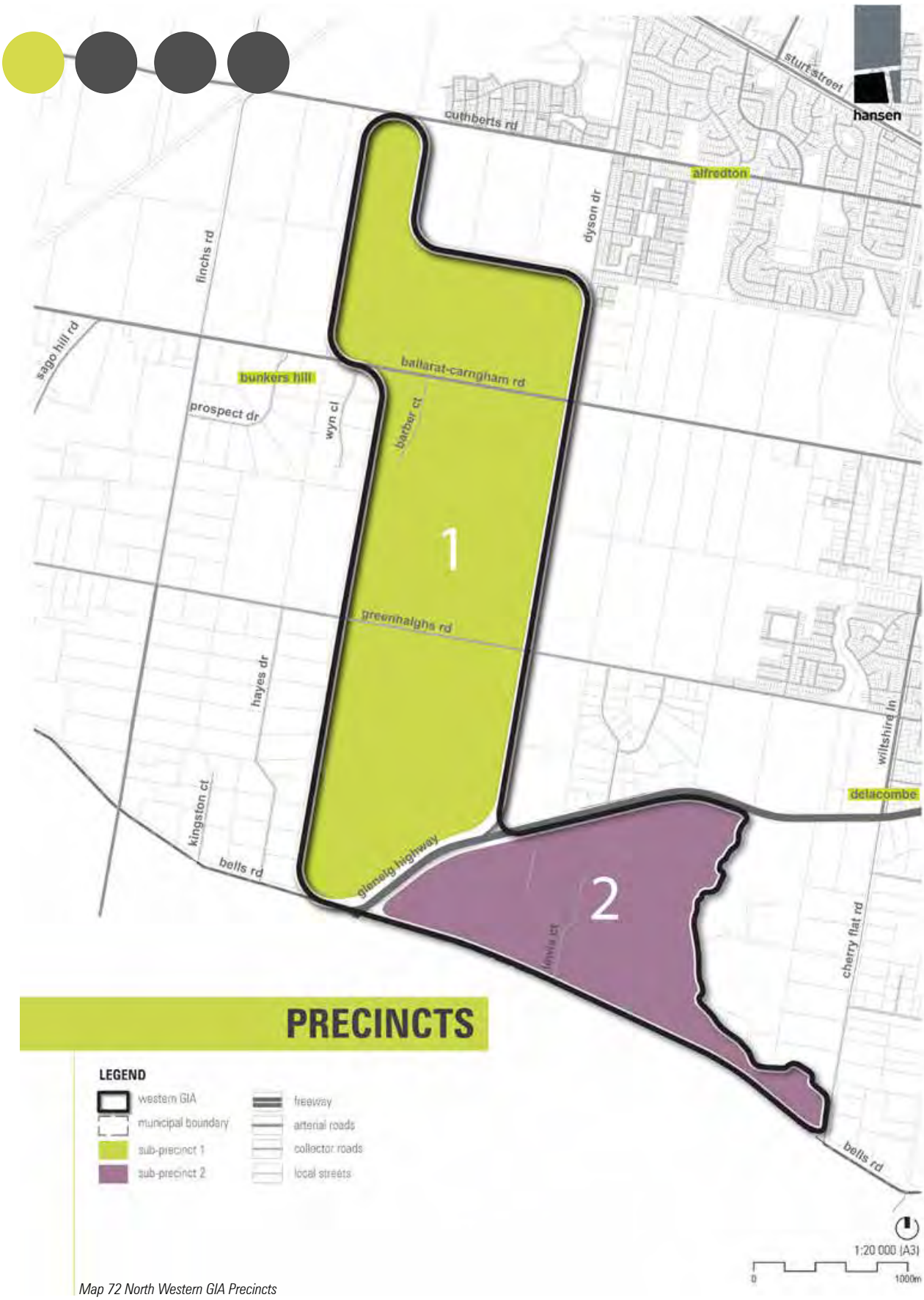
GIA SUB-PRECINCTS

Following on from the overarching analysis of each of the GIA's, it was established that they could be split up into a series of 'sub-precincts', based on land use, physical landform and environmental features.

The identification of sub-precincts is important, as the physical attributes and potential constraints of each will specifically inform the development potential of such land. Accordingly the designation of sub-precincts for each of the GIA's will both inform and constitute part of recommendations to follow on from this Part A Analysis Report.

Sub-precincts identified for each of the GIA's are described on following pages.



Map 72 North Western GIA Precincts

WESTERN GIA SUB-PRECINCTS

The Western GIA can be categorised into two sub-precincts as follows (shown in map 66 to the left):

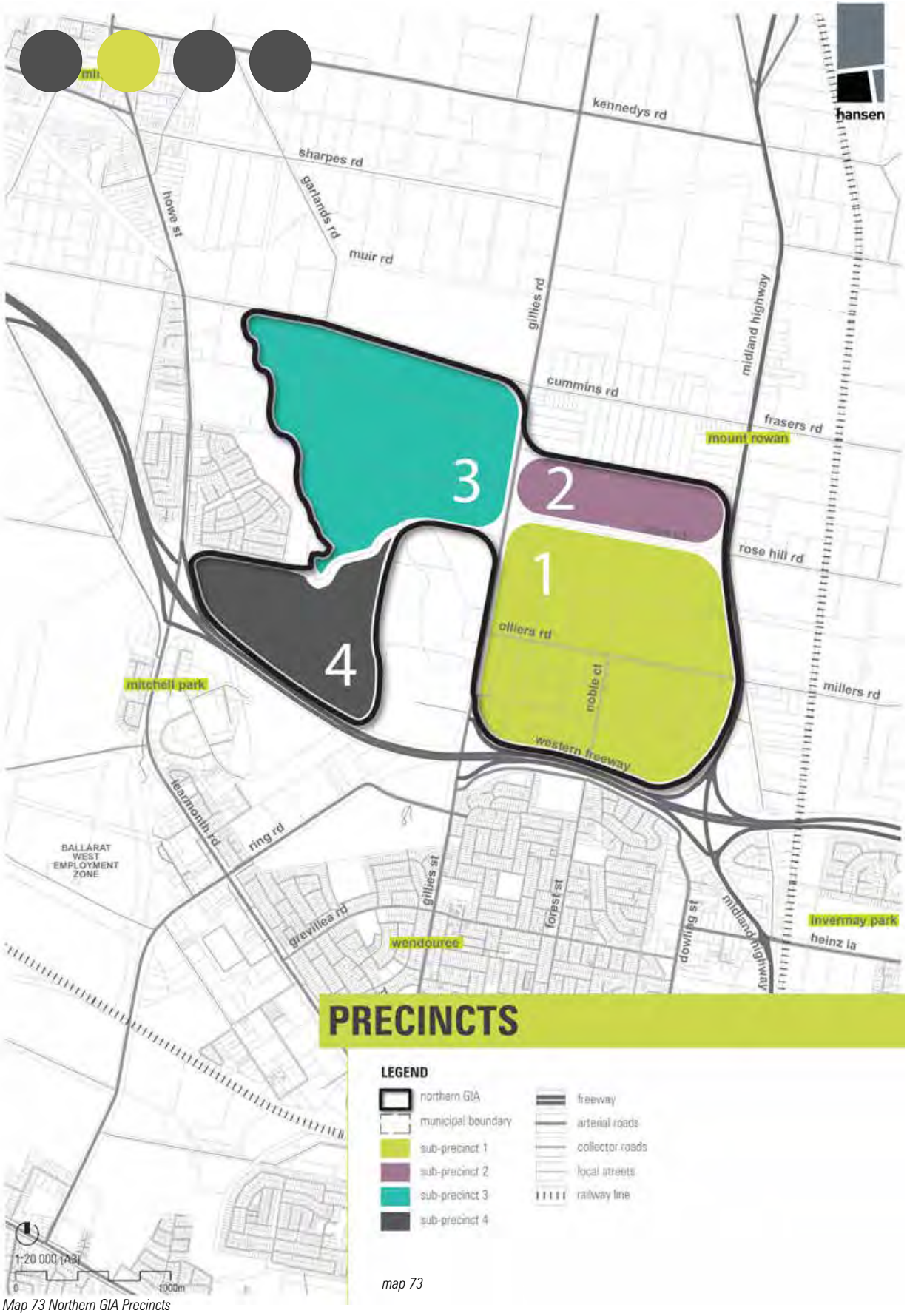
SUB-PRECINCT 1 (WESTERN GIA)

Sub-Precinct 1 contains all land located to the north of Glenelg Highway. Land in this sub-precinct is relatively open and topographically flat, consisting of broad acre rural land/ farmland. Allotment sizes are predominantly 20ha and above. The sub-precinct is bisected by two east-west aligned roads, being Ballarat-Carngham Road and Greenhalghs Road, whilst the north-south aligned Dyson Drive forms the eastern boundary. Sub-Precinct 1 forms a logical continuation of the current approved development front in the form of the Ballarat West Growth Area, which shares a boundary with the Western GIA along Dyson Road.

SUB-PRECINCT 2 (WESTERN GIA)

Sub-precinct 2 contains all land located to the south of Glenelg Highway. Land in this sub-precinct is also relatively open, but constitutes rural living type activity, noting that the land has been previously subdivided into 'rural living' allotment sizes of between 2-4ha. This existing subdivision pattern created a general fragmentation of land within this sub-precinct.

Glenelg Highway forms the north and east boundary; Bells Road the southern boundary, whilst to the east it aligns with a number of property boundaries. Lewis Court is located to the approximate centre of the sub-precinct, being accessed off Bells Road. Noting that Bells Road forms the municipal boundary between the City of Ballarat and the Shire of Golden Plains, the 'rural living' type land-use found within Sub-Precinct 2 is also reflected across the municipal boundary within Golden Plains.



Map 73 Northern GIA Precincts

NORTHERN GIA SUB-PRECINCTS

The Northern GIA can be categorised into four sub-precincts as follows (shown in map 67 to the left):

SUB-PRECINCT 1 (NORTHERN GIA)

Sub-Precinct 1 contains all land bounded by Simms Road (north), Western Freeway (south) Midlands Highway (east) and Gillers Road (west), with each forming defined edges to this sub-precinct. Land in this sub-precinct is relatively open and topographically flat, accommodating broad acre rural land/ farmland. Allotment sizes are generally between10-40+ha. However the land bounded by Olliers Road, Noble Court and Western Freeway, allotment sizes are more reflective of a 'rural living' type scale, ranging from 2-4ha. Canopy trees are generally limited, with vegetation mostly delineating property boundaries.

SUB-PRECINCT 2 (NORTHERN GIA)

Sub-Precinct 2 contains all land located north of Simms Road, which constitutes the lower slopes of Mount Rowan, with allotments being between 20-40ha. Canopy trees are generally limited, with vegetation mostly delineating property boundaries.

