

OFFICIAL

Planning Delegated Committee Meeting

Agenda

8 May 2024 at 6:30pm

**Council Chamber, Town Hall, Sturt Street,
Ballarat**



PUBLIC SUBMISSIONS

- Public representations may be made on any items listed on the agenda in a Planning Meeting apart from those listed in the confidential section.
- If you do wish to attend the meeting in person to make a submission, please fill out the [form on our website](#).
- Members of the public who wish to make a submission on an agenda item but who are unable to attend the meeting in person may make a submission in writing:
 - Submissions must be submitted in writing via the [form on our website](#) by no later than 2:00pm on the day of Planning meeting; and
 - limited to no more than 200 words that will be read out by the Chief Executive Officer or nominated delegate at the meeting prior to the matter being considered.



ORDER OF BUSINESS:

1. Acknowledgement Of Country4

2. Apologies For Absence.....4

3. Declaration Of Conflict Of Interests.....4

4. Confirmation Of Minutes.....4

5. Officer Briefing.....4

6. Planning Delegated Committee Reports5

 6.1. Extension to Interim Heritage Control for 127 Edmonston Road, Addington ‘Lintel
 Grange Homestead Complex’5

 6.2. Growth Areas Framework Plan - Informal Consultation43

7. General Business - Matters Arising From The Agenda529

8. Close529

1. ACKNOWLEDGEMENT OF COUNTRY



The City of Ballarat acknowledges the Traditional Custodians of the land we live and work on, the Wadawurrung and Dja Dja Wurrung People, and recognises their continuing connection to the land and waterways. We pay our respects to their Elders past, present and emerging and extend this to all Aboriginal and Torres Strait Islander People.

2. APOLOGIES FOR ABSENCE

3. DECLARATION OF CONFLICT OF INTERESTS

4. CONFIRMATION OF MINUTES

5. OFFICER BRIEFING

6. PLANNING DELEGATED COMMITTEE REPORTS

6.1. EXTENSION TO INTERIM HERITAGE CONTROL FOR 127 EDMONSTON ROAD, ADDINGTON 'LINTEL GRANGE HOMESTEAD COMPLEX'

Division: Development and Growth
Director: Natalie Robertson
Author/Position: Evan Burman – Principal Strategic Planner and Urban Designer

PURPOSE

1. This report provides an update on the Lintel Grange Homestead heritage amendment and highlights the need to extend the expiry date for the interim Heritage Overlay (HO232) that is in place for the property whilst the request to apply a permanent Heritage Overlay (Amendment C245ball) continues to progress.
2. Interim Heritage Overlay (HO232) will expire on 1 September 2024. It is unlikely that a Council request to the Minister for Planning to Approve Amendment C245ball (the permanent Heritage Overlay request) will be approved by the Minister for Planning prior to the lapse date of the IHO. As a result, it is necessary for Council to apply to the Minister for Planning to formally request an extension to the expiry date of the current Interim HO232. This amendment to extend the expiry date is known as Amendment C248ball. This will ensure the continued coverage and protection of the Lintel Grange Homestead under the provisions of the Heritage Overlay while the process of applying the permanent Heritage Overlay is considered and approved by the Minister for Planning.

BACKGROUND

3. At its meeting on 12 July 2023, Council resolved to request the Minister for Planning apply an interim Heritage Overlay to the Lintel Grange Homestead complex at 127 Edmonston Road, Addington under section 20(4) of the *Planning and Environment Act 1987*.
4. Amendment C241ball applied the Heritage Overlay (HO232) to part of the land at 127 Edmonston Road, Addington known as 'Lintel Grange Homestead Complex' and its curtilage, on an interim basis until 1 September 2024.



Figure 1. Heritage Overlay boundary (blue). Property boundary (yellow).

5. A separate process, Amendment C245ball, proposes to apply HO232 on a permanent basis and is currently in the planning panel stage of the amendment process, where submissions to that amendment are being considered.

KEY MATTERS

6. The Department of Transport and Planning (DTP) have advised that Amendment C245ball will not be approved and gazetted before the interim due date has expired in September 2024.
7. As a result, it is necessary that Council requests the Minister for Planning amend the schedule to the Heritage Overlay (applying to HO232 – Lintel Grange Homestead) through Planning Scheme Amendment C248ball, with a new date for expiry. This will allow the permanent controls to be considered at the planning panel, and potentially approved after September 2024.
8. A Directions hearing associated with the Independent Planning Panel for the permanent HO (Amendment C245ball), was held on 19 April 2024 at the Ballarat Town Hall which was attended by City of Ballarat staff and observed by the owner of the property. At the Panel hearing, no party had requested to be heard, and the panel noted that it had enough information for it to consider the unresolved issues and asked Council to consider a written process without the need for a full Hearing.
9. The attachments to this report have been prepared for Council endorsement, following which they will be submitted to the Minister for Planning to initiate the amendment.
10. In this case, Council can request that the Minister for Planning approves a 'prescribed amendment' under the provisions of section 20A of the *Planning and Environment Act 1987*, exempting Council from the need to exhibit the amendment.

OFFICER RECOMMENDATION

11. That the Planning Delegated Committee:

11.1 Notes that the Interim Heritage Overlay (HO232) expires on 1 September 2024, and requests that the Minister for Planning prepare and approve Planning Scheme Amendment C248ball. This amendment will extend the expiry date of the Interim Heritage Overlay that applies to the land known as 127 Edmonston Road, Addington by a further 12 months, to 1 September 2025.

11.2 Submit Amendment C248ball to the Minister for Planning and request approval of the Amendment, pursuant to Section 20A of the *Planning and Environment Act 1987* as attached.

ATTACHMENTS

1. Governance Review [6.1.1 - 2 pages]
2. Ballarat Amendment C248ball Explanatory Report [6.1.2 - 2 pages]
3. Ballarat Amendment C248ball Instruction Sheet [6.1.3 - 1 page]
4. SCHEDULE TO CLAUSE 43.01 HERITAGE OVERLAY Compare [6.1.4 - 30 pages]

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ALIGNMENT WITH COUNCIL VISION, COUNCIL PLAN, STRATEGIES AND POLICIES

1. This report aligns with Council's Vision, Council Plan, Strategies and Policies, including the following Council Plan goals:
 - a. Goal 3: A city that fosters sustainable growth
 - b. Goal 4: A city that conserves and enhances our natural and built assets

COMMUNITY IMPACT

2. The amendment will have positive social and community impacts by seeking to protect and retain identified heritage fabric which has significance importance to the course or pattern of Victoria's cultural history, demonstrating the principal characteristics of a class of cultural places and objects and special association with the life or works of a person, or group of persons, of importance in Victoria's history.

CLIMATE EMERGENCY AND ENVIRONMENTAL SUSTAINABILITY IMPLICATIONS

3. This amendment does not raise any direct climate emergency issues or environmental sustainability implications.

ECONOMIC SUSTAINABILITY IMPLICATIONS

4. There are no economic sustainability implications identified for the subject of this report.

FINANCIAL IMPLICATIONS

5. The amendment process will not have any significant financial implications to Council with the exception of the usual cost associated with the planning scheme amendment process.

LEGAL AND RISK CONSIDERATIONS

6. The amendment does not raise any legal risks or concerns of note. Section 9(1) of the Local Government Act 2020 states that a Council must - in the performance of its role - give effect to the overarching governance principles of the [Local Government] Act.
7. This includes section 2 which states that: c) the economic, social, and environmental sustainability of the municipal district, including mitigation and planning for climate change risks, is to be promoted, (d) the municipal community is to be engaged in strategic planning and strategic decision making, f) collaboration with other Councils and Governments and statutory bodies is to be sought' and, g) the ongoing financial viability of the Council is to be ensured.
8. The Planning and Environment Act 1987 (the Act) sets out the framework for the use, development, and protection of land in Victoria in the present and long-term interests of all Victorians.

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9. The amendment seeks to identify land suitable for heritage protection and manage new development through the planning scheme controls to minimise impacts to the heritage fabric of the place.
10. Divisions 1 and 2 of Part 3 of the Act set out the procedure for planning scheme amendments and the relevant provisions in relation to the notification of planning scheme amendments including the process for public submissions and the consideration of those submissions by the planning authority or an appointed panel. The recommendations set out in this report are consistent with the Act.

HUMAN RIGHTS CONSIDERATIONS

11. It is considered that the report does not impact on any human rights identified in the *Charter of Human Rights and Responsibilities Act 2006*.

COMMUNITY CONSULTATION AND ENGAGEMENT

12. Amendment C245ball, which proposes permanent heritage controls, was exhibited in accordance with the Act which includes a requirement to give notice to all affected landowners, occupiers and prescribed Ministers, notices in the local newspapers and the Victorian Government Gazette.
13. This proposed amendment (C248ball) does not require community consultation and engagement and is administrative in nature.

GENDER EQUALITY ACT 2020

14. There are no gender equality implications identified for the subject of this report.

CONFLICTS OF INTEREST THAT HAVE ARISEN IN PREPARATION OF THE REPORT

15. Council officers affirm that no general or material conflicts need to be declared in relation to the matter of this report.

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Planning and Environment Act 1987

BALLARAT PLANNING SCHEME
AMENDMENT C248BALL
EXPLANATORY REPORT

Who is the planning authority?

This amendment has been prepared by the Minister for Planning.
The amendment has been made at the request of the Ballarat City Council.

Land affected by the amendment

The land affected by the amendment is part of 127 Edmonston Road, Addington (Figure 1), including the curtilage.

The site is in the Farming Zone (FZ) and the Environmental Significance Overlay Schedule 3 - Water Catchments (ESO3) applies to the entirety of the site.



Figure 1. Heritage Overlay boundary (blue). Property boundary (yellow).

What the amendment does

The Amendment extends the expiry date of interim Heritage Overlay HO232 applying to the property known as the Lintel Grange Homestead at 127 Edmonston Road, Addington to 1 September 2025.

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Specifically, the amendment makes the following change to the Ballarat Planning Scheme:

- Amend the Schedule to Clause 43.01 Heritage Overlay to amend the expiry date of interim HO232 applying to the Lintel Grange Homestead at 127 Edmonton Road, Addington from 1 September 2024 to 1 September 2025.