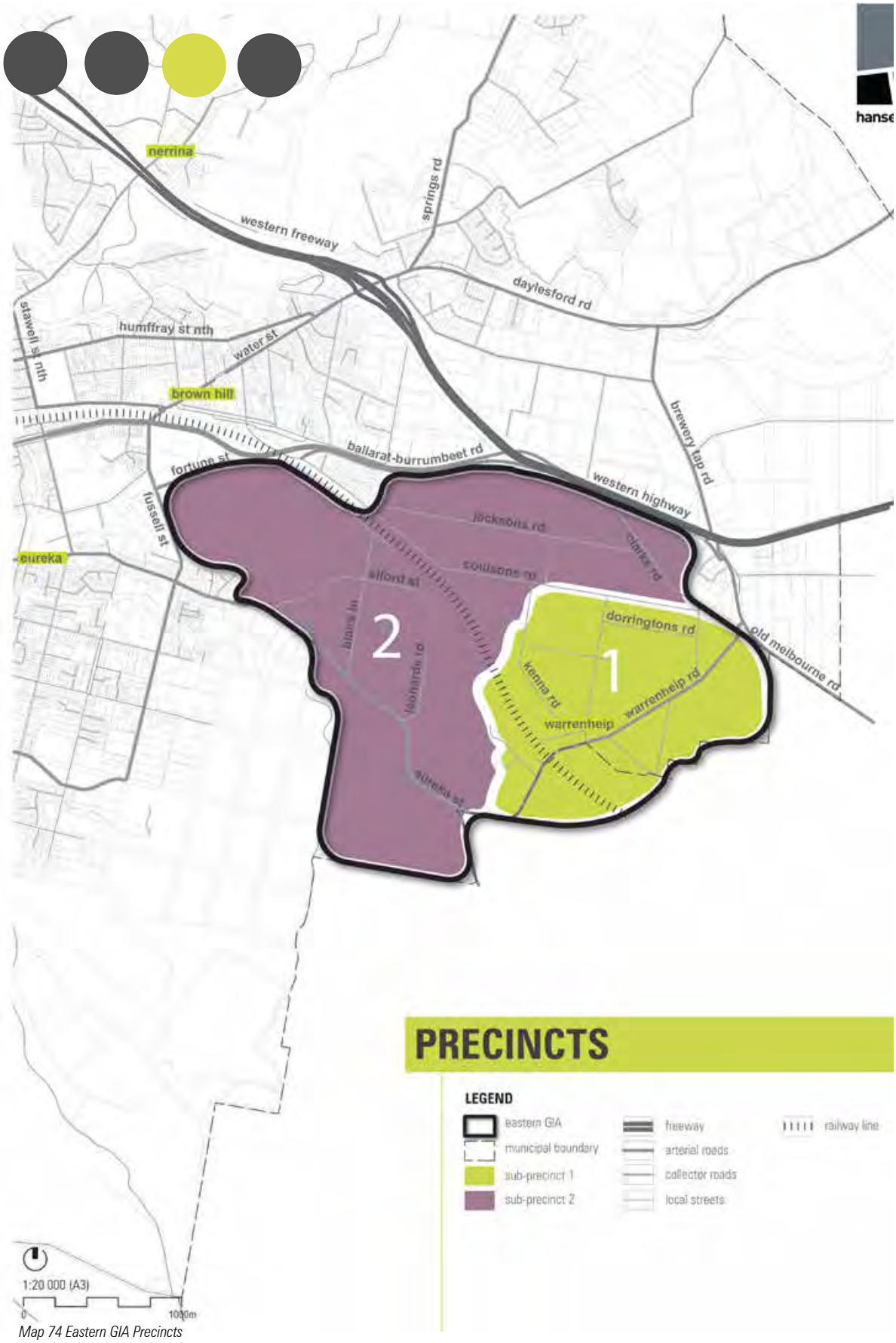
SUB-PRECINCT 3 (NORTHERN GIA)

Sub-Precinct 3 contains land located to the north of the Central Highlands Waste Water Treatment Plant, south of Cummins Road, west of Gillies Road and east of Burrumbeet Creek. Cummins Road, Gillers Road and the Central Highlands Waste Water Treatment Plant form strong defined edges to this sub-precinct, with the Burrumbeet Creek forming a slightly looser environmental/ landscape edge to Sub-Precinct 3.

Land in this sub-precinct is relatively open and topographically flat, consisting of broad acre rural land/ farmland. Allotments sizes are generally in excess of 40ha (except for the allotments located to the north west corner, which are well below 40ha). Canopy trees are generally limited, with vegetation mostly delineating property boundaries, or along the creek corridor.

SUB-PRECINCT 4 (NORTHERN GIA)

Sub-Precinct 4 contains land located to the north of the Western Freeway, south of Macarthur Park/ Burrumbeet Creek and west of the Central Highlands Waste Water Treatment Plant. This sub-precinct constitutes a large parcel of Crown Land (in excess of 40ha) which accommodates the North Common Wetland Reserve. With the land accommodating the wetlands and vegetation, it forms an informal public open space reserve which currently services the Macarthur Park residential estate.



Map 74 Eastern GIA Precincts

EASTERN GIA SUB-PRECINCTS

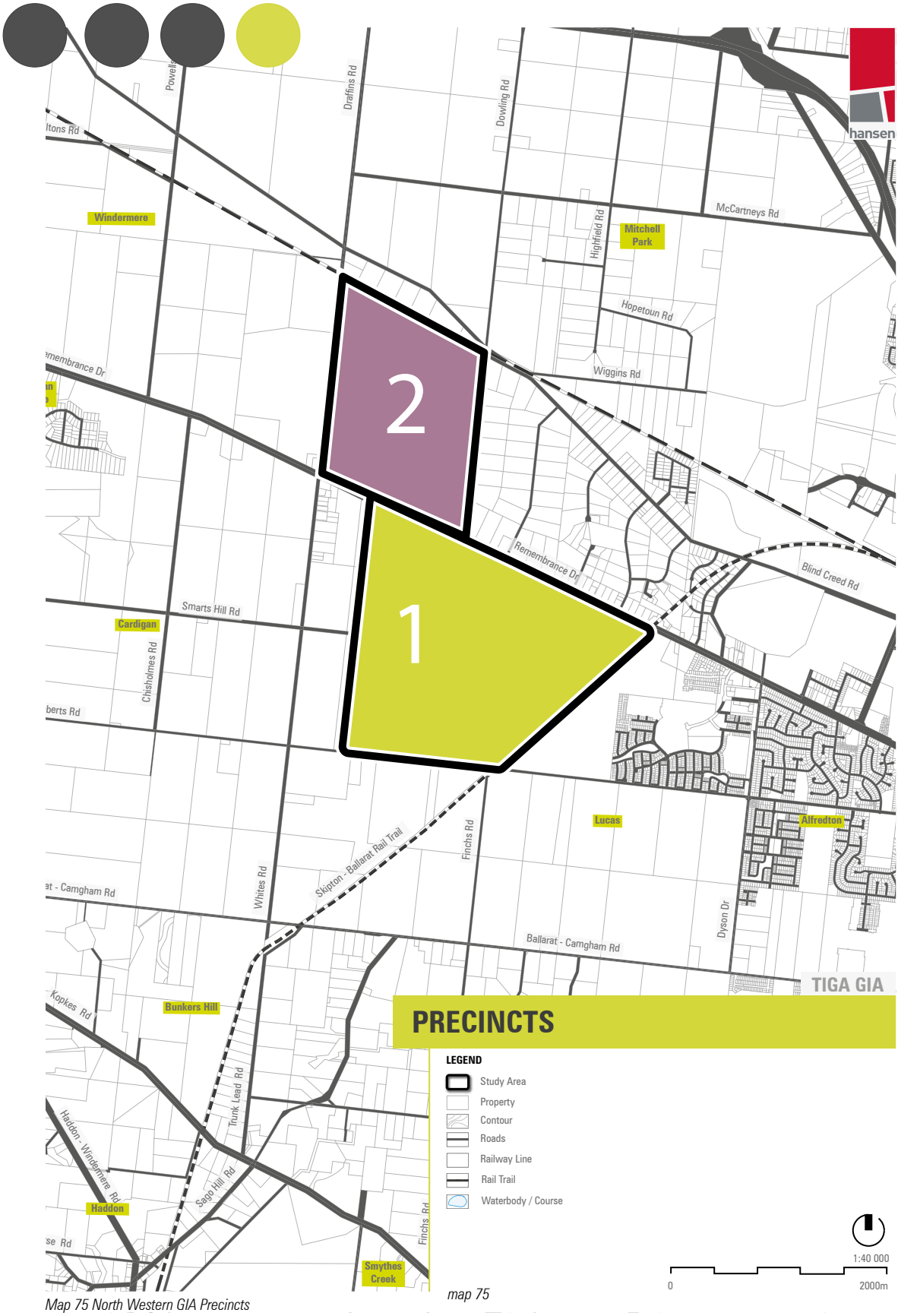
The Eastern GIA can be categorised into two sub-precincts as follows (shown in map 68 to the left):

SUB-PRECINCT 1 (EASTERN GIA)

Sub-Precinct 1 contains land located south of Coulsons Road and either side of Warrenheip Road, extending west to include Leonards Road East. Roads north of the railway line are broadly laid out in a grid pattern. Land in this sub-precinct is relatively flat and open, consisting 'rural living' to 'low density residential' type land use and activity. Allotment sizes within this sub-precinct are generally below 2ha, with much smaller 'urban' sized allotments being located along Warrenheip Road. The existing subdivision pattern has caused a general fragmentation of land within this sub-precinct. Canopy trees and vegetation is sparse throughout this sub-precinct, with trees and vegetation mostly delineating property boundaries, or sited within the road corridors.

SUB-PRECINCT 2 (EASTERN GIA)

Sub-Precinct 2 contains land located north of Coulsons Road, west of Leonards Road East and Resurrection Lane, and includes the land either side of Eureka Street. Land within this sub-precinct is topographically varied and heavily undulating, with road and property boundary alignments south of the railway line being influenced by landforms and slope. Sub-Precinct 2 accommodates large patches of canopy trees and vegetation throughout, with allotments sizes also being varied, rating from below 2ha to around 20ha. Mount Xavier and St Francis Xavier Primary school are located to the western extent of this sub-precinct. Although Sub-Precinct 2 is located at the immediate urban edge of Ballarat, including direct links to the Ballarat CBD via Eureka Street, this sub-precinct displays a different character and feel due to vegetation cover, topographic form and larger allotment sizes.



Map 75 North Western GIA Precincts

NORTH WESTERN GIA SUB-PRECINCTS

The North Western GIA can be categorised into two sub-precincts as follows (shown in map 69 to the left).

SUB-PRECINCT 1 (NORTH WESTERN GIA)

Sub-Precinct 1 contains all land located to the south of Remembrance Drive. Land in this sub-precinct is relatively open and topographically flat, consisting of broad acre rural land/ farmland. Allotment sizes are varied, from 3 ha to above 55ha, although are all held within the single ownership. The sub-precinct abuts the Skipton-Ballarat Rail Trail to its eastern edge, beyond which is the developing Ballarat West Growth front. The North Western GIA abuts broad acre rural land/ farmland along its southern and western interfaces.

SUB-PRECINCT 2 (NORTH WESTERN GIA)

Sub-Precinct 2 contains all land located to the north of Remembrance Drive. Land in this sub-precinct is relatively open and topographically flat, and like sub-precinct 1 consist of broad acre rural land/ farmland. Sub-precinct 2 consists of 7 separate land parcels ranging in size from 28ha to 39ha. Six parcels are within single ownership, with the seventh individually owned (i.e. the north-west allotment). Allotment sizes are varied, from 3 ha to above 55ha, although are all held within the single ownership. Sub-precinct abuts the rail-reserve along the northern interface, and Draffins Road to its western edge, with broad acre rural land/ farmland beyond abutting along these interfaces. Sub-precinct 2 abuts Dowling Road along its eastern edge with land beyond consisting large rural allotments (approx. 4ha) within the Rural Living Zone (RLZ). This rural living styled subdivision covers an area in the order of 1.4sqkm, and by extending to the north of the rail-reserve is located both within Cardigan and Mitchell Park. A Low Density Residential Zone (LDRZ) subdivision fronting Remembrance Drive is located further east, covering an area in the order of 11.2sqkm, and with allotments ranging from 0.4ha and larger.

From a land zoning and development perspective, the existing rural subdivisions located to the east of sub-precinct 2 represents a gradual reduction in the intensity of residential development to the western edge of Ballarat.

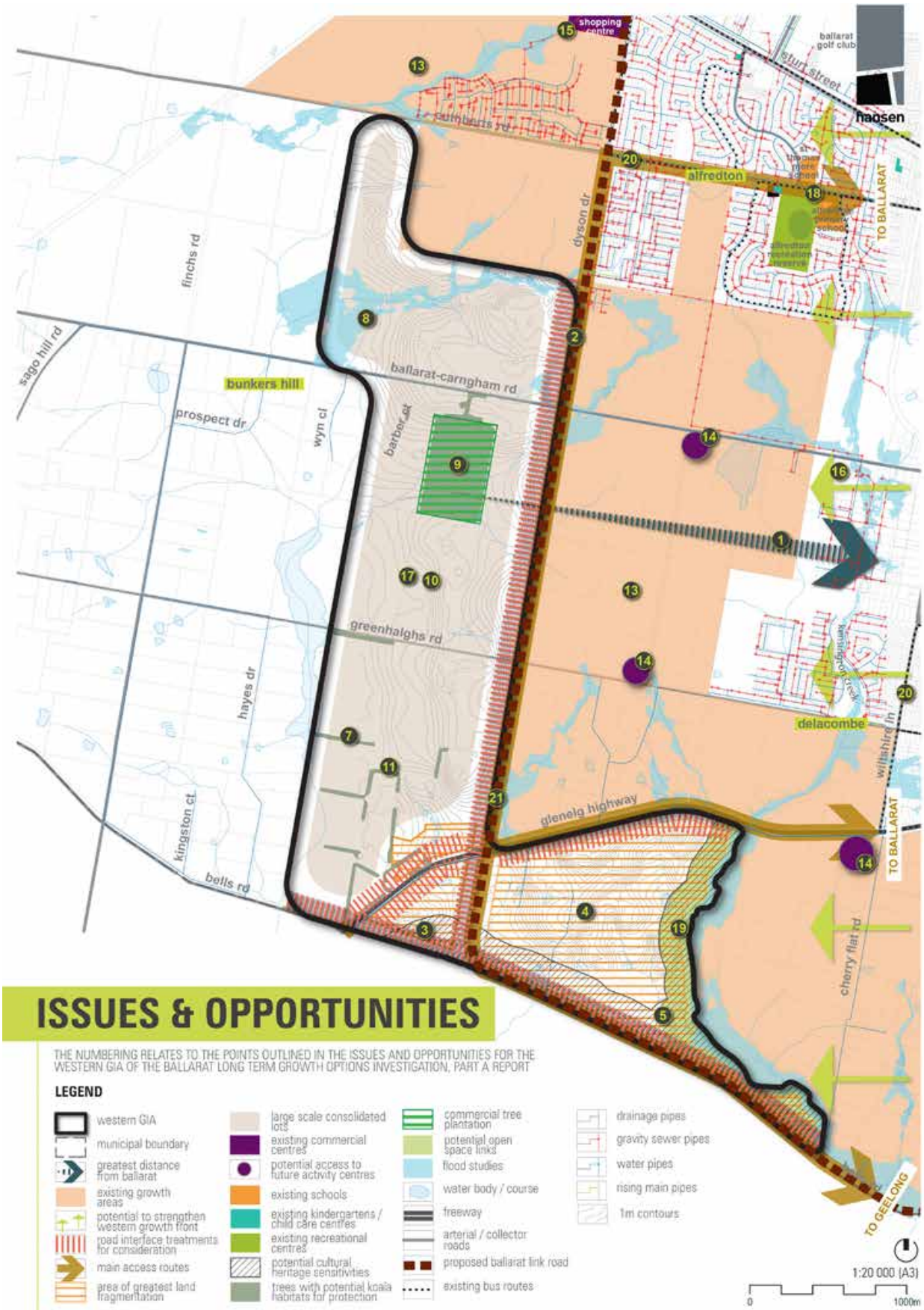
Following the background investigation and analysis phase, a range of issues and opportunities have been identified. These highlighted issues and opportunities will be developed in greater depth to subsequently form the basis of the Part B recommendations to follow.

ISSUES & OPPORTUNITIES

In addition to the the detailed analysis conducted for each of the GIA's, and the identification of 'sub-precincts', specific issues and opportunities for each of the GIA's have been identified and documented.

The identification of issues and opportunities has been an important part of framing and informing the recommendations made in Part A of this report.

Issues and Opportunities associated with each of the four GIA's are described on following pages.



Map 76 Western GIA Issues & Opportunities

WESTERN GIA

The following issues and opportunities have been identified in association with the analysis of the Western GIA. The following numbering relates to the numbers represented on the issues and opportunity mapping (map 70) to the left.

ISSUES

1. Of all the GIA's, the Western GIA has the greatest distance to Ballarat CBD and by extension to Melbourne, with noted traffic congestion at peak times.
2. The proposed Ballarat West Link Road will form the boundary between the Ballarat West and Western GIA, where road design and treatment along this interface will require consideration.
3. Potential interface treatments along Bells Road will require consideration, noting this is the municipal boundary between the City of Ballarat and the Shire of Golden Plains and that land use and activity within Golden Plains is of a 'rural living' to 'low density residential' type.
4. Land located south of Glenelg Highway has a greater degree of fragmentation, with allotments being predominantly of a more 'rural living' size (i.e. 2-4 hectares). This is also low lying land.
5. Potential areas of Aboriginal Cultural Heritage Sensitively are located along parts of the southern and eastern boundaries which will necessitate investigation and due consideration if development were to be facilitated.
6. There is a noted lack of lack of secondary schools/ kindergartens/ child care centres within proximity of the Western GIA.
7. There are patches of identified potential koala habitat areas which will require consideration.
8. Flood studies have been conducted which shows part of the northern area and south-eastern areas of the GIA are affected.
9. A commercial tree plantation is located just south of Ballarat-Carngham Rd, which will affect potential development.

OPPORTUNITIES

10. There are no existing land formations or physical barriers which would constrain the potential future development of the Western GIA.
11. There is minimal trees and vegetation clusterings within the GIA.
12. The Western GIA does not contain any significant environmental constraints.
13. The Western GIA is located at the immediate interface with the Alfredton & Ballarat West Growth Areas, where the potential development of the Western GIA can maximise the use of services and infrastructure within the adjacent growth areas.
14. The Western GIA is within immediate/ close proximity of a number of proposed commercial activity centres to be located within the adjacent Ballarat Growth Area.
15. The Western GIA is in close proximity to the newly constructed shopping centre on the corner of Sturt Street and Dyson Drive.
16. The Western GIA can in future facilitate a consolidated urban growth front in Ballarat West.
17. Land parcels to the north of Glenelg Highway are generally of a larger scale (above 20 hectares), which limits issues associated with land fragmentation/ consolidation. This would in turn assist in potential future development rollout.
18. Alfredton Primary School and Recreation Reserve is located within relative proximity of the Western GIA.
19. Potential to utilise the Kensington Creek corridor as a future reserve.
20. Opportunities to connect up to existing bus services on Wiltshire Lane, Cuthberts Road and any new services provided in the Ballarat West Growth Area.
21. The Ballarat West Link Road is an opportunity to provide ease of vehicle access to the Western GIA from both the Western Freeway and Glenelg Highway. The Link Road will also provide ease of access to the Ballarat West Employment located to the north.

Map 77 Northern GIA Issues & Opportunities

NORTHERN GIA

The following issues and opportunities have been identified in association with the analysis of the Northern GIA. The following numbering relates to the numbers represented on the issues and opportunity mapping (map 71) to the left.

ISSUES

1. The land is physically separated from the current urban edge of Ballarat by the Western Freeway.
2. The location of the waste water treatment plant and associated buffer distances requires specific consideration.
3. The North Common Wetland Reserve (located to the south west corner) is Crown Land and on that basis does not constitute land for potential development and should potentially be excluded from consideration as part of this process.
4. A former landfill site located to the south east of Gillies Road and Western Freeway could pose issues with potential redevelopment.
5. A Design and Development Overlay (DDO) associated with Ballarat Airport constrains a small area of land to the western boundary (adjacent to MacArthur Park).
6. Potential areas of Aboriginal Cultural Heritage Sensitivity and areas of environmental significance (ESO) are located along the Burrumbeet Creek corridor. Flooding studies have been conducted that also affect areas along the creek corridor.
7. Potential fire risk associated with vegetation located on the waste water treatment plant land (designated with a Bushfire Management Overlay (BMO)).
8. The mid slopes of Mt Rowan are designated with a Significant Landscape Overlay (SLO) and Erosion Management Overlay (EMO), which both pose associated constraints.
9. Areas surrounding the waste waster treatment plant are constrained by the Environmental Significance Overlay (ESO) (i.e. required buffer separate distance). Central Highlands Water have verbally indicated they are not opposed to a potential rezoning, but may reserve the right to seek an additional buffer zone beyond the existing ESO. The extent of a additional buffer zone is not currently known and would be need to be determined through further investigation and a Framework Plan process for the Northern GIA if development were to be potentially facilitated.
10. There is a noted lack of commercial activity centres within immediate proximity of the Northern GIA.
11. There are small patches of potential koala habitats noted for protection through the GIA.

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OPPORTUNITIES

12. Apart from some physical land formations and features, there are no major matters which would constrain the potential future development of the Northern GIA.
13. The Northern GIA does not contain any specific environmental constraints, save for environmental overlays along Burrumbeet Creek.
14. Potential to use existing landscape features such as Mount Rowan as a positive visual backdrop.
15. Recognise and retain any opportune sight lines to Mount Rowan.
16. Potential use of existing landscape features to create linear open space along Burrumbeet Creek, including links with North Common Wetland Reserve.
17. Potential to create a number of 'stand-alone' residential development within a broader 'greenbelt' landscape setting, such as what has been previously created at the MacArthur Park residential developments.
18. Potential to create housing choice within the Ballarat housing market, including differing housing products.
19. Potential creation of new housing opportunity adjacent to the Western Highway, with proximity of access to Ballarat CBD and direct connection to Melbourne.
20. A number of schools are noted to be located within or in close proximity to the Northern GIA including: Ballarat Grammar (Mount Rowan Campus), Forest Street Primary School, Yuille Park Community College.
21. The Northern GIA has access to two large recreation centres: Hollioake Park Sports Complex and the Wendouree West Recreation Reserve.
22. The Northern GIA will benefit from the construction of the Ballarat Western Link Road which provides an alternative connection to Geelong.

Map 78 Eastern GIA Issues & Opportunities

EASTERN GIA

The following issues and opportunities have been identified in association with the analysis of the Eastern GIA. The following numbering relates to the numbers represented on the issues and opportunity mapping (map 72) to the left.

ISSUES

1. Land form is heavily undulating which creates technical infrastructure servicing issues and an associated increase in servicing costs.
2. Existing land subdivision is highly fragmented, which creates barriers to potential land consolidation for redevelopment.
3. Existing land use and activity appears to be accommodating a 'rural living' type role for existing property owners/ residents.
4. Land is highly constrained by the Environmental Significance Overlay/s (ESO), extensively covering the Eastern GIA, which applies to the existing water catchment area to the east, and the koala habitat protection areas to the west.
5. There is a band of significant vegetation and habitats to be protected through the Eastern GIA (VPO) which would limit development density in these areas.
6. There is a notable fire risk in the Eastern GIA due to the dense clustering of vegetation (i.e. BMO areas), which would constrain any future development.
7. The Public Acquisition Overlay (PAO) and Design and Development Overlay (DDO) restricts the development of land on the southern side of the Western Highway, for a potential road re-alignment and the consequent noise implications.
8. Potential areas of Aboriginal Cultural Heritage Sensitivity are located along localised drainage lines and creek corridor.
9. There is a noted lack of commercial activity centres within immediate proximity of the Eastern GIA.
10. The existing high voltage power lines through the Eastern GIA don't follow either parcel or road alignments, and would need to be re-aligned or put underground if future development was considered.