Prescribed amendment

The amendment is a prescribed class of amendment listed in regulation 8 of the Planning and Environment Regulations 2015. The amendment has been prepared under section 20A of the Planning and Environment Act 1987 (the Act).

Under the prescribed classes as set out in regulation 9A(1), the amendment meets the following:

(p) an amendment to extend the expiry of a clause in the Victoria Planning Provisions or a planning scheme for a period of 12 months or less, beginning on the day the amendment takes effect, if notice has been published in accordance with section 19(3) of the Act of the preparation of an amendment to introduce a clause that is similar or substantially the same.

Exhibition and notification requirements of sections 17, 18 and 19 of the Act do not apply in respect of this amendment.

Where you may inspect this amendment

The amendment is available for public inspection, free of charge, during office hours at the following places:

City of Ballarat
Phoenix Building
25 Armstrong Street South
Ballarat Central VIC 3350

The amendment can also be inspected free of charge at the Department of Transport and Planning website at <http://www.planning.vic.gov.au/public-inspection> or by contacting the office on 1800 789 386 to arrange a time to view the amendment documentation.

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Planning and Environment Act 1987

BALLARAT PLANNING SCHEME

AMENDMENT C248ball

INSTRUCTION SHEET

The planning authority for this amendment is the Minister for Planning.

The Ballarat Planning Scheme is amended as follows:

Planning Scheme Ordinance

The Planning Scheme Ordinance is amended as follows:

1. In **Overlays** – Clause 43.01, replace Schedule with a new Schedule in the form of the attached document.

End of document

BALLARAT PLANNING SCHEME

28/02/2019
GC117

SCHEDULE TO CLAUSE 43.01 HERITAGE OVERLAY

1.0

Application requirements

28/02/2019
GC117

None specified.

2.0

Heritage places

06/09/2023
G244ball

The requirements of this overlay apply to both the heritage place and its associated land.



PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO1	Lauderdale 7 Prince Street, Alfredton	-	-	-	-	-	Yes Ref No H486	No	No
HO2	Beaufort House 9a Beaufort Avenue, Alfredton	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO5	Ebenezer Presbyterian Church and Hall 212 Armstrong Street South, Ballarat Central	Yes	Yes	No	Yes	Yes - cast iron fence	No (On National Estate Register)	No	No
HO6	Former Ebenezer Manse 214 Armstrong Street South, Ballarat Central	Yes	Yes	No	Yes	Yes - cast iron fence	No	No	No
HO8	Synagogue 2-4 Barkly (Cnr Princes Street), Ballarat East	-	-	-	-	-	Yes Ref No H106	No	No
HO9	Former Ballarat East Free Library	-	-	-	-	-	Yes	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	25-29 Barkly Street, Ballarat East						Ref No H1493		
HO10	Lamp Post Barkly Street and East Street Intersection, Ballarat East and Bakery Hill	Yes	No	No	Yes	No	No	No	No
HO11	Ballarat East Fire Station 20-22 Barkly Street, Ballarat East	-	-	-	-	-	Yes Ref No H1001	No	No
HO12	Clowance 518 Barkly Street (Cnr Cameron Street), Golden Point	-	-	-	-	-	Yes Ref No H1898	No	No
HO13	Ballarat Botanical Gardens Gillies Street and Wendouree Parade, Lake Wendouree	-	-	-	-	-	Yes Ref No H2252	Yes	No
HO16	North View Villa 108 Burnbank Street, Lake Wendouree	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO17	Former Police Station, Ballarat 15 Camp Street, Ballarat Central	-	-	-	-	-	Yes Ref No H1544	No	No
HO18	Former Court House Camp Street, Ballarat Central	Yes	Yes	No	Yes	No	No	No	No
HO20	Ballarat Trades Hall	-	-	-	-	-	Yes Ref No H657	No	No

BALLARAT PLANNING SCHEME

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	24 Camp Street, Ballarat Central								
HO21	Terraces 30-32 Camp Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO22	Colemans Spring and adjacent land 102 Caffrey Street and 201-203 Herriott Street, Buninyong	Yes for all	Refer specific area	Refer specific area	Yes	Refer specific area	No	Refer specific area	No
HO23	Former Ranger Barracks 1-61 Curtis Street, Ballarat Central	-	-	-	-	-	Yes Ref No H1949	No	No
HO24	Former South British Insurance Co. Ltd. 211 Dana Street (cnr Armstrong Street South), Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO25	Dana House, Former hostel 506 Dana Street (cnr Lyons Street South), Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO26	Primary School No. 33 Dana Street Primary School 401 Dana Street, Ballarat Central	-	-	-	-	-	Yes Ref No H1714	Yes	No
HO27	Former Wesleyan Church and Sunday School	-	-	-	-	-	Yes	Yes	No

BALLARAT PLANNING SCHEME

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	101 Dana Street (Cnr Lydiard Street), Ballarat Central						Ref No H1089		
HO28	Former Chapter House 102 Dana Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO29	Ballarat Club 203 Dana Street, Ballarat Central	Yes	Yes	No	Yes	No	No	No	No
HO30	Yarrowee Hall 1 Darling Street, Redan	-	-	-	-	-	Yes Ref No H1168	No	No
HO31	Former Congregational Church and Hall Dawson Street North and 503 Mair Street, Ballarat Central	-	-	-	-	-	Yes Ref No H995	Yes	No
HO32	Former Baptist Church 9/3 Dawson Street South, Ballarat Central	-	-	-	-	-	Yes Ref No H107	No	No
HO33	Lutheran Church 204A Doveton Street South, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO36	St John of God Hospital (Bailey's House) Drummond Street North, Lake Wendouree	Yes	No	No	Yes	Yes - fence	No	No	No
HO37	House	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

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	217 Drummond Street South, Ballarat Central								
HO38	Former Ballarat-Buninyong Railway Land between Elizabeth and Forest Streets, Buninyong	Yes for all	Refer specific area	Refer specific area	Yes	Refer specific area	No	Refer specific area	No
HO39	Montrose Cottage 111 Eureka Street, Ballarat East	-	-	-	-	-	Yes Ref No H108	Yes	No
HO40	House 1104 Eyre Street, Newington	Yes	No	No	Yes	No	No	No	No
HO41	Former Water and Sewerage Authority Office 6 Grenville Street South (Lots 1-4 on PS 544004H) (South Western Cnr Grenville and Lewis Streets), Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO42	Manchester Unity Hall 9 Grenville Street South, Ballarat Central	Yes	Yes	No	Yes	No	No	No	No
HO43	Former Protestant Hall 10 Grenville Street South, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO44	Former Ballarat Woollen & Worsted Mill 14 Hill Street (Cnr Humffray Street South), Mount Pleasant	Yes	No	No	Yes	No	No (On National Estate Register)	No	No

BALLARAT PLANNING SCHEME

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HO45	Former Myer Woollen Mills 502 Howitt Street, Ballarat North	Yes	No	No	Yes	No	No	No	No
HO46	Former Methodist Church 116-118 Humffray Street North, Brown Hill	Yes	No	No	Yes	No	No	No	No
HO48	House 328 Ligar Street, Soldiers Hill	Yes	No	No	Yes	No	No	No	No
HO50	Christ Church Anglican Cathedral & Christ Church Hall 49 and 49A Lydiard Street South, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO53	Gas Lamps In front of 10-16 Lydiard Street South and outside Craig's Royal Hotel, Ballarat Central	-	-	-	-	-	Yes Ref No H977	No	No
HO54	Ballarat School of Mines (Federation University Australia) 107 Lydiard Street South, Ballarat Central	-	-	-	-	-	Yes Ref No H1463	No	No
HO57	Former Ballarat Post Office 2-6 Lydiard Street North (NE Cnr Lydiard Street North and Sturt Street), Ballarat Central	-	-	-	-	-	Yes Ref No H1018	Yes	No
HO59	Ballarat Railway Complex	-	-	-	-	-	Yes Ref No H902	Yes	No

BALLARAT PLANNING SCHEME

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	140 Lydiard Street North, Ballarat Central, 75 Humffray Street North, Bakery Hill, 60 Corbett Street, Ballarat East, 202 Lydiard Street North, Soldiers Hill, Scott Parade, Ballarat East and Nolan Street, Soldiers Hill.								
HO62	Former National Mutual Building 2 Lydiard Street South, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO63	Former National Bank of Australasia 5 Lydiard Street North, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO64	Former Union Bank Building 4-6 Lydiard Street South, Ballarat Central	-	-	-	-	-	Yes Ref No H109	No	No
HO65	Former Mining Exchange 8-14 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H391	Yes	No
HO66	Former ANZ (also known as ES&A) Bank 9 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H110	No	No
HO67	Craig's Royal Hotel 10-16 Lydiard Street South, Ballarat Central	-	-	-	-	-	Yes Ref No H111	No	No

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HO68	Former Bank of New South Wales 13 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H112	No	No
HO69	Old Colonists Association 16-24 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H116	Yes	No
HO70	Her Majesty's Theatre Royal South Street Memorial Theatre, Academy of Music 17 Lydiard Street South, Ballarat Central	-	-	-	-	-	Yes Ref No H648	Yes	No
HO71	George Hotel 25 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H113	No	No
HO72	Alexandria Tea Rooms 26-34 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H115	Yes	No
HO73	Counsel Chambers 26 Lydiard Street South, Ballarat Central	Yes	Yes	No	Yes	No	No	No	No
HO74	Furnival Chambers 28-36 Lydiard Street South, Ballarat Central	Yes	Yes	No	Yes	No	No	No	No
HO75	Chancery House 38 Lydiard Street South, Ballarat Central	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

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HO76	Fine Art Gallery, Ballarat 38-48 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H680	No	No
HO77	Former Neil W Jones Real Estate 50 Lydiard Street South, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO78	Land 53 Lydiard Street South, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO79	Shop 60 Lydiard Street North, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO80	Office (Former Union Trustee Building) 101-103 Lydiard Street North, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO81	Former J J Goller & Co 114 Lydiard Street North, Ballarat Central	Yes	Yes	No	Yes	No	No	No	No
HO82	Former Warehouse 118 - 122 Lydiard Street North, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO83	Provincial Hotel 121 Lydiard Street North (Cnr Ararat Street), Ballarat Central	-	-	-	-	-	Yes Ref No H432	No	No