OPPORTUNITIES

11. The Eastern GIA has the easiest, most direct access and proximity to Ballarat CBD.
12. Of the four GIA's, the Eastern GIA is the closest on route to Melbourne.
13. Potential to maintain the existing 'rural living' type role of the area to maintain diversity of housing product within the broader Ballarat housing market.
14. Potential to maintain the area as it currently exists (i.e. preventing any further subdivision), with a view to avoiding further fragmentation to keep it as an 'option' for much longer term growth of Ballarat if required.
15. A number of schools are noted to be located within or in close proximity to the Eastern GIA including: Warrenheip Primary School, St Francis Xavier Primary School, Ballarat Secondary College, Damascus College.
16. Opportunity to re-establish the Warrenheip Railway Station. Benefits of the potential station reestablishment include: providing a hub and township focus for Warrenheip; fostering public transport links with Federation University and Ballarat Technology Park; provision of a commuter parking role with a view to minimising commuter parking from Ballarat CBD.

Map 79 North Western GIA Issues & Opportunities

NORTH WESTERN GIA

The following issues and opportunities have been identified in association with the analysis of the North Western GIA. The following numbering relates to the numbers represented on the issues and opportunity mapping (map 73) to the left.

ISSUES

1. The North Western GIA has the second greatest distance to Ballarat CBD and by extension to Melbourne, with noted traffic congestion at peak times.
2. The Skipton-Ballarat Rail trail will form will form the boundary between Ballarat West and North Western GIA, where formal road connections and interface design treatments will require careful consideration.
3. The interface treatment to the Remembrance Drive/ Avenue of Honour will require careful consideration and will need to respond to and reflect the findings and recommendations of the separate study currently being undertaken to consider urban design treatments and potential planning controls for the Ballarat Avenue of Honour.
4. Land use and allotment pattern located east of Dowling Road is of a 'rural living' style, which would give rise to issues of appropriate interface, integration and treatment for any development of the North Western GIA.
5. There are patches of identified potential koala habitat areas which will require consideration.
6. There is a noted lack of lack of secondary schools/kindergartens/ child care centres within proximity of North Western GIA.
7. Existing overlays indicate the susceptibility of a remnant creek line to potential erosion.
8. A commercial tree plantation is located to the west of Draffins Road and south of the rail reserve, which may affect potential development.
9. The potential urban rural interface would require careful consideration.
10. Presence of Plains Grassy Woodland, Plains Grassland, Plains Grassy Wetlands & Aquatic Herbland Ecological Vegetation Classes (EVCs).

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OPPORTUNITIES

11. There are no existing land formations or physical barriers which would constrain the potential future of the North Western GIA.
12. There is minimal trees and vegetation clustering within the North Western GIA, except for boundary/ windrow planting and the aforementioned commercial tree plantation.
13. Potential EVC environmental constraints are clustered to the south east of the North Western GIA.
14. The North Western GIA land south of Remembrance Drive is located at the immediate interface with the Lucas & Ballarat West Growth Areas.
15. The Lucas town centre is within reasonable proximity of the developing Lucas Town Centre.
16. North Western GIA land to the south of Remembrance Drive can in future facilitate a consolidated urban growth front in Ballarat West.
17. The North Western land is predominantly is single ownership which limits issues associated with land fragmentation/ consolidation. This would in turn assist in potential future development rollout.
18. Opportunities to connect up to existing bus services (i.e. extend Route 10 & 26) and any new services provided in the Ballarat West Growth Area.
19. Potential opportunity to plan for a new railway station at the northern boundary of the site, however, the viability of such a station would likely be limited as its catchment would only cover a small part of the site and the existing train service frequency is low.
20. The Ballarat West Link Road is an opportunity to provide ease of vehicle access to the North Western GIA from both the Western Freeway and Glenelg Highway. The Link Road will also provide ease of access to the Ballarat West Employment located to the north.

Following the background investigation and analysis phase, a range of issues and opportunities have been identified. These highlighted issues and opportunities will be developed in greater depth to subsequently form the basis of the Part B recommendations to follow.

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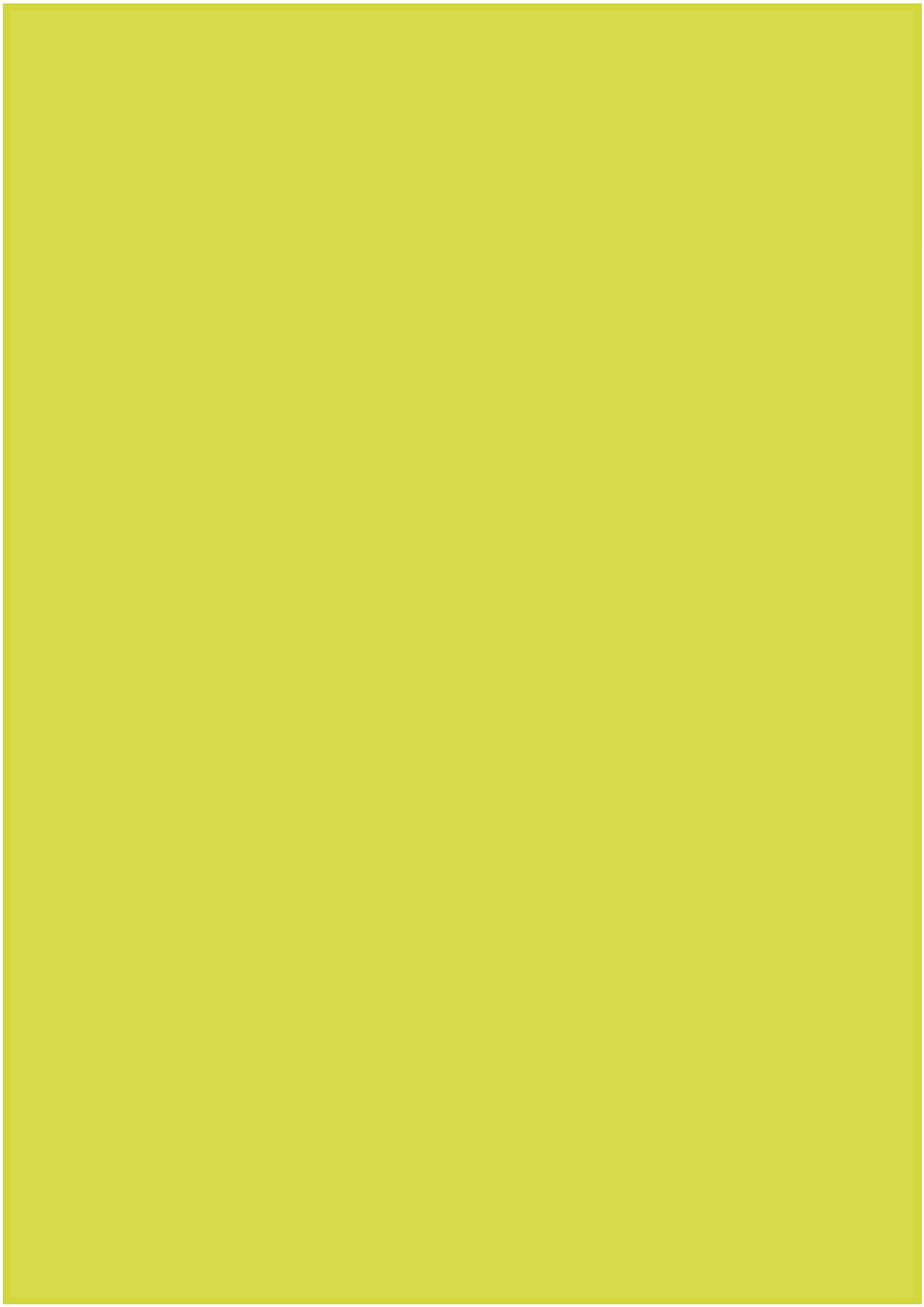

Ballarat Long Term Growth Options Investigation: Economic Assessment

June 2018

Prepared by Tim Nott for Hansen Partnership and City of Ballarat

Report Data

Version	Date	Approved By	Sent to
Draft	26 June 2015	TN	Richard Stevenson, Hansen Partnership
Draft 2	26 June 2015	TN	Richard Stevenson, Hansen Partnership
Final	13 July 2015	TN	Richard Stevenson, Hansen Partnership
Revised Final	21 July 2015	TN	Richard Stevenson, Hansen Partnership
Revised Final	22 Sept 2015	TN	Richard Stevenson, Hansen Partnership Nichola Sleight, City of Ballarat
Updated report	May 2017	TN	Richard Stevenson, Hansen Partnership
Updated report	June 2017	TN	Richard Stevenson, Hansen Partnership
Updated part 1 report	April 2018	TN	Richard Stevenson, Hansen Partnership
Updated draft report	June 2018	TN	Richard Stevenson, Hansen Partnership

Prepared by:

Tim Nott
economic analysis + strategy
ABN: 29 590 304 665

20 Scotia Street
West Preston
Victoria 3072
Australia

Tel: 0401 993 451
Email: tim@timnott.com.au
Web: www.timnott.com.au

Disclaimer

This report has been prepared as a working paper for the Hansen Partnership and City of Ballarat. No responsibility is taken for its use by other parties. The assessment in this document provides scenarios for future development based on a variety of assumptions by the author as well as data and analysis from Council and previous reports prepared for Council. The reader should bear in mind that there is no certainty in predicting the future.

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EXECUTIVE SUMMARY

Ballarat Long Term Growth Options Investigation: Economic Assessment

Council has commissioned a team led by Hansen Partnership to assess the potential of four Growth Investigation Areas (GIAs) to become Ballarat's next greenfield development areas, and to make recommendations about the need, timing and feasibility of development.

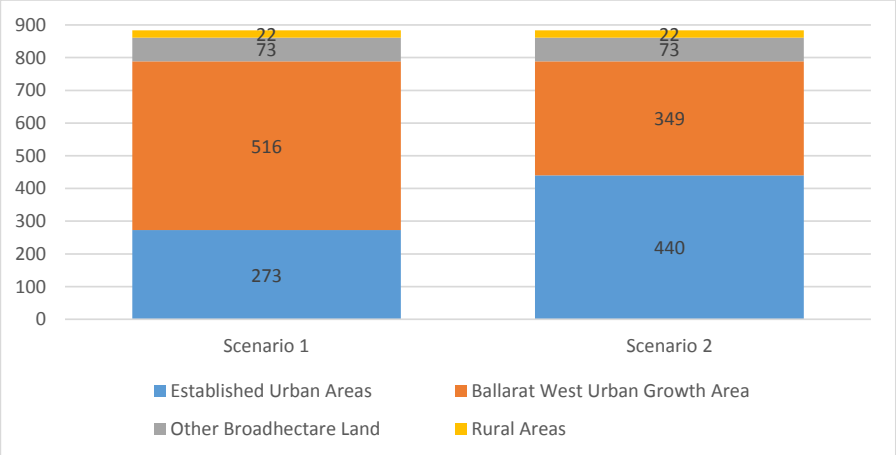
This report is part of the investigation by the Hansen Partnership team and includes an assessment of the demand for greenfield land and assesses the economic consequences for Council. It is a working paper for the Hansen Partnership and City of Ballarat and has been prepared by development economist Tim Nott.

Key Findings

1. Ballarat has had an average of around 900 new dwellings per year over the period 2010 to 2017. The suburbs of Ballarat West have experienced the strongest growth although many areas around the City have also grown strongly.
2. Two scenarios for future housing growth have been developed for this report:
   - ***Current trends*** is based on the forecast for population and housing prepared for Council by forecasters .id. In this scenario, dwelling numbers would continue to average around 900 per year. Approximately 58% of all new dwellings will be in the Ballarat West urban growth area between 2016 and 2036, with existing urban areas accommodating only 31% of new dwellings.
   - ***50% infill*** is based on Council's policy to accommodate 50% of new dwellings in established urban areas (interpreted here as existing residentially zoned land). In this scenario, while half new dwellings are accommodated in existing urban areas, the Ballarat West growth area accommodates 38% of new dwellings.