BALLARAT PLANNING SCHEME

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HO84	Former Reid's Coffee Palace 128 Lydiard Street North, Ballarat Central	-	-	-	-	-	Yes Ref No H469	Yes	No
HO85	St Patrick's Presbytery (3 Lyons Street South, Ballarat Central), and O'Collins Hall (8 Dawson Street South, Ballarat Central)	Yes	No	No	Yes	No	No	No	No
HO86	Ballarat Terrace 227-231 Lydiard Street North, Soldiers Hill	Yes	No	No	Yes	Yes - front fences	No	No	No
HO87	Former Terrace 18-20 Lyons Street South, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO88	Ballarat Municipal Observatory 439 Cobden Street (Cnr Magpie Street), Mount Pleasant	-	-	-	-	-	Yes Ref No H936	Yes	No
HO89	Former Pratt's Warehouse 101-103 Mair Street (Cnr Camp Street), Ballarat Central	-	-	-	-	-	Yes Ref No H955	No	No
HO90	House 505 Mair Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO91	Verandah and Shop 805 Mair Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO92	Aquinas College 1200 Mair Street, Lake Wendouree	Yes	No	Yes	Yes	No	No	No	No
HO93	Former Titheridge and Growcott 15-19 Main Road, Bakery Hill	Yes	No	No	Yes	No	No	No	No
HO94	Ballarat East Post Office 21 Main Road, Bakery Hill	Yes	No	No	Yes	Yes	No	No	No
HO95	Nazareth House 218 Mill Street, Lake Wendouree	Yes	Yes	No	Yes	Yes - fence	No	No	No
HO96	House 411A Neill Street, Soldiers Hill	Yes	No	Yes	Yes	Yes - lantern	No	No	No
HO97	Cemetery, Chinese Section, Alter 1250 Doveton Street North, Invermay Park	Yes	No	No	Yes	No	No	No	No
HO98	Cemetery, Chinese Section, Oven 1250 Doveton Street North, Invermay Park	Yes	No	No	Yes	No	No	No	No
HO100	Old Curiosity Shop 7 Queen Street, Ballarat East	-	-	-	-	-	Yes Ref No H1982	No	No
HO101	House	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	14 Seymour Crescent, Soldiers Hill								
HO102	House 16 Seymour Crescent, Soldiers Hill	Yes	No	No	Yes	Yes - fence, retaining wall and plinth	No	No	No
HO104	Ballarat Town Hall 225 Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H978	Yes	No
HO105	Titanic Memorial Bandstand Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H971	No	No
HO106	Queen Alexandra Bandstand Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H972	No	No
HO107	St Patrick's Cathedral & Hall 501 Sturt Street, south-west corner of Dawson Street, Ballarat Central	-	-	-	-	-	Yes Ref No H997	No	No
HO108	Grandstand City Oval, 1402-1406 Sturt Street, Lake Wendouree	Yes	Yes	No	Yes	No	No (On National Estate Register)	No	No
HO109	Union Hotel 11 Sturt Street, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO110	Former The Log Tavern	Yes	Yes	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

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	23 Sturt Street, Ballarat Central								
HO111	Camp Hotel 36-38 Sturt Street, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO112	Former Chamber of Commerce 42-46 Sturt Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO113	Former State Savings Bank 48 Sturt Street, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO114	Ballaarat Mechanics Institute 113-121 Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H987	Yes	No
HO115	Former Unicorn Hotel façade and verandah 127 Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H1911	No	No
HO116	Former ANZ Bank 200-202 Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H114	No	No
HO117	Myer (Mitchell's Building) 301-305 Sturt Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO118	St Andrews Uniting Church 502 Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H44	No	No
HO119	Former Broadwood Flats 608-608A Sturt Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO120	Former Ballarat City Fire Station 702 Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H2236	Yes	No
HO121	House 704 Sturt Street, Ballarat Central	Yes	No	No	Yes	Yes - fence, coach house/stable	No (On National Estate Register)	No	No
HO122	Former Residence 802 Sturt Street, Ballarat Central	-	-	-	-	-	Yes Ref No H529	Yes	No
HO123	St Peter's Church of England 1307 Sturt Street, Ballarat Central	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO124	House and Garden 1421 Sturt Street, Newington	Yes	No	Yes	Yes	Yes - fence	No (Garden on National Estate Register)	No	No
HO125	Former Bishop's Palace	-	-	-	-	-	Yes	Yes	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	1444 Sturt Street, Lake Wendouree						Ref No H413		
HO126	Former Mary's Mount Convent (Loreto Abbey) 1600 Sturt Street, Lake Wendouree	-	-	-	-	-	Yes Ref No H1017	Yes	No
HO127	Former Primary School 602 Urquhart Street, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO129	Terrace Houses 21, 23, 25 Victoria Avenue, Lake Wendouree	Yes	No	No	Yes	No	No	No	No
HO131	House and garden 111 Webster Street, Lake Wendouree	Yes	No	Yes	Yes	No	No (Garden on National Estate Register)	No	No
HO132	Lakeview Hotel 22 Wendouree Parade, Lake Wendouree	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO133	Ballantrae 7208 Midland Hwy, Buninyong	-	-	-	-	-	Yes Ref No H551	No	No
HO134	Buninyong Town Hall and Court House 313 Learmonth Street, Buninyong	-	-	-	-	-	Yes Ref No H758	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO135	Former Library 408 Warrenheip Street, Buninyong	-	-	-	-	-	Yes Ref No H488	No	No
HO136	Former Primary School No. 668 456 Remembrance Drive (Cnr Draffins Road), Windermere	-	-	-	-	-	Yes Ref No H763	No	No
HO137	Former Ballarat Shire Hall 326 High Street, Learmonth	Yes	Yes	No	Yes	No	No (On National Estate Register)	No	No
HO138	Barnfield Cottage and Barn 195 Kennedys Road, Miners Rest	No	No	No	Yes	No	No (On National Estate Register)	No	No
HO139	Progress Hall (Former Methodist Church) 24 Church Street (Cnr Hillcrest Road), Nerrina	Yes	No	No	Yes	No	No (On National Estate Register)	No	No
HO140	St James Church of England 120 Hillcrest Road, Nerrina	Yes	No	No	Yes	No	No	No	No
HO141	Primary School No. 2093 Little Bendigo State School 30 Monte Street, Nerrina	-	-	-	-	-	Yes Ref No H1632	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO142	Former St Joseph's Orphanage 208-240 Grant Street (Crown Allotments 2, 3 & 4, Section 35, Township of Sebastopol), Sebastopol	Yes, All face brick and stone buildings	Yes, ground floor entrance and stair hall (north end) and central passage of the former Orphanage building (building 2)	Yes, Front garden setting include the fir trees, and the rear cypress and pine trees forming part of the setting to the lake	Yes	Yes	No	No	No
HO143	Yuille Cairn, Yuille Station Park, 37 Vickers Street, Sebastopol	Yes, Yuille Cairn only	No	No	Yes	No	No	No	No
HO144	MUIOOF(Manchester Unity Independent Order of Oddfellows) Lodge (former Southern Star Mine Office), 113 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO145	Sebastopol State School No. 1167 (former), 185-187 Yarrowee Street, Sebastopol	Yes	No	Yes, English Oaks, English Elms, Bhutan Cypress boundary plantings	Yes	No	No	No	No
HO149	Olympic Rings Lake Wendouree Foreshore, Lake Wendouree	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO151	Gnarr Creek Air Vent Tower Corner Creswick Road and Doveton Street North, Ballarat Central	Yes	No	No	Yes	No	No	No	No
HO153	Old Ballarat Cemetery 904 Macarthur Street (Cnr Creswick Road), Lake Wendouree	Yes	No	No	Yes	No	No	No	No
HO154	Avenue of Honour and Arch of Victory Including all memorial name plaques, the Memorial Cairn and Cross of Remembrance, the Memorial Rotunda and Roll of Honour, and the Memorial Wall. Ballarat-Burrumbeet Road, Alfredton, Cardigan, Windermere, Weatherboard, Burrumbeet and Lucas.	-	-	-	-	-	Yes Ref No H2089	No	No
HO155	Stone Mileposts Glenelg Highway (between Ballarat and Scarsdale), Smythes Creek and Delacombe	-	-	-	-	-	Yes Ref No H1701	No	No
HO156	Former Redemptorist Monastery	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	300 and 300B Gillies Street North, 1320 and 1322 Howitt Street, and 11-37 Monastery Drive (NE Corner Howitt and Gillies Streets), Wendouree								
HO157	House 301 Wendouree Parade, Lake Wendouree	Yes	No	No	Yes	No	No	No	No
HO158	Buninyong Botanic Gardens Gong Reservoir 201-209 Scott Street and 705 Inglis Street, Buninyong	-	-	-	-	-	Yes Ref No H1826	No	No
HO159	Former Female Refuge Complex 183 Scott Parade, Ballarat East	-	-	-	-	-	Yes Ref No H1893	No	No
HO160	Eureka Historic Precinct 501-525 Eureka Street, Eureka	-	-	-	-	-	Yes Ref No H1874	No	No
HO161	Ballarat High School 25 Gillies Street North (Cnr Sturt Street West), Lake Gardens	-	-	-	-	-	Yes Ref No H1797	No	No
HO162	House 108 Pleasant Street North, Lake Wendouree	Yes	No	No	Yes	No	No	No	No
HO163	Lake Wendouree Heritage Precinct	No	No	Yes	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	Incorporated plan: Ballarat Planning Scheme Heritage Control 2004								
HO164	West Ballarat Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO165	Victoria Park Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO166	Central Ballarat Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO167	Sturt Street Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	Yes	No	Yes	Yes	No	No	No	No
HO168	South Ballarat Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO169	Waller Estate Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO170	Soldiers Hill Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO171	Lydiard Street Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	Yes	No	Yes	Yes	No	No (Ballarat Central Conservation Area on National Estate Register)	No	No
HO172	Creeks and River Channels Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO173	Mount Pleasant / Golden Point Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO174	Black Hill Heritage Precinct	No	No	Yes	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	Incorporated plan: Ballarat Planning Scheme Heritage Control 2004								
HO175	Humffray Street Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO176	Bridge Mall / Bakery Hill Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	Yes	No	Yes	Yes	No	No	No	No
HO177	Victoria Street Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	Yes VAHR 7622-0186
HO178	Ballarat East Civic Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO179	Eureka Street Heritage Precinct Incorporated plan:	No	No	Yes	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	Ballarat Planning Scheme Heritage Control 2004								
HO180	Learmonth Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	No	No	Yes	Yes	No	No	No	No
HO181	Buninyong Heritage Precinct Incorporated plan: Ballarat Planning Scheme Heritage Control 2004	Yes	No	Yes	Yes	No	No	No	No
HO182	Eureka Memorials, Old Ballarat Cemetery 904 Macarthur Street (cnr Creswick Road), Ballarat Central	-	-	-	-	-	Yes Ref No H1007	No	No
HO183	St Aidan's Heritage Precinct Incorporated plan: Ballarat Heritage Precincts Study Part A 2006	No	No	Yes	Yes	No	No	No	No
HO184	Colpin Avenue Heritage Precinct Incorporated plan: Ballarat Heritage Precincts Study Part A 2006	No	No	Yes	Yes	No	No	No	No
HO185	Dowling Street Heritage Precinct Incorporated plan:	No	No	Yes	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	Ballarat Heritage Precincts Study Part A 2006								
HO186	Old Showgrounds Heritage Precinct Incorporated plan: Ballarat Heritage Precincts Study Part A 2006	No	No	Yes	Yes	No	No	No	No
HO187	Creswick Road/Macarthur Street Heritage Precinct Incorporated plan: Ballarat Heritage Precincts Study Part A 2006	No	No	Yes	Yes	No	No	No	No
HO188	Barkly Street/Humffray Street South Heritage Precinct Incorporated plan: Ballarat Heritage Precincts Study Part A 2006	No	No	Yes	Yes	No	No	No	No
HO189	Scar Tree Lot S2 Cuthberts Road, Alfredton	No	No	Yes	Yes	No	No	No	Yes
HO190	Former Ballarat RAAF Base 1 Airport Access Road, Mitchell Park	-	-	-	-	-	Yes Ref No H2113	Yes	No
HO191	St Pauls Anglican Church 3 Humffray Street South, Bakery Hill	-	-	-	-	-	Yes Ref No H401	Yes	No
HO192	Regent Picture Theatre	-	-	-	-	-	Yes	Yes	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	49 Lydiard Street North, Ballarat Central						Ref No H2221		
HO194	Former Prince of Wales & Bonshaw Company gold mining site and residence 362 Albert St, Sebastopol	No	No	No	Yes	No	No	No	No
HO195	Former St. James Presbyterian Church 10 Creswick Street, Miners Rest	Yes	No	No	Yes	No	No	Yes	No
HO196	Selkirk House 436 Wendouree Parade, Ballarat	Yes	No	No	Yes	No	No	No	No
HO197	Gateway and curtilage including two mature trees (elm trees), driveway and four mature trees (three elm trees and a pine tree) Arranmore, Howe Street, Miners Rest	Yes	No	Yes	Yes	No	No	No	No
HO198	House 'Edale', 99 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO199	Clontarn (former Southern Star Mine Managers Residence), 122 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO200	Sebastopol Post Office (former), 176 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO201	Melbourne House store, 186A Albert Street, Sebastopol	Yes	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO202	Bank of Victoria (former), 197 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO203	Holy Trinity Church Complex (Church, Hall, Sunday School and trees), 227 Albert Street, Sebastopol	No	No	Yes 2 English Elms on rear property boundary	Yes	No	No	No	No
HO204	Ballarat South Uniting Church Mission Centre, 104-6 Albert Street, Sebastopol	No	No	No	Yes	Yes, low brick front fence and iron gates	No	No	No
HO205	Masonic Lodge, 173-175 Albert Street, Sebastopol	Yes	No	No	Yes	No	No	No	No
HO206	Sebastopol Town Hall Complex, 183-185 Albert Street, Sebastopol	No	No	Yes, English Elm fronting Wilson Lane	Yes	No	No	No	No
HO207	Row of 1920s Shops, 206, 206a-c Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO208	Carmel Welsh Presbyterian Church Complex, including former manse and trees, 261-265 Albert Street, Sebastopol	No	No	Yes, All mature trees within the complex - English Oak, Giant Redwood and English Elms	Yes	Yes, Memorial entrance to church including brick piers; low brick fence to manse at 261 Albert Street.	No	No	No
HO209	Royal Mail Hotel, 288-290 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
HO210	1940s Garage, 129 Beverin Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO211	RSL Memorial Hall, 10 Birdwood Avenue, Sebastopol	No	No	No	Yes	No	No	No	No
HO212	Roxburgh Dairy Farm (former) 624 Glenelg Highway, Smythes Creek The curtilage contains the c1850s cottage, 1870s farmhouse, a pair of Canary Island Palms, a collection of farm outbuildings from the late 19 th C and early 20 th C and the archaeological site of a third farmhouse of c1890s on the east side of the entrance drive.	No	No	Yes, 2 Canary Island Palms	Yes	No	No	No	No
HO213	Smythes Creek State School No. 1504 (former), 606 Glenelg Highway, Smythes Creek	No	No	No	Yes	No	No	No	No
HO214	House, 4 Hertford Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO215	Redan State School No. 1289, 32-48 Hertford Street, Sebastopol	No	No	Yes, Lawson's Cypress planted in 1953	Yes	Yes – Jubilee Gates (cnr. Hertford & Albert Streets)	No	No	No
HO216	Copernicus Hall, 26-28 Orion Street, Sebastopol	No	No	No	Yes	Yes	No	No	No
HO217	Ploughman's Arms Hotel (former), 300 Tait Street, Bonshaw	No	No	No	Yes	No	No	Yes	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	The curtilage includes the extent of the fabric dating 1880s – 1920s including the larger timber building and rear timber extension and stables.								
HO218	Interwar Bungalow Heritage Precinct 2: 90, 92, 94, 96, 98, 100 Albert Street, Sebastopol	No	No	No	Yes	Yes, All front fences	No	No	No
HO219	Cornish Row Heritage Precinct 363-377 Albert Street, Sebastopol	Yes, 371 & 373 Albert Street	No	No	Yes	No	No	No	No
HO220	Timber Mining Cottage Series: 133 Albert Street, Sebastopol 9, 37 & 49-51 Birdwood Avenue, Sebastopol 32 & 38 Charlotte Street, Sebastopol 21 & 23 Victoria Street, Sebastopol 10 Walker Street, Sebastopol 49 Wilsons Lane, Sebastopol 197 & 209 Yarrowee Street, Sebastopol	No	No	No	Yes	Yes	No	No	No
HO221	Late Victorian Timber Residence Series: 77, 102, 155, 160, 168, 193, 208, 230, 240, 280 Albert Street, Sebastopol	No	No	Yes, three Canary Island Palms at 73, 160 and 168 Albert Street	Yes	Yes	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	140 Beverin Street, Sebastopol 3 Bridge Street, Sebastopol 100 & 114 Grant Street Sebastopol 1 & 7 Kent Street Sebastopol 101 & 103 Vickers Street, Sebastopol 62 & 73 Yarrowee Street, Sebastopol								
HO222	Late Federation Residence Series: 166 & 226 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO223	Redan Prince of Wales Store (former) 2 Albert Street, Sebastopol	No	No	No	Yes	No	No	No	No
HO224 Interim control Expiry date: 31 March 2021	Former Eureka Lead Gold Sluicing Company Pumping Site 113 Lofven Street and Crown Allotment 22C Section AA, Nerrina Statement of Significance: Former Eureka Lead Gold Sluicing Company Pumping Site Statement of Significance, 2019	No	No	No	Yes	No	No	No	No
HO225	Ballarat Saleyards (former)	Yes	Yes	No	Yes	Yes	No	No	No

BALLARAT PLANNING SCHEME

PS map ref	Heritage place	External paint controls apply?	Internal alteration controls apply?	Tree controls apply?	Solar energy system controls apply?	Outbuildings or fences not exempt under Clause 43.01-4	Included on the Victorian Heritage Register under the Heritage Act 2017?	Prohibited uses permitted?	Aboriginal heritage place?
	1020 La Trobe Street, Delacombe Statement of Significance: Ballarat Saleyards (former) - Statement of Significance, November 2019								
HO232 Interim control Expiry date: 1 September 2024 2025	Lintel Grange Homestead Complex 127 Edmonston Road, Addington	No	No	Yes - Mature Privet hedge, Mature Ash and Walnut tree and Weeping Nootka Cypress	Yes	Yes - Granite piers and slabs at entry, the pre 1900 outbuildings constructed of brick, bluestone, granite, galvanised iron and timber located to the north, east and south of the homestead.	No	No	No



6.2. GROWTH AREAS FRAMEWORK PLAN - INFORMAL CONSULTATION

Division: Development and Growth
Director: Natalie Robertson
Author/Position: Fiona Koutsivos – Principal Planner Sustainable Growth

PURPOSE

1. The purpose of this report is to seek endorsement of the Growth Areas Framework Plan and accompanying documentation for the purpose of consultation.