   A comparison of average annual dwelling numbers in each location type for each scenario is provided in the chart below.

Comparison of average annual new dwellings by land type for each scenario, Ballarat, 2016 to 2036



Source: Tim Nott

3. Under the ***current trends*** scenario, the Ballarat West Urban Growth Area would be fully developed by 2041. In order to comply with the planning scheme requirement to have 15 years' supply of housing land, a new growth area would be required by 2026, with planning for that area needing to commence around 2021.
4. Under the ***50% infill*** scenario, the Ballarat West Urban Growth Area would not be fully developed until 2053, with a new growth area not required until 2038.
5. In the ***current trends*** scenario, there is a step change as the urban growth area begins to accommodate the majority of new dwellings in Ballarat, accounting for two thirds of all new dwellings in the latter parts of the study period. Demand in other parts of Ballarat, including infill locations, is correspondingly low. This scenario has the benefit that new services can be concentrated in the Ballarat West Urban Growth Area. However, Ballarat has until now provided a wide variety of outlooks and locations for new dwellings all around the City. It is not certain whether this scenario will cater sufficiently for the aspirations and preferred outlooks of residents.
6. In the ***50% infill*** scenario, the Ballarat West Urban Growth Area accommodates a slightly higher proportion of new dwellings than it has in recent years, with growth area suburbs likely to accommodate 40%-44% of new dwellings after 2021, compared with 37% in the 2010 to 2017 period. With half of new dwellings to be built in infill locations, in existing residential, commercial and township zones all around the municipality. This outcome better preserves choice of location. Given that more houses will be in infill locations, and therefore likely to be smaller houses and apartments, it also caters better for the needs of a wider variety of household types.
7. There is a 12-year time difference in the need to have a new urban growth area available between the two scenarios. The studies reviewed for this project – see Appendix 2 - suggest that the cost to the community of greenfields development far outweighs the cost of infill development. From this viewpoint, it would be preferable to push back the need for greenfield development in new urban growth areas. The ability to do so will depend in part on Council successfully implementing the measures designed to promote infill development outlined in the Ballarat Strategy.
8. The costs of developing a new urban growth area in one of the four locations identified by Council have been examined elsewhere by ARUP for this project. The costs to Council cannot be determined with any certainty until a development contributions plan (DCP) is prepared. A preliminary and provisional estimate in this report suggests the costs to Council could be in the order of $2,000 to $4,000 ($2015) per lot for the Western, Northern and North-Western growth investigation areas (GIAs). Costs in the Eastern GIA could be twice as much as this, largely because of higher land costs. This compares with $2,200 ($2014) in the Ballarat West Urban Growth Area.
9. The introduction of a new growth area will attract house buyers who would otherwise have bought into Ballarat West. It is reasonable to assume that both the growth areas will be serving the same market and that any new growth area will not draw a large proportion of its customers from people who would otherwise by settling in the established residential areas (since such people would have had the choice to buy into Ballarat West). This will have the effect of slowing down development in Ballarat West as demand is split between the two growth areas. This will likely have some impact on the costs of development for Council, especially the debt holding costs as Council loans taken out to provide early infrastructure take longer to pay back.

1 INTRODUCTION

1.1 Background

The Ballarat Strategy (*Today, Tomorrow, Together*, City of Ballarat, 2015) has identified three areas for potential greenfield urban development in the medium to long term. Initiative 3.6 in the draft strategy provides for the investigation of these areas:

> *Although Ballarat has significant greenfield supply available at the moment, it is expected this supply will approach the 15-year minimum threshold before 2040 [the planning period for the strategy] as the Ballarat West Growth Area is developed. It is important to strategically assess the next phase of greenfield development after Ballarat West to identify future options.*
>
> *Over the short-to-medium term, feasibility assessments are proposed to be undertaken to identify the relative merits of medium to long term greenfield development in targeted areas meeting the "10 minute city" principle. These areas include land west of the current Ballarat West Growth Area; land to the north of the Western Freeway in the vicinity of Miners Rest; and at Warrenheip. Council will then engage with local communities to determine the range of options able to offer the greatest potential for Ballarat's long term future.*
>
> (City of Ballarat, 2015)

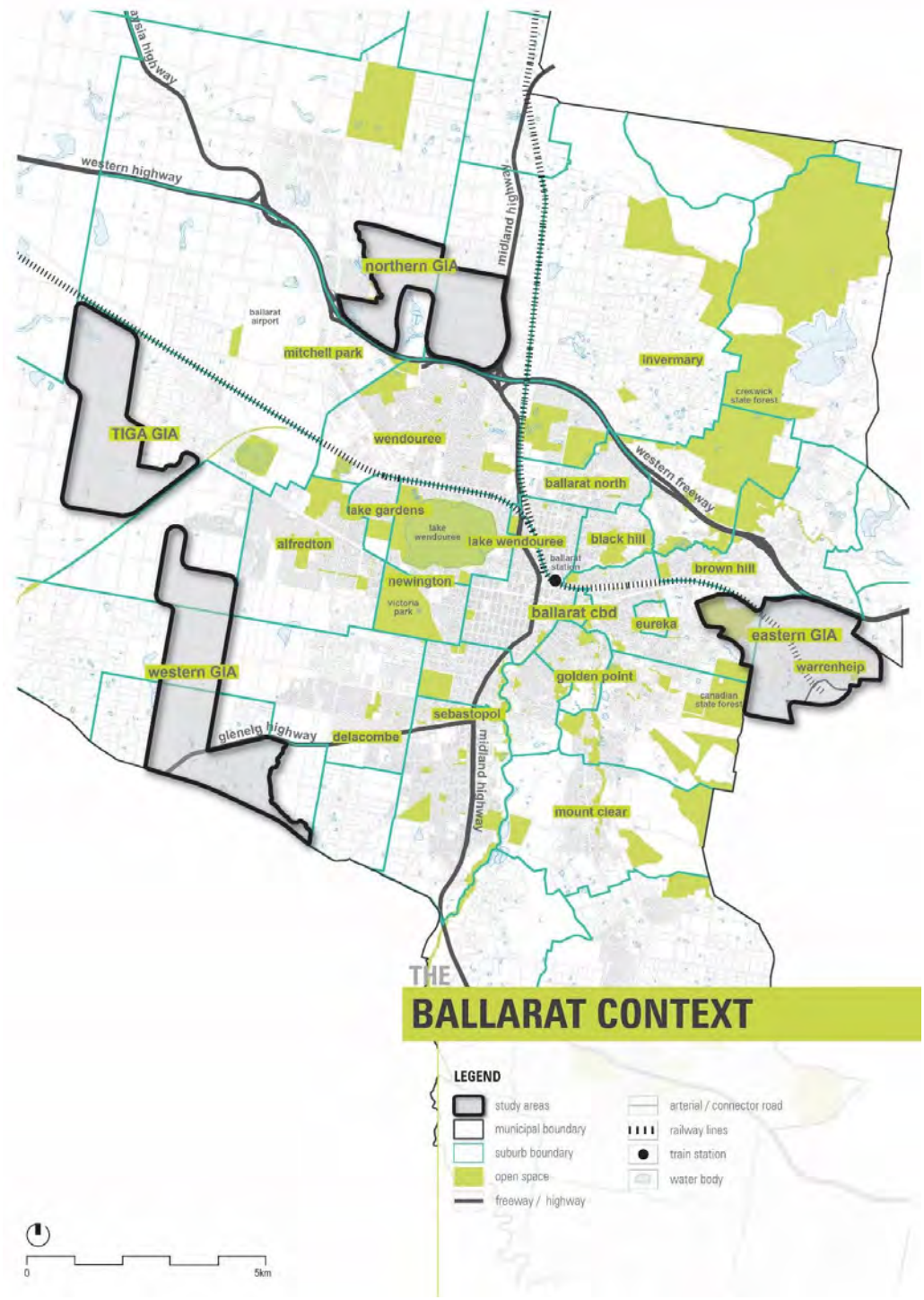
Council has commissioned a team led by Hansen Partnership to assess the potential of these three areas to become Ballarat's next greenfield development areas and to make recommendations about the need, timing and feasibility of development.

This report is part of the investigation by the Hansen Partnership team and includes an assessment of the demand for greenfield land and assesses the economic consequences for Council. It is a working paper for the Hansen Partnership and City of Ballarat and has been prepared by development economist Tim Nott.

1.2 A Further Investigation Area

The Panel Report on Amendment C194 to the Ballarat Planning Scheme recommended that a further greenfields investigation area be assessed along with the three areas identified in the Ballarat Strategy. This area, the North Western Growth Investigation Area (also known as the TIGA land), is in Cardigan to the west of Lucas and is shown in the diagram below along with the other Growth Investigation Areas. The TIGA land has a long planning history, with a series of urban development proposals that have not yet come to fruition. The land is beyond the 8km boundary from the city centre (a notional ten-minute travel time) and was therefore excluded from initial consideration as a Growth Investigation Area. However, the Panel judged that the TIGA land, only just beyond the 8km limit, did have good access to growing employment precincts and was therefore worthy of being a Growth Investigation Area.

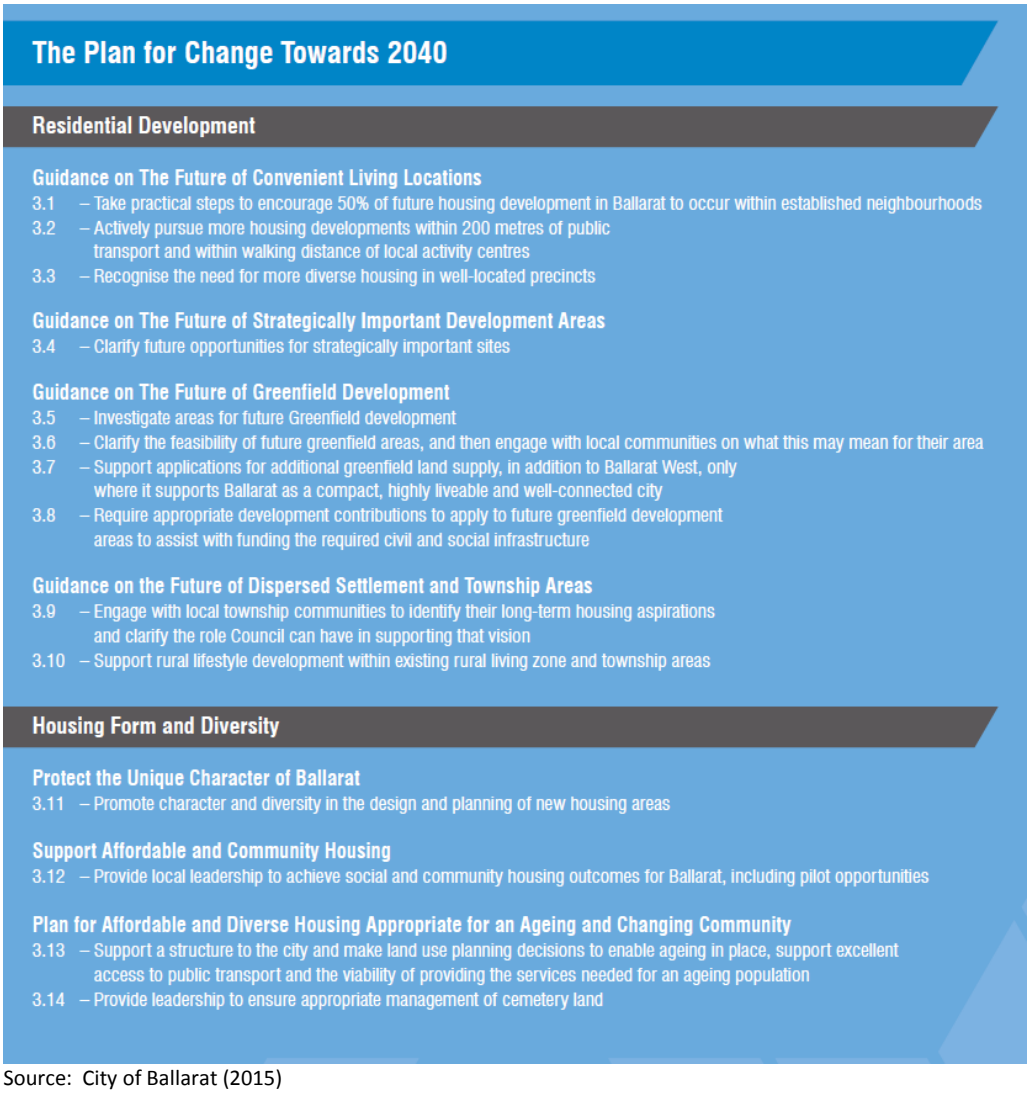
Figure 1: Ballarat's Growth Investigation Areas



Source: Hansen Partnership

1.3 Planning for Housing

The investigation of potential new greenfield development areas should be seen in context as just one of the means by which the City intends to accommodate its growing population. The Ballarat Strategy (City of Ballarat 2015) identifies a range of other policies for accommodating housing growth, as shown below.