BACKGROUND

Growth Areas Framework Plan

2. The City of Ballarat has completed a draft Growth Areas Framework Plan which is now ready for community consultation.
3. The Ballarat Growth Areas Framework Plan is a high-level strategic document that guides the long-term growth of Ballarat's future growth areas by outlining the required infrastructure and preferred sequencing for future Precinct Structure Plan (PSP) preparation.
4. The areas identified for future growth are geographically described as the Western and North Western growth areas.
5. As outlined in the draft Ballarat Housing Strategy, by 2041, the Ballarat municipality will have grown by 55,000 people and the city will need 29,000 more dwellings to accommodate this population growth.
6. The adopted Ballarat Strategy 2040 identifies a target for future dwelling supply to be split 50:50 between greenfield and infill areas.
7. City of Ballarat's responsibility as planning authority is to:
 - Ensure the ongoing provision of land and supporting infrastructure to support sustainable urban development.
 - Ensure that sufficient land is available to meet forecast demand.
 - Plan to accommodate housing growth for at least a 15-year period and provide clear direction on locations where growth should occur.
8. At its meeting on 23 February 2022, Council resolved (R14/22) to prepare a Growth Areas Framework Plan to establish the most appropriate sequencing of PSP preparation for the Western and North Western growth areas.
9. To support the draft Growth Areas Framework Plan, the following technical studies have been prepared:
 - Infrastructure servicing strategy (including transport, stormwater, integrated water management and servicing)
 - Community infrastructure assessment
 - Retail assessment

Previous Consultation

10. No previous formal consultation on the draft Framework Plan has been undertaken to date.
11. The draft Growth Areas Framework Plan builds on the work done to date on growth areas in Ballarat, including the Long-Term Growth Options Investigation Paper prepared by Hansen in 2018.
12. Consultation was undertaken as part of the Long-Term Growth Options Investigation paper. The consultation was undertaken in 2015 and included drop-in sessions and landowner meetings.

KEY MATTERS

13. The draft Growth Areas Framework Plan advises on the following:
 - Sequencing of Precinct Structure Plan (PSP) preparation for the Western and NorthWestern growth areas
 - Out of sequence development criteria
 - Infrastructure requirements for each growth area
 - Greenfield land supply
 - Urban development objectives
 - Key growth actions

Sequencing of rezoning land and Precinct Structure Plan preparation for the Western and North Western growth areas

14. Ballarat's growth areas will be planned and developed in an orderly sequence of medium and long-term precincts with recommended staging of sub precincts.
15. Sequencing of residential development is required to ensure success in Ballarat's new neighbourhoods. It also benefits the city's broader community and economy.
16. A Development Staging Plan has been prepared to represent the City of Ballarat's preferred direction for future growth through the development of PSPs and sub precinct sequencing.
17. The commencement of PSP in Ballarat will be undertaken in the following sequence:
 - Western Growth Area
 - North Western Growth Area

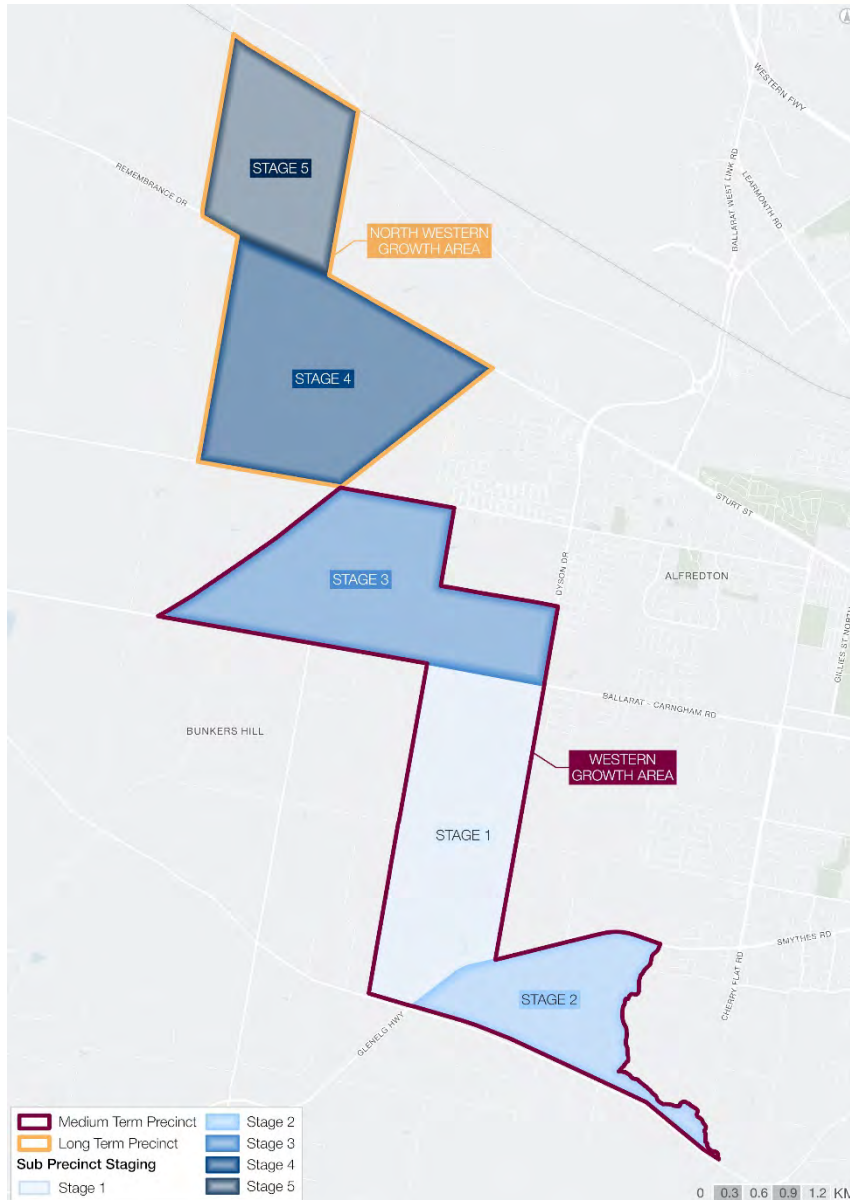


Figure 1: Development Staging Plan

18. The Development Staging Plan is based on:

- Victorian Government and City of Ballarat policy direction
- Infrastructure needs
- Estimated infrastructure project costs
- Infrastructure project complexity
- Infrastructure project benefit to the wider Ballarat community
- Estimated yield
- Estimated cost per hectare
- Advice from service authorities on the likely sequencing of infrastructure

19. The need to commence a PSP will be based on ongoing greenfield land supply monitoring. It is expected that in the short term, no rezoning or PSP development will occur. This is based on Council’s existing sufficient greenfield land supply and that immediate rezoning of additional land is unlikely to be supported by the state government.

20. The Growth Areas Framework Plan also outlines recommend staging of sub precincts. It is noted that this is provided as a guide and will be determined as part of future PSP preparation.

Out of sequence development criteria

21. Out of sequence development criteria is included in the Growth Areas Framework Plan to represent a range of items that need to be addressed for any proposals to change or depart from the Development Staging Plan.

Infrastructure requirements and development potential for each Growth Area

22. To inform the Development Staging Plan and Growth Areas Framework Plan, infrastructure requirements and development potential for each growth area were investigated and have been summarised below:

Item	Western	North Western
Total Growth Area	1,035 hectares	698 hectares
Net developable area	862 hectares	540 hectares
Anticipated dwellings	17,203	10,800
Anticipated population	43,000	27,000
Transport	Road and intersection upgrades are required along existing roads. New local roads, bicycle lanes and bus stops are required.	Road and intersection upgrades are required along existing roads. New local roads, bicycle lanes and bus stops are required.
Drainage	A network of 20 wetland retarding basins with waterway corridors and associated drains.	A network of 11 wetland retarding basins with waterway corridors and associated drains.
Retail	1 x local convenience centre 2 x neighbourhood activity centre	1 x neighbourhood activity centre
Community Centres	Level 1 multipurpose community centre x 2-3 Level 2 multipurpose community centre x 2	Level 1 multipurpose community centre x 1 Level 2 multipurpose community centre x 1 Level 3 multipurpose community centre x 1
Active open space	54 hectares	30 hectares

Sports pavilion	Sports pavilion x 3 (serving 2 playing areas) Sports pavilion x 2 (serving 3 playing areas)	Sports pavilion x 2 (serving 2 playing areas) Sports pavilion x 1 (serving 3 playing areas)
Sessional kindergarten	16-24 rooms	9-14 rooms
Maternal & child health	5.4 consulting rooms	3.0 consulting rooms
Government primary school	6 schools (2,800 enrolments)	3 schools (1,600 enrolments)
Government secondary school	1.7 schools (1,700 enrolments)	1 school (950 enrolments)
Non-government schools	2 primary and 1 secondary (for both growth areas)	
Regional active open space	30 hectares (for both growth areas)	
Indoor recreation centre	1 indoor recreation centre with capacity for up to 8 courts (for both growth areas)	

Greenfield land supply

23. Further to preparation of the draft Housing Strategy, the draft Growth Areas Framework Plan has clarified the amount of existing Greenfield Zoned Land Supply. The City of Ballarat has extensive greenfield land supply comprising of land within the Ballarat West PSP, Alfredton West PSP (Lucas) and the Northern Growth Area (Core Area). Between these areas, the dwelling capacity is 17,000 which will provide between 17 – 24 years of greenfield land supply.
24. In terms of greenfield unzoned land supply, there is expected to be capacity for 30,000 dwellings. This is between the Northern Growth Area (Expanded Area), Western Growth Area and North Western Growth Area. This will provide between 30 – 42 years of greenfield land supply.

Urban development objectives

25. Urban development objectives are included in the Growth Areas Framework Plan to represent high-level guidance for the development of Ballarat's future growth areas. They represent the city's aspirations for the future growth areas and should be followed throughout the planning of these growth areas.

Key growth actions

26. Key growth actions are included in the Growth Areas Framework Plan in response to the findings from the technical studies undertaken for the Growth Areas Framework Plan and Long-Term Growth Options Investigation.

27. The actions represent known opportunities and issues that will need to be resolved as part of the PSP preparation (unless stated otherwise).

Next Steps

28. Consultation on the draft Growth Areas Framework Plan and accompanying technical reports is planned for May 2024. Consultation will consist of:
- Community drop in sessions
 - Landowner drop in sessions
 - Developer workshop
 - Media releases
 - Opportunity for feedback via Ballarat mySay
 - Media briefing
 - Website/social media
 - Direct engagement with state government agencies and the Wadawurrung Traditional Owners Corporation
29. The key objective of consultation is to seek feedback through submissions to the draft Growth Areas Framework Plan and accompanying technical reports.
30. Submissions received during the consultation will be reviewed and updates to the draft Growth Areas Framework Plan will be considered and, where possible, changes made before presentation of the final Growth Areas Framework Plan is made to Council where approval will be sought to:
- Adopt the Final Growth Areas Framework Plan and accompanying documents; and
 - Seek ministerial authorisation to exhibit a Planning Scheme Amendment to incorporate the final Growth Areas Framework Plan into the Planning Scheme.

OFFICER RECOMMENDATION

31. That the Planning Delegated Committee:

31.1 Note the draft Growth Areas Framework Plan and accompanying technical reports.

31.2 Endorse the draft Growth Areas Framework Plan and accompanying technical reports for consultation.

31.3 Note that this draft plan will be returned for further consideration by Council upon completion of consultation and consideration of submissions.

ATTACHMENTS

1. Governance Review [6.2.1 - 2 pages]
2. Growth Areas Framework Plan [6.2.2 - 56 pages]
3. ASR - Community and Recreation Infrastructure Assessment - November 2023 [6.2.3 - 106 pages]
4. Macroplan - Retail Assessment - February 2024 [6.2.4 - 26 pages]
5. Taylors Engineering Servicing Strategy [6.2.5 - 290 pages]

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ALIGNMENT WITH COUNCIL VISION, COUNCIL PLAN, STRATEGIES AND POLICIES

1. This report aligns with Council's Vision, Council Plan, Strategies and Policies.

COMMUNITY IMPACT

2. Consultation with the community on the draft Growth Areas Framework Plan will have positive social and community impacts by seeking to involve the community in land use and planning and the future blueprint of Ballarat's growth areas.

CLIMATE EMERGENCY AND ENVIRONMENTAL SUSTAINABILITY IMPLICATIONS

3. The draft Growth Areas Framework Plan focuses on positive environmental and sustainable development outcomes for Ballarat's growth areas. In general, the Plan does not raise any direct climate emergency issues or environmental sustainability implications.

ECONOMIC SUSTAINABILITY IMPLICATIONS

4. There are no economic sustainability implications identified for the subject of this report.

FINANCIAL IMPLICATIONS

5. Implementation of the Growth Areas Framework Plan through a planning scheme amendment process will not have any significant financial implications to Council beyond expected costs associated with the planning scheme amendment process.
6. As the proponent is the Planning Authority, the City of Ballarat will be responsible for all amendment related costs including notification of landowners and Gazettal of the amendment.

LEGAL AND RISK CONSIDERATIONS

7. The amendment does not raise any legal risks or concerns of note.
8. Section 9(1) of the Local Government Act 2020 states that a Council must - in the performance of its role - give effect to the overarching governance principles of the Act. This includes Section 2 which states that:
 - c) the economic, social, and environmental sustainability of the municipal district, including mitigation and planning for climate change risks, is to be promoted,
 - d) the municipal community is to be engaged in strategic planning and strategic decision making,
 - f) collaboration with other Councils and Governments and statutory bodies is to be sought' and,
 - g) the ongoing financial viability of the Council is to be ensured.
 - h) regional, state and national plans and policies are to be taken into account in strategic planning and decision making;

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- i) the transparency of Council decisions, actions and information is to be ensured.

And Section 9(3) of the *Local Government Act 2020* states that in giving effect to the overarching governance principles, a Council must take into account the following supporting principles -

- a) the community engagement principles;
- c) the strategic planning principles;

9. The *Planning and Environment Act 1987* (the Act) sets out the framework for the use, development, and protection of land in Victoria in the present and long-term interests of all Victorians. The Growth Areas Framework Plan will provide long-term planning and guidance for the City of Ballarat's greenfield areas.

HUMAN RIGHTS CONSIDERATIONS

10. It is considered that the report does not impact on any human rights identified in the *Charter of Human Rights and Responsibilities Act 2006*.

COMMUNITY CONSULTATION AND ENGAGEMENT

11. Public consultation on the Growth Areas Framework will provide an opportunity to inform the community of the future blueprint of Ballarat's growth areas. It will also provide the community with the opportunity to review the data and work that underlies this first draft of the Growth Areas Framework Plan and enable the community to identify any key issues and provide input.

GENDER EQUALITY ACT 2020

12. There are no gender equality implications identified for the subject of this report.

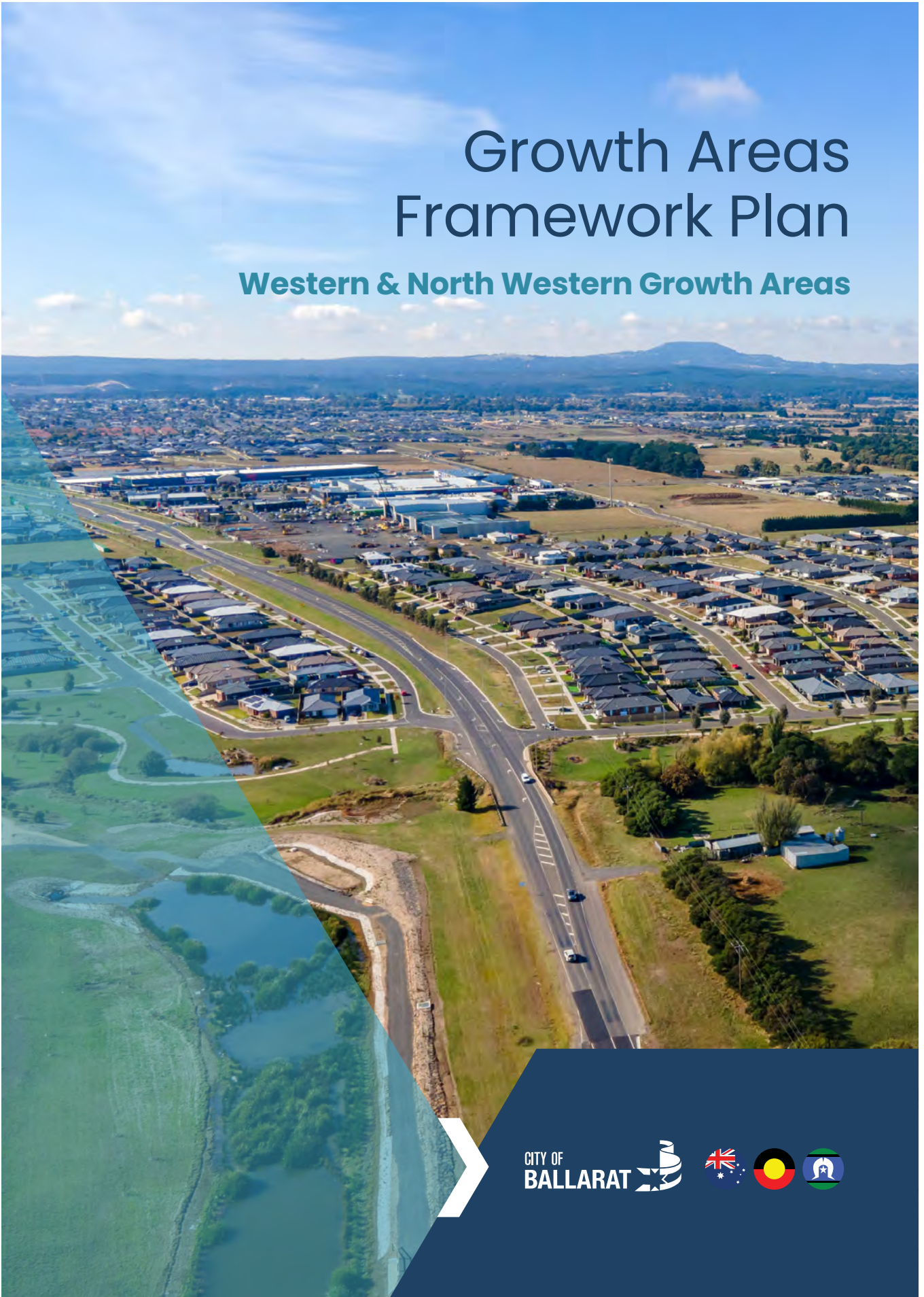
CONFLICTS OF INTEREST THAT HAVE ARISEN IN PREPARATION OF THE REPORT

13. Council officers affirm that no general or material conflicts need to be declared in relation to the matter of this report.

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Growth Areas Framework Plan

Western & North Western Growth Areas



City of Ballarat > Growth Areas Framework Plan



Contents

Introduction	5
Planning Context	9
Growth Context	11
Concurrent City of Ballarat Work	13
Existing Context	14
Precinct Features	24
Defining the Growth Area Framework Plan	32
Urban Development Objectives	34
Future Growth Areas	37
Key Growth Actions	44
Development Sequencing	49
References	54

City of Ballarat > Growth Areas Framework Plan



4

Introduction

The future Western and North Western Growth areas represent an essential part of the City of Ballarat's long-term growth strategy.

As Victoria's fourth largest city, Ballarat will continue to play an important role in the State's economic and cultural growth, contributing significant investment and vibrancy to the region.

Ballarat is growing rapidly due to its proximity to Melbourne and the many economic, social and cultural opportunities that the area presents. By 2041, the Ballarat municipality will have grown by 55,000 people and the city will need approximately 29,000 more dwellings to accommodate this population growth. It is expected that Ballarat's future growth areas can accommodate up to 71,000 new residents.

The Growth Areas Framework Plan (the Framework Plan) is a key document which will address the future long-term greenfield growth of the city. It will be a blueprint for how the city should plan for the roll out of its growth

areas, building on the key physical and infrastructure implications for an expanded urban area. In combination with the *Ballarat Housing Strategy 2041* and the *Ballarat Strategy 2040: Today, Tomorrow, Together*, the three documents provide a clear understanding of how growth should occur across the city.

The Growth Areas Framework Plan includes implementable actions to ensure that housing, employment, road networks, rail corridors, local services, open space and other opportunities are provided for future residents. Ultimately, strategic implementation of the Growth Areas Framework Plan will ensure that development is facilitated in a sequenced and orderly manner, with a focus on maximising the community benefits of urban growth.