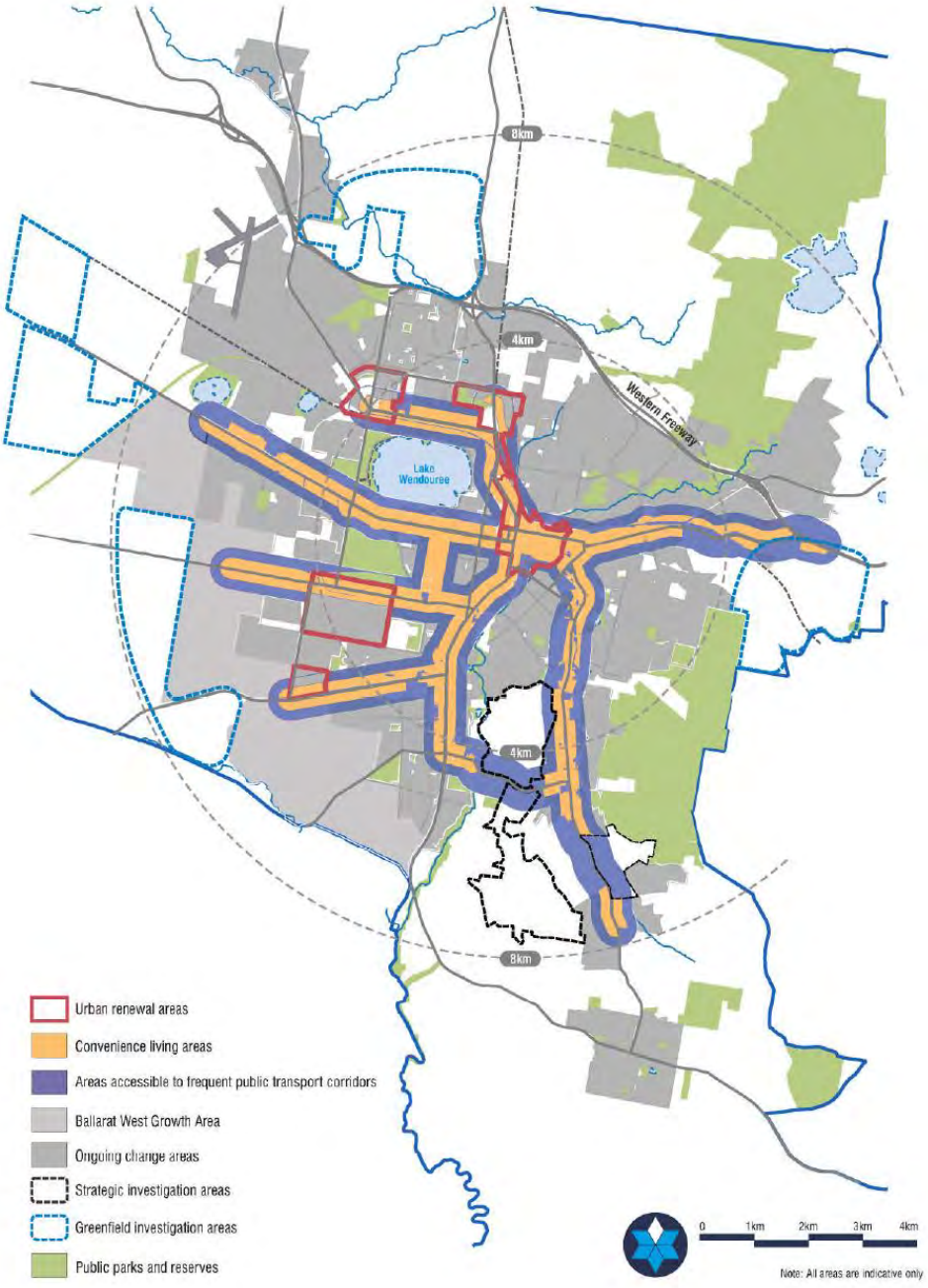
Source: City of Ballarat (2015)

The Ballarat Strategy also makes it clear that,

> "*Ballarat West and other existing greenfield development sites already zoned for housing are the priority for new greenfield housing until additional supply is required over the medium-long term*." (p125)

The priority areas are shown in the Housing Overview Map below.

Figure 2: Housing overview map (Ballarat Strategy)



Source: City of Ballarat, 2015

1.4 The Key Questions

The key questions addressed in this report are:

- When will the existing supply of housing land in the current urban growth areas be exhausted?
- When will new greenfield areas be required to accommodate demand in a timely way?
- What will be the consequences of a new growth area for Council?

The examination of these issues has relied extensively on work already completed for Council on supply and demand issues, in particular:

- *The Ballarat Housing Needs Assessment (update)*, SGS, September 2014
- *Ballarat Residential Land Supply Review*, Hill PDA, September 2013

These reports have informed the development of the draft Ballarat strategy plan.

1.5 This Report

This report is set out as follows:

- An examination of recent and forecast housing demand
- A review of infill, broadhectare and rural supply of land for housing
- Provision of a scenario of future housing development in each location
- Likely timing of the requirement for new greenfield land
- Comparison of the feasibility of developing each of the four GIAs for housing

Appendix 1 provides the housing demand scenarios developed for the report.

Appendix 2 provides an understanding of why infill development is important for meeting housing needs in the City.

Appendix 3 provides a summary of the development feasibility assessment for the four GIAs.

1.6 Definitions

Term	Meaning in this report
Broadhectare land	Extensive areas of land that can be subdivided to create many housing lots, providing the future supply of housing land mainly on the fringes of Ballarat (with the existing supply of broadhectare land identified in the report by Hill PDA); this land includes the Ballarat West Urban Growth Area
Greenfield	Broadhectare land that can be used for urban development which has not been previously developed
Greenfield Investigation Areas (GIAs)	The four areas – West, North, East & North West GIAs – nominated by Council's draft Ballarat Strategy (or by the subsequent Panel Report on Amendment C194) have potential to be extensive greenfield areas that could be subject to a precinct structure planning process to provide housing land beyond the life of the existing Ballarat West Urban Growth Area

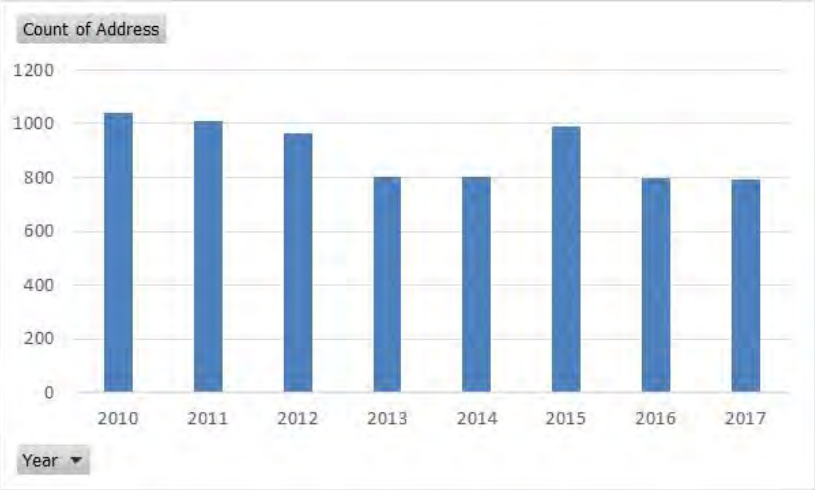
Ballarat West Urban Growth Area	Land in the Urban Growth Zone currently on the western fringes of Ballarat in the suburbs of Lucas, Alfredton, Delacombe, Bonshaw and Sebastopol

2 HOUSING DEMAND

2.1 Recent Growth in Dwellings

According to Council records analysed for this project there have been 7,191 additions to the dwelling stock in Ballarat between 2010 and 2017. The following chart provides a year-by-year count of net new dwellings.

Figure 3: Net growth in dwelling numbers in Ballarat, 2010 to 2017



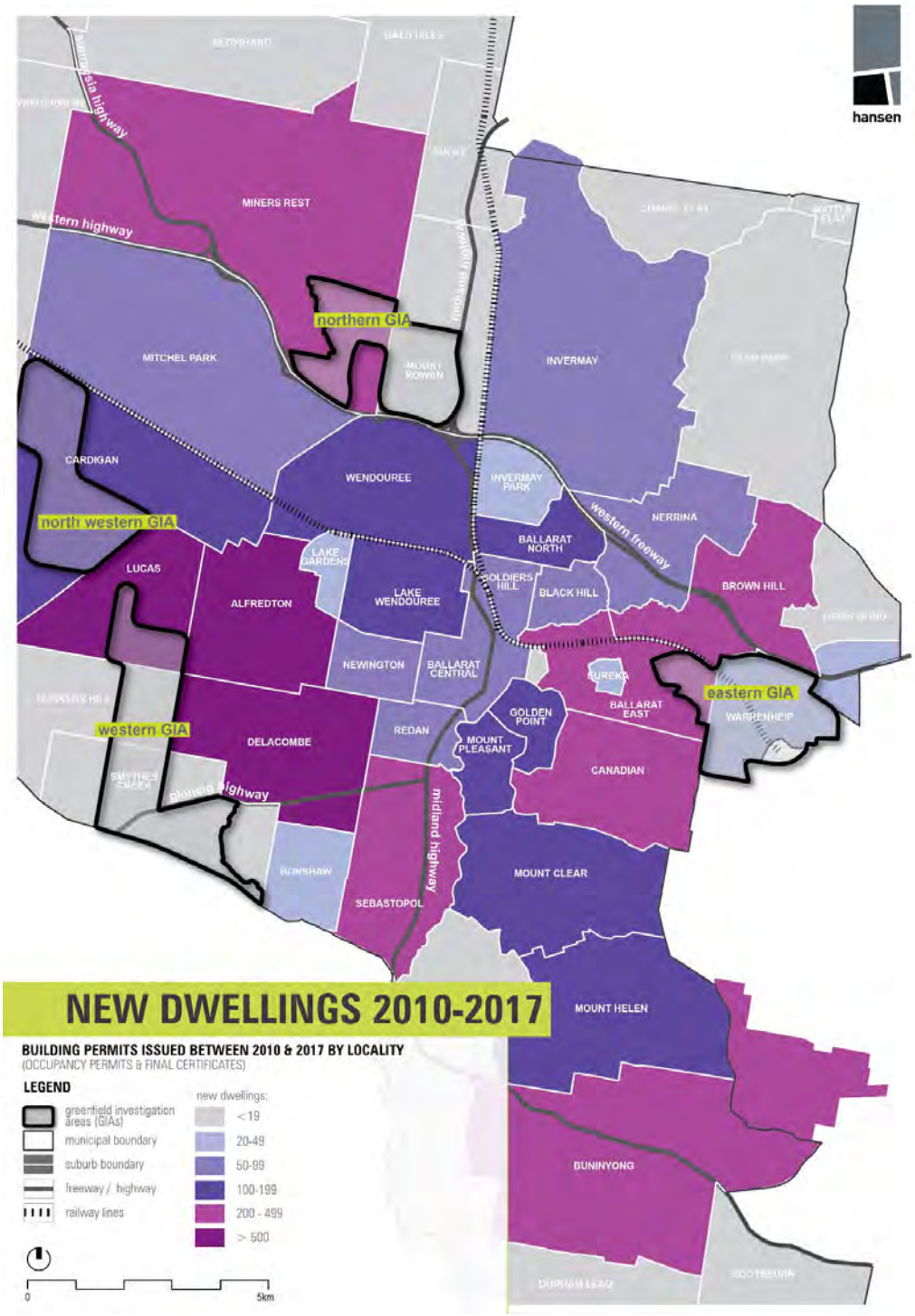
Source: Council records; excludes replacement dwellings

The average annual net increase in dwelling numbers from 2010 to 2017 was 899; from 2013 (when the Ballarat West Urban Growth Zone came on stream) to 2017 it was 836. Anecdotally, there has been a spike of new dwelling commencements in 2018 because of the introduction of the Regional First Home-Owners Grant, which provides $20,000 for first-home buyers who buy or build new homes in regional Victoria.