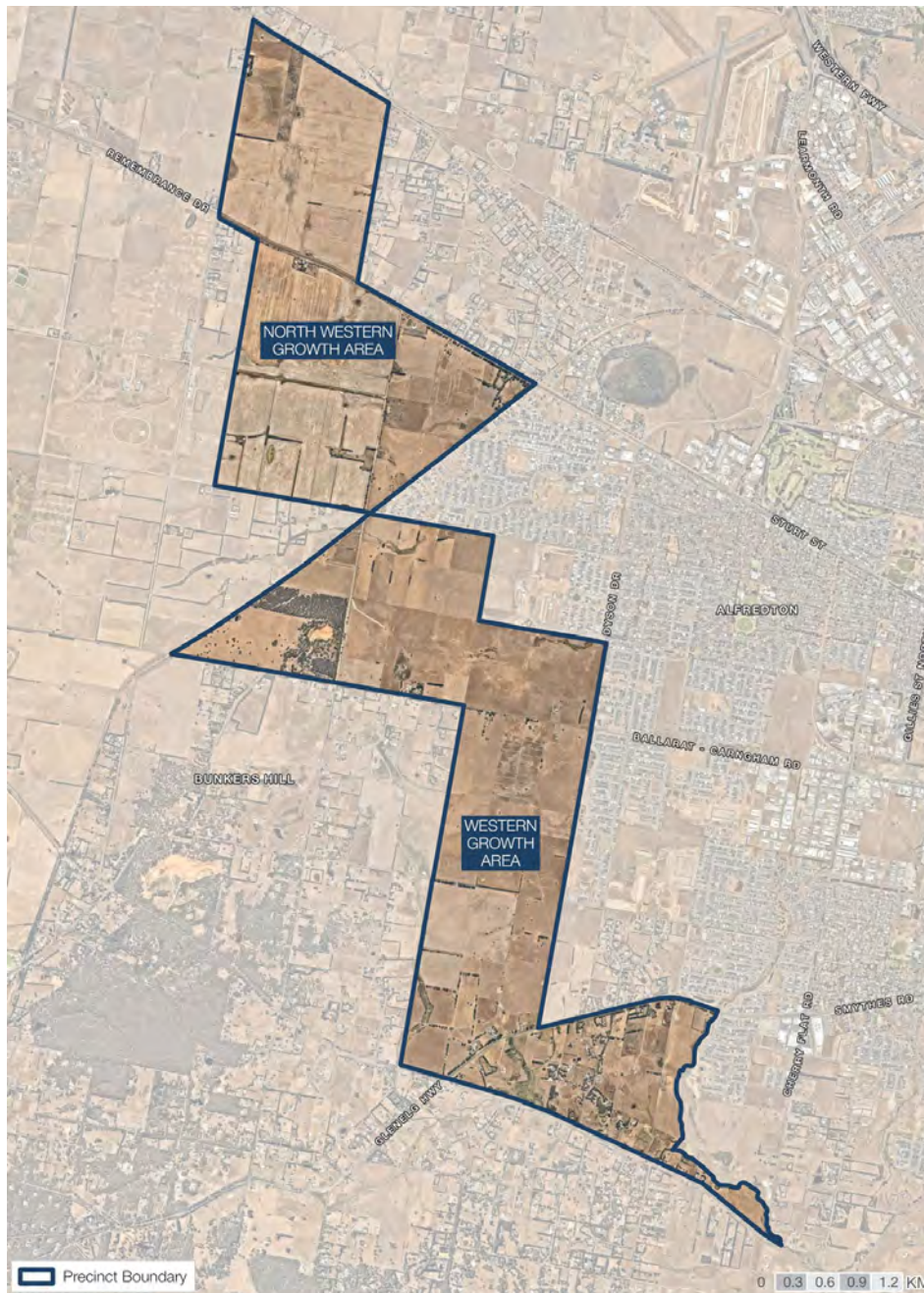
The Growth Areas Framework Plan will ensure that Ballarat remains a regional settlement with its own unique identity.

Role of the Framework Plan

The Ballarat Growth Areas Framework Plan is a high-level strategic document that guides the long term growth of Ballarat's future growth areas. The areas

identified for future growth are geographically described as the Western and North Western growth areas.

Map 1 Growth Areas Framework Plan Areas



The Framework Plan describes the existing context of the growth areas and outlines the future vision and development objectives. The Framework Plan will guide greenfield urban growth which supports the community's shared vision outlined in the Ballarat Strategy 2040 and meets the aspirations of the city and the broader region. The future growth provides opportunities for Ballarat's long term greenfield land supply and forms a logical extension of the existing Ballarat West Growth Area. Ultimately, the Framework Plan establishes the following key themes:

Enable a logical and sequenced roll-out of future greenfield land and support orderly planning

Provide a logical sequence of development that will support a more sustainable and equitable approach to urban development, ensuring cost efficiency and delivery of services are provided in a timely manner for future residents.

Support a continuous and diverse supply of housing

Address the need for a diversity of housing options to accommodate changing demographic groups and income levels, while ensuring affordability and accessibility is achieved.

Encourage employment opportunities and establishment of activity centres

Facilitate the creation of job opportunities and location of activity centres within walkable catchments of residential areas.

Enhance the local environment and integrate sustainable practices

Integrate sustainable practices to better support and enhance the local environment and ecosystems, preserving natural resources including protecting creek corridors and local biodiversity and their habitats, and encouraging a climate resilient community.

Support an integrated transport network which encourages walking and cycling, reduced car dependency and promotes community connectivity

Develop a connected and integrated transport network which enhances connectivity and encourages safe and useable active transport options.

Foster a thriving community and sense of well-being

Deliver community infrastructure and facilities that support community cohesion, resilience and a thriving network of multi-culturalism.

Ensure that valued heritage is preserved

Preserve and celebrate the cultural and historic heritage and identity of the area.

Protect and enhance the landscape and visual amenity of the area

Including important visual attributes, vistas, landmarks, site features and gateways and recognising the urban and rural interface that the study area currently provides.

Provide useable and high quality open space areas

Including an integrated open space network that incorporates environmental values, cycling and walking trails.

These key themes are further explored in the Development Objectives section of the Framework Plan.

How the Framework Plan will operate

The Framework Plan includes a Development Staging Plan outlining the preferred order and direction in which Precinct Structure Plan (PSP) preparation and development should occur. PSPs are required to be prepared before the land can be developed for residential use.

The Framework Plan is largely influenced by technical investigations undertaken to determine expected infrastructure needs.

The Framework Plan includes:

- Context on the growth areas
- Development objectives
- Actions that must be resolved through the PSP preparation
- Concept future urban structure plans that outline broad land uses (these plans are conceptual and will be subject to change through the PSP process)
- Development staging plan
- Criteria to consider alternative and out of sequence development.

The Framework Plan builds on the work done to date on growth areas in Ballarat including the *Long Term Growth Options Investigation Paper* prepared by Hansen in 2018.

Why is a Framework Plan required?

As outlined in the Ballarat Housing Strategy, by 2041, the Ballarat municipality will have grown by 55,000 people and the city will need 29,000 more dwellings to accommodate this population growth.

The adopted Ballarat Strategy 2040 identifies a target for future dwelling supply to be split 50:50 between greenfield and infill areas. This objective is to encourage a stronger compact urban form where higher densities are encouraged to be located around existing infrastructure and within activity centres.

City of Ballarat’s responsibility as planning authority is to:

- Ensure the ongoing provision of land and supporting infrastructure to support sustainable urban development
- Ensure that sufficient land is available to meet forecast demand
- Plan to accommodate housing growth for at least a 15 year period and provide clear direction on locations where growth should occur.

The Framework Plan responds to Clause 21.01 (Further Strategic Work) of the Ballarat Planning Scheme which identifies that clarity needs to be provided on the preferred long-term direction of greenfield investigation areas following Ballarat West.

How will the Framework Plan be implemented?

The Growth Areas Framework Plan will be included as a background document in the Ballarat Planning Scheme. Clause 21.02 of the Local Planning Policy Framework in the Ballarat Planning Scheme will also be updated.

As outlined in Figure 1, following the sequencing of the Framework Plan, detailed planning will be undertaken to prepare PSPs and Development Contributions Plans (DCP), rezoning of the growth areas to the Urban Growth Zone (UGZ).

Each PSP will build on the work undertaken as part of the Framework Plan, including undertaking detailed precinct scale technical investigations, determining a future urban structure plan and detailing all infrastructure requirements and costs. Future PSPs should have regard to the Growth Areas Framework Plan. Once approved, planning permits for subdivisions and development can be issued if they are generally in accordance with the PSP and DCP.

The Urban Growth Framework delivery

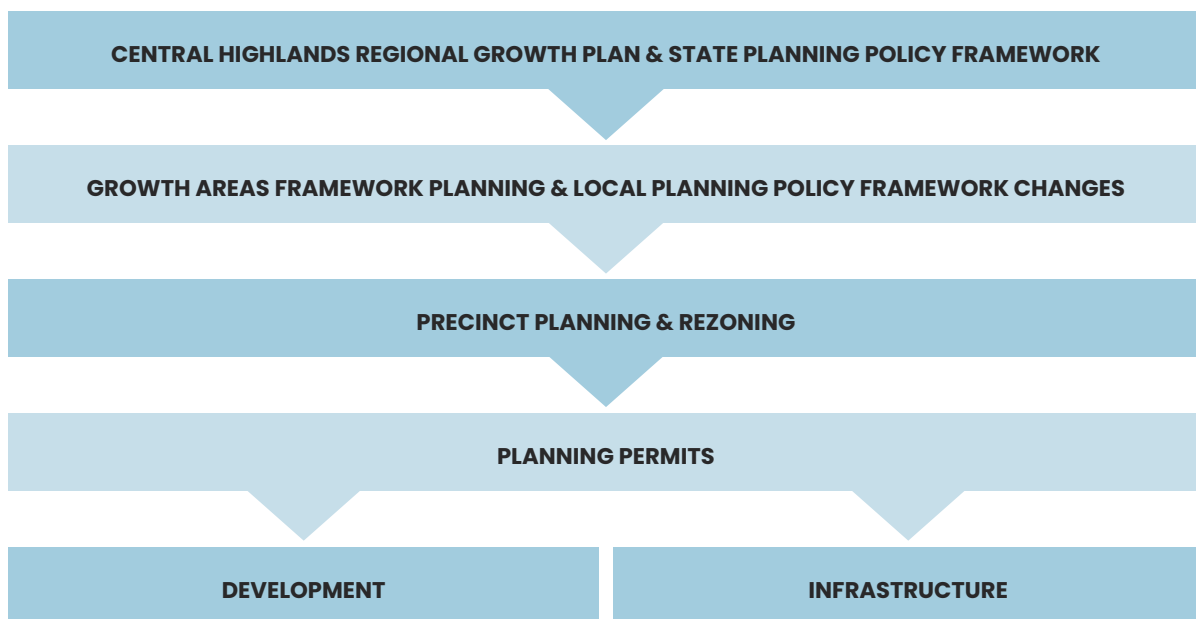


Figure 1

Planning Context

The following State and Local Planning Policy was considered in preparing the Growth Areas Framework Plan.