The housing growth was concentrated in particular suburbs around the municipality as shown in the map on the following page. The map shows:

- The suburbs of Alfredton, Delacombe and Lucas have experienced the largest growth over the period, which, along with Sebastopol, contain the Ballarat West Growth Area
- Other high growth areas include the eastern suburbs of Ballarat East, Brown Hill and Canadian, the corridor to Buninyong and the village of Miners Rest
- Central Ballarat and surrounds, with its substantial heritage areas, has had comparatively little growth over the period

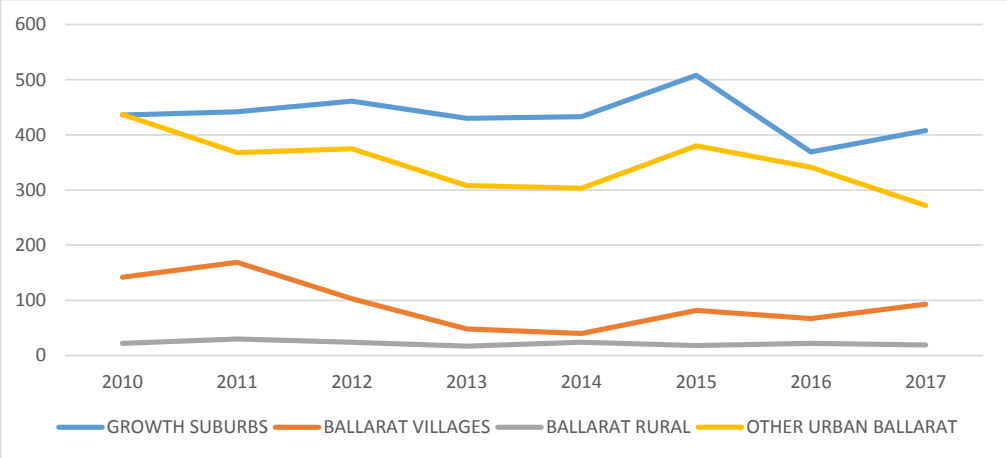
Figure 4: Location of new dwellings, 2010 to 2017



Source: Hansen Partnership with Data from Ballarat City Council

The trends over time are shown in the following chart. Suburbs have been grouped into settlement types.

Figure 5: New dwellings by suburban group, Ballarat, 2010 to 2017

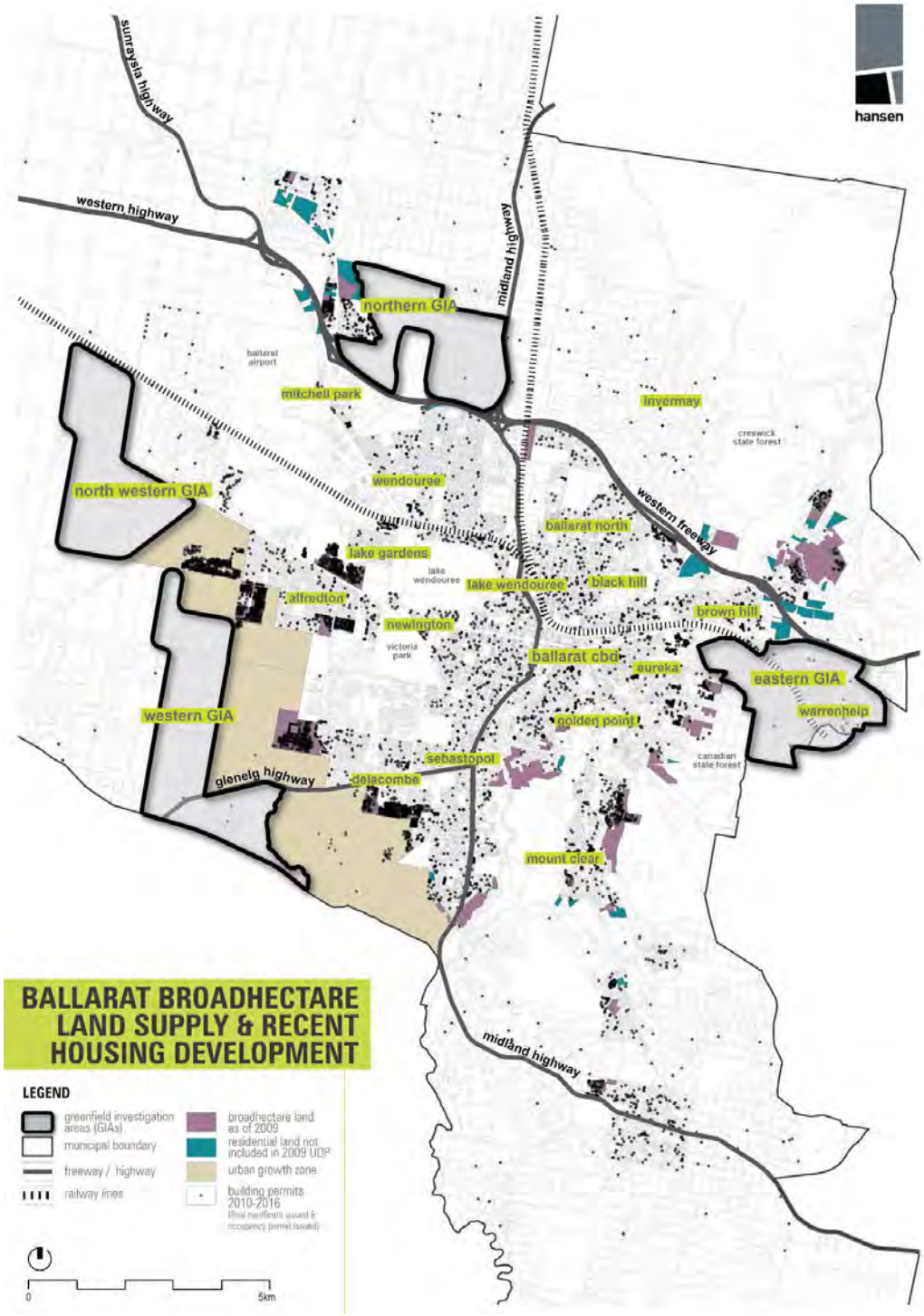


Source: Council records; Hansen Partnership; Tim Nott
Note: Growth suburbs – Alfredton, Bonshaw, Delacombe, Lucas, Smythes Creek and Winter Valley; Ballarat Villages – Buninyong, Cardigan, Cardigan Village and Miners Rest; Other urban Ballarat – Bakery Hill Ballarat Central, Ballarat East, Ballarat North, Black Hill, Brown Hill, Canadian, Eureka, Golden Point, Invermay Park, Lake Gardens, Lake Wendouree, Mitchell Park, Mount Clear, Mount Helen, Mount Pleasant, Nerrina, Newington, Redan, Sebastopol, Soldiers Hill, Wendouree; Ballarat Rural – all other locations in the City of Ballarat

The chart shows that the growth suburbs have been the largest location for new dwellings over the period, although the established suburbs and villages have also been the location of significant housing development.

More detail about the uptake of broadhectare land for housing has been developed using GIS techniques by Hansen Partnership for this project. The map on the following page shows the location of all new dwellings in Ballarat over the period 2010 to 2017. It also shows the location of the Urban Growth Zone (that is, the Ballarat West Urban Growth Area) and land identified as available broadhectare housing land by a previous study conducted for Council in 2013 by Hill PDA.

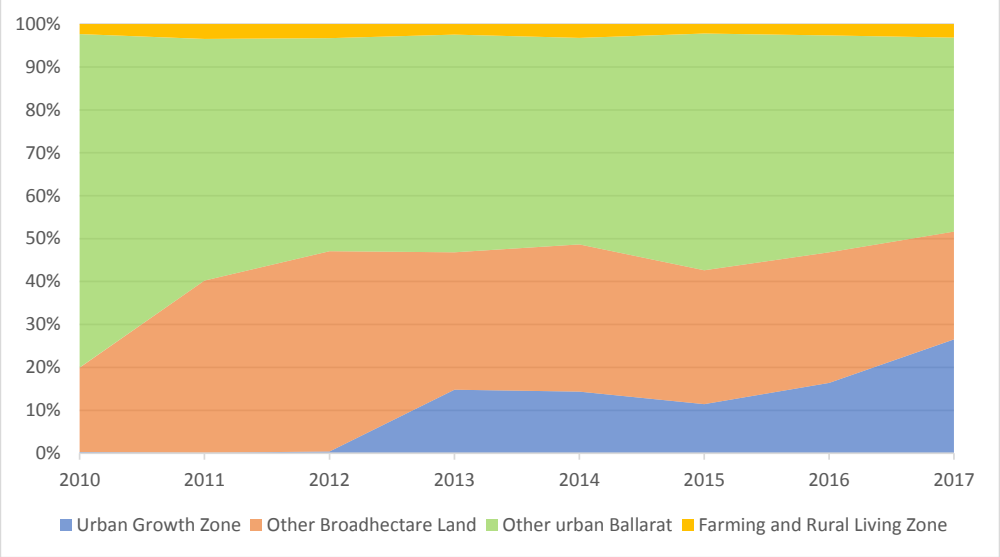
Figure 6: Dwelling construction, Ballarat, 2010 to 2017



Source: Hansen Partnership from Council Records

The share of dwellings developed on broadhectare land compared with other locations over time is illustrated in the following chart.

Figure 7: Share of dwellings on broadhectare land compared with other locations, Ballarat, 2010 to 2017



Source: Council records; Hansen Partnership; Tim Nott

Note: "Other Broadhectare Land" has been identified as available for extensive housing development in a previous study for Council by HillPDA (2013); "Other Urban Ballarat" includes dwellings in Residential Zones (including Low Density Residential Zone).

The chart shows:

- The share of dwellings on broadhectare land has been growing over the period so that by 2017, for the first time, it accommodated a majority of all new dwellings
- The Urban Growth Zone, which began to develop in 2013, has rapidly come to account for most dwellings developed on broadhectare land and in 2017 accounted for 27% of all new dwellings; the share of dwellings on other broadhectare land has declined
- The share of dwellings on existing residentially zoned land has been over 50% for much of the period, dipping to 45% in 2017
- The share of dwellings in rural areas – those in the Farming or Rural Residential Zone – has remained at 2-3% over the study period

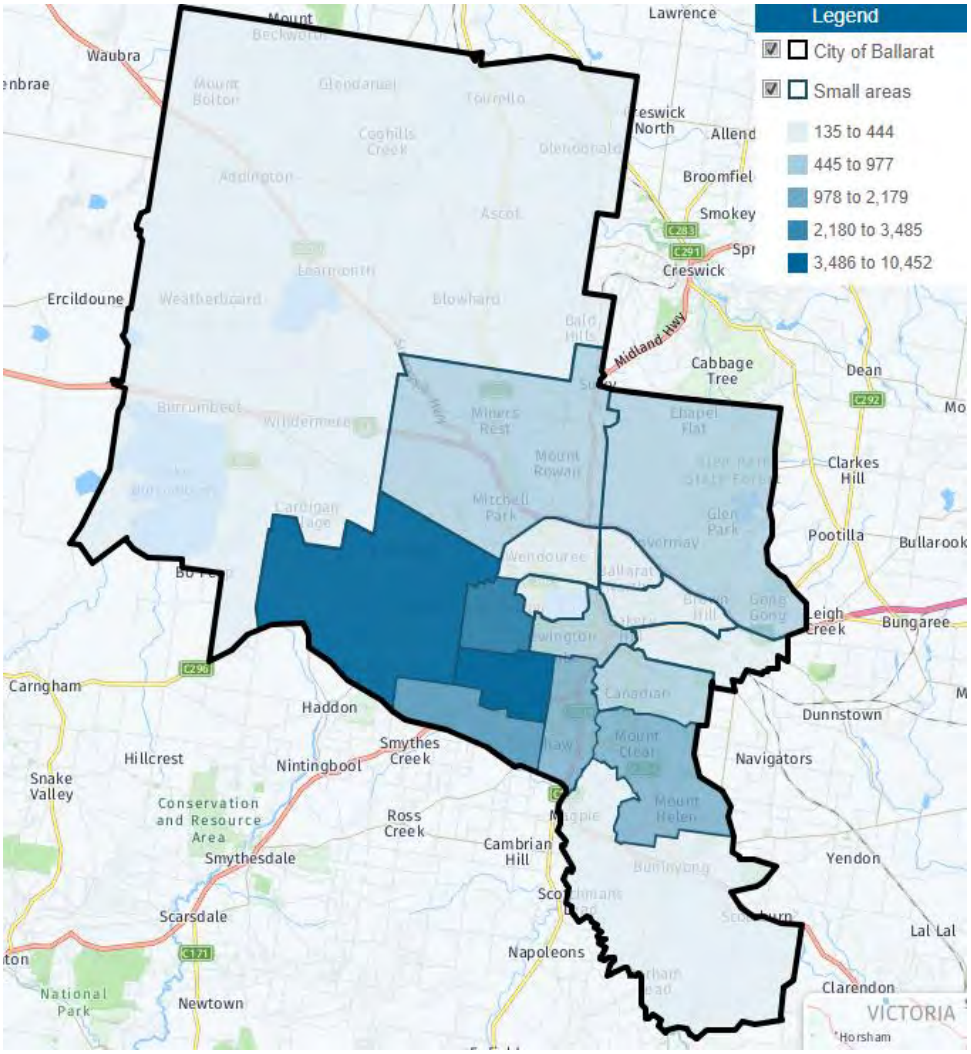
Overall it appears that the advent of the Urban Growth Zone in Ballarat West has shifted the share of development towards broadhectare land somewhat. This is to be expected given the well-organised development and promotion of the Ballarat West area, including the provision of new services and activity nodes. Nevertheless, Council's aspiration to have 50% of new dwellings in established urban areas appears reasonable because it has been achieved, at least until 2016. The map showing the location of new dwellings reveals that infill development has been scattered throughout the urban area, including the established outlying villages such as Buninyong and Miners Rest. However, the central area of Ballarat has relatively few new dwellings, likely because of the

absence of major redevelopment sites and the heritage controls that protect the attractive streetscapes.

2.2 Forecast Demand for Housing

Demand for housing in Ballarat has been forecast for Council most recently by .id consulting (2017) as part of its online population forecast. This shows that the City's population is forecast to grow by a third from 103,405 in 2016 to 144,108 by 2036. The number of dwellings is forecast to grow from 45,653 to 63,324 over the same period. The expected percentage change in dwellings for suburbs within the City of Ballarat is shown in the following diagram.

Figure 8: Forecast change in dwelling numbers, City of Ballarat, 2016 to 2036



Source: .idcommunity, 2017

This map clearly shows that the suburbs containing the Ballarat West Growth Area are expected to experience the most rapid growth in dwelling numbers.

3 HOUSING SUPPLY

3.1 Broadhectare Land

The supply of broadhectare land – that is, land in greenfield parcels capable of being subdivided to produce generally more than 10 lots and sometimes 100s or 1,000s of lots – was assessed for Council by Hill PDA (2013). Hill PDA identified a total supply of 20,500 lots, although around 3,400 of these were considered by the consultants to be subject to major constraints and were potentially doubtful.

A large part of the supply is in the Urban Growth Zone of Ballarat West.

The estimated number of lots in these parcels is shown below.

Table 1: Supply of housing lots in broadhectare land parcels, 2013

	Total potential lots		Lots without major constraints	
	Lots	share of total	lots	share of total
Urban Growth Zone	17,684	86%	14,470	85%
Other broadhectare supply	2,820	14%	2,594	15%
Total supply	20,504	100%	17,064	100%

Source: Hill PDA, 2013

3.2 Infill Opportunities

Potential locations for infill housing are scattered throughout the existing neighbourhoods of the urban area and the outlying villages, including:

- vacant lots
- houses on large lots that can be subdivided
- lots that might be suitable for unit or apartment development
- commercial sites suitable for shop-top apartments
- precincts identified in Council's housing overview as being suitable for more intensive infill development, including the urban renewal precincts (see Figure 2)

New sites for infill development become available as old activities become redundant or as buildings reach the end of their useful life. These processes ensure that a constant stream of sites for redevelopment is available. Nevertheless, given the relatively low number of new dwellings in the central areas of Ballarat over recent times, work may be required to identify how heritage can be protected whilst still allowing higher density housing forms in the area.

The level of infill will be determined to some extent by property values. In the medium-term property prices are likely to rise in comparison with construction costs and at a certain trigger level, units and apartments will become the most viable form of development for many sites in the established areas of Ballarat. Once apartment development becomes generally viable, the share of dwellings in infill locations is likely to rise significantly.

4 DEVELOPMENT SCENARIOS

4.1 Two Development Scenarios

In order to gauge the longer-term demand for broadhectare land and the timing of the requirement for future urban growth areas, two housing development scenarios have been generated for this report:

- **Scenario 1: Current Trends** is based on the dwelling forecasts generated in the .id population forecast for the City of Ballarat.
- **Scenario 2: 50% infill** meets the Council policy of achieving 50% of new dwellings in established neighbourhoods (interpreted here as existing Residential or Commercial zones but excluding land that has previously been identified as "broadhectare")

More detailed scenario results are provided in **Appendix 1**.

4.2 Scenario 1: Current Trends

In scenario 1, between 2016 and 2036, the number of additional dwellings in Ballarat is forecast by .id to be 17,671, an average of 884 per year. The forecast by .id is down to the suburb level, with the key growth area suburbs (Alfredton, Lucas, Delacombe and Bonshaw) expected to take 59% of new dwellings over the period – a much higher share than hitherto. In developing a forecast for the uptake of all identified broadhectare land, the following points have been taken into account:

- some of the growth area suburbs have extensive established areas with opportunities for infill
- many, but not all, parcels of land identified in the broadhectare supply are outside the growth suburbs

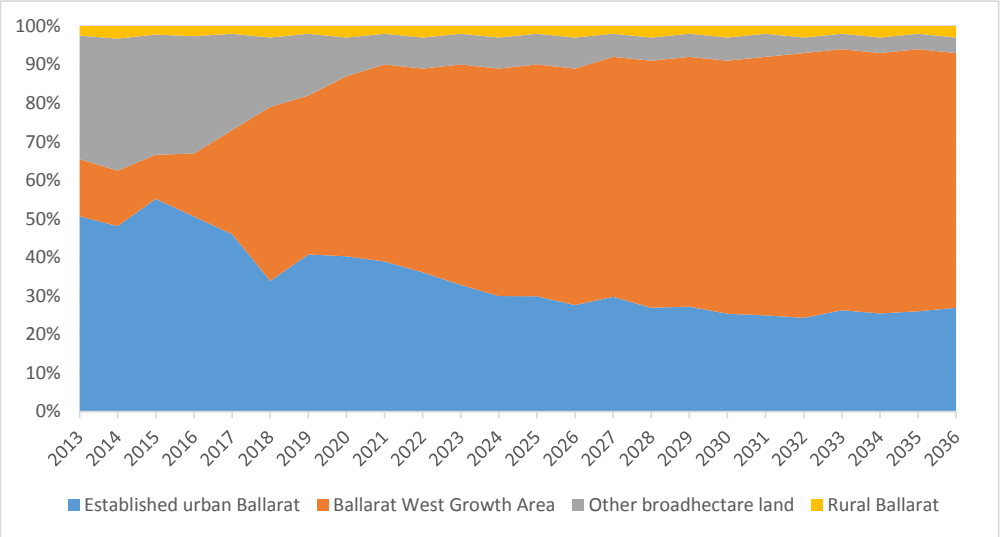
In all, this scenario suggests that a total of 66.6% of all new dwellings will be on broadhectare land over the period, 58.4% in the Urban Growth Zone and 8.2% on other broadhectare land. Given the supply of broadhectare land outside the Urban Growth Zone is relatively limited, this scenario has the share of dwellings on this land declining over the period so that by 2036, the existing supply of broadhectare land outside the Urban Growth Zone is fully consumed.

The broadhectare land supply is taken here to be the land without major constraints to development, a total of 15,878 lots in 2016 (that is, adjusting the total identified by HillPDA in 2013 to take account of lots that were consumed between 2013 and 2016). In drawing conclusions, the reader should bear in mind that the timing of demand for new greenfield areas may be conservatively short given that there may be potential to overcome the impediments to development of a further 3,400 lots in identified broadhectare sites.

The following chart illustrates the share of new dwellings forecast for each type of location in this scenario. It shows:

- The Ballarat West Growth Area rapidly becomes the biggest location for new housing and remains so from around 2021
- The share of dwellings in the other identified broadhectare sites around the city declines as the supply is consumed
- The share of new dwellings in infill locations declines from 51% in 2016 to 27% in 2036

Figure 9: Scenario 1 - share of dwellings by location, Ballarat, 2016 to 2036



Source: Tim Nott

In this scenario, guided by the current .id forecast for the location of dwellings, the Ballarat West Urban Growth Area becomes the dominant supplier of new dwellings for the expanding population of Ballarat. This will be a change from the current situation in which new dwellings are spread throughout the urban area, in infill locations and on broadhectare sites around the urban fringe. It remains to be seen whether housing consumers will demand a wider range of locations such as are available currently. Council's policy of encouraging 50% of housing in existing urban neighbourhoods will not be met, with infill development falling as low as 25% of the total in some years.

4.3 Scenario 2: 50% Infill

In scenario 2, the overall demand for housing remains the same as scenario 1 but some of the demand for new dwellings in the Ballarat West Urban Growth Area is diverted to infill development to achieve Council's policy target of 50% of new dwellings in existing neighbourhoods, with this taken to mean existing residential and commercially zoned land (including Township Zone).

The figure overleaf illustrates the outcome of this scenario. It shows:

- There is, broadly, a balance between infill development and broadhectare development over the period – continuing the balance that has previously prevailed
- Development in the Ballarat West Growth Area rapidly becomes the predominant source of dwellings on broadhectare land
- Dwellings on rural land continue to account for 2-3% of all new dwellings