› [Plan Melbourne 2017](#)

› [Central Highlands Regional Growth Plan 2014](#)

Planning Policy Framework

The State Planning Policy Framework provides key directions around settlement, housing, environment, infrastructure and transport. Relevant considerations for the Framework Plan include:

- Ensure a sufficient supply of land is available for housing, employment, recreation, open space, commercial, community facilities and infrastructure
- Focus investment and growth in major regional cities such as Ballarat
- Locate urban growth close to transport corridors and services
- Manage the sequence of development in areas of growth so that services are available from early in the life of new communities
- Protect, restore and enhance sites and features of nature conservation, biodiversity, geological or landscape value
- Minimise the impacts of natural hazards and adapt to the impacts of climate change
- Protect and enhance catchments, water bodies, groundwater and water quality
- Provide housing choice and deliver affordable housing closer to jobs, transport and services
- Support the establishment and maintenance of communities that provide functional, accessible, safe and diverse physical and social environments
- Establish and maintain a diverse and integrated network of public open space that meets the needs of the community

- Provide fair distribution and access to social and cultural infrastructure and health and education services
- Encourage the concentration of major retail, residential, commercial, entertainment and cultural developments into activity centres that are highly accessible to the community
- Create a safe and sustainable transport system by integrating land use and transport
- Sustainably manage water supply, water resources, wastewater, drainage and stormwater through an integrated water management approach
- Promote the provision of renewable energy
- Encourage average overall densities in the growth areas of a minimum of 15 dwellings per net developable hectare and overtime seek an overall increase to more than 20 dwellings per net developable hectare.

Local Planning Policy Framework

The Local Planning Policy Framework implements the objectives and strategies of the Municipal Strategic Statement. Relevant considerations for the Framework Plan include:

Clause 21.02-1 (Urban Growth) highlights the significant population growth expected for Ballarat by 2040 and that this growth is planned to be accommodated through and infill and planned greenfield growth areas.

Clause 21.02-4 (Greenfield Investigation Areas) notes that:

- The Ballarat West Growth Area is the primary greenfield development area
- The Northern Growth Area will provide for short to medium term land supply
- Medium to long term land supply will be provided by investigation areas (North Western and Western growth areas) that are subject to detailed assessment.

City of Ballarat > Growth Areas Framework Plan

Clause 21.02-4 (Greenfield Investigation Areas) highlights that greenfield development is to be connected to the existing urban area by:

- Discouraging rezoning of additional greenfield land, which would compete with Ballarat West, until the market requires additional supply
- Ensuring that future greenfield development is focused within roughly an 8km arc from the centre of Ballarat
- Avoiding ad-hoc and unplanned greenfield development
- Discouraging disconnected or 'leap frog' development
- Minimising the impacts of development on Ballarat's historic urban landscape, the environment and Ballarat's natural resource base
- 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.

Clause 21.08-3 (Development Infrastructure) ensures that new social and economic infrastructure meets the needs of the community during the forecast population growth.

> Council Plan 2021-2025

The Council Plan establishes the strategic vision for all Council activities over its period of operation. Its an expression of current community priorities and expectations.

The Council Plan includes the following community vision:

- Ballarat, Victoria's heritage city: leading the way as a sustainable, innovative and inclusive community
- In 2031, our city is a leader in sustainable living with ecologically sound neighbourhoods where people can meet their daily needs within a short walk, ride or bus trip
- We have easy access to parks and gardens, community facilities and education for all ages. Our health and community services respond to community need
- Everyone is valued and welcomed in our city. We celebrate our diversity, and everyone in our community can participate fully in life
- We approach challenges and opportunities with a creative and innovative approach to get the best result for our people
- Our people work locally in the diverse range of industries that make up our solid local economy
- We embrace our rich heritage. We continue to preserve our links to the gold rush era and recognise and celebrate our long Aboriginal history and the breadth of our cultural heritage
- We balance the need to conserve our historical places and spaces with the need and desire to progress as a modern regional city.

Growth Context

The following section outlines a brief history of growth areas within Ballarat.

Ballarat Strategy 1998

The *Ballarat Strategy* identified Ballarat West as the next logical extension to the urban fringe of the city and the primary growth front of the city. The Strategy was incorporated into the Planning Scheme including the Overall Framework Plan for the city. This ultimately directed the development of the Alfredton and Ballarat West PSPs.

Ballarat West Growth Areas Plan 2009

The *Ballarat West Growth Area Plan* was developed to give effect to the incorporated Ballarat Strategy 1998. The plan provides limited detail on urban structure but includes a staging plan for Ballarat West and Alfredton West that outlines recommended sequencing for future PSPs. It advises of alternative sequence criteria. The plan emphasises that more detailed planning would occur through the PSP process.

Alfredton West Precinct Structure Plan 2011

The *Alfredton West Precinct Structure Plan* (PSP) (Integra, June 2011) provides direction for future urban development within the Alfredton West area. The Alfredton West PSP applies to approximately 317 hectares of land at Ballarat West.

Ballarat West Precinct Structure Plan 2012

The *Ballarat West Precinct Structure Plan* (PSP) (SMC, October 2016) provides direction for future urban development within the Ballarat West Growth Area. The Ballarat West PSP applies to approximately 1290 hectares of land. The PSP and accompanying DCP are currently being reviewed, including the future infrastructure needs.

Today, Tomorrow, Together – The Ballarat Strategy 2040

Adopted by the City of Ballarat in 2015 with a time horizon up to 2040, the *Ballarat Strategy* sets the long-term direction for growth. The *Ballarat Strategy* identifies the target for future dwelling supply to be split 50:50

between infill and greenfield locations. Relevant actions in the *Ballarat Strategy* also support the 10-minute city concept, with further actions seeking the prevention of ad hoc greenfield residential development. Initiative 3.6 identifies future growth areas (North, West and East) as greenfield opportunities and investigation areas.

The *Ballarat Strategy* is still a relevant document which will be updated to align with the more recent Housing Strategy and Framework Plan.

Ballarat Long Term Growth Options Investigation 2018

Prepared by Hansen, Arup and Tim Nott Economics, the study determined the suitability of the Greenfield Investigation Areas (GIA) identified in the Ballarat Strategy to accommodate Ballarat's long-term growth. The study included a high level desktop assessment of known planning considerations and investigated the Northern, Western, North-Western and Eastern GIAs. The Northern GIA was recommended as the preferred location for long term growth of Ballarat. The Western and North Western GIAs were considered to have the potential to form part of a longer-term growth corridor.

Council Resolution 16 September 2020

Council was provided with a status report of land supply within the Ballarat West Growth Area for the 2019/2020 financial year. The report demonstrated high levels of growth with high demand rates and supported the need to advance planning work for the identified growth areas. Predictions at the time estimated that the required 15 years of land supply would be diminished by 2025 when the only land available for Ballarat West would be constrained and fragmented. Council resolved to proceed with a policy related planning scheme amendment which identifies the Northern and Western Greenfield Investigation Areas as Ballarat's future greenfield growth areas, include in that same amendment the rezoning of the land to the Urban Growth Zone.

City of Ballarat > Growth Areas Framework Plan

Council Resolution 23 February 2022

Council was provided with a report that recommended a program of rezoning land and further strategic work for three new growth areas. The report also outlined that the supply of greenfield land was predicted to exhaust by 2025–2026. Council resolved to seek Ministerial authorisation to rezone the growth areas, to commence preparation of a Precinct Structure Plan for the Northern Growth Area and to prepare a Growth Areas Framework Plan to establish the most appropriate sequencing of Precinct Structure Plan preparation for the Western and North Western growth areas. The growth areas were based on the Greenfield Investigation Areas investigated as part of the Ballarat Long Term Growth Options Investigation and were expanded on to include additional land surrounding key features. These are the growth areas considered as part of the Framework Plan.

Northern Growth Area 2022

In April 2022, the Victorian Planning Authority (VPA) was appointed as Planning Authority to prepare a PSP and DCP for the Northern Growth Area. The land (core section) was also rezoned to Urban Growth Zone (UGZ). The precinct is divided into two parts (the core and expanded areas) and the inclusion of the expanded area will be determined as part of the PSP. Should the expanded area not be included in the Ballarat North PSP, it is expected that this area will be developed in some capacity subject to Council approval. The expanded area has not been considered as part of the Growth Areas Framework Plan. The PSP and DCP are expected to be incorporated into the Ballarat Planning Scheme in mid 2026

Infrastructure Growth Area Framework (IGAF)

The VPA is leading the Infrastructure Growth Area Framework (IGAF) project. In September 2022, the Minister for Planning requested the VPA undertake a high-level, strategic review of housing and land supply within Ballarat including potential sites for residential development in Ballarat. At the time of writing, the IGAF has not been released.

Cambrian Hill

The proposed Cambrian Hill development is a 3,000 lot residential proposal within Golden Plains Shire, adjacent to the Ballarat West PSP. Although the Cambrian Hill development is outside of the Ballarat municipality, if the development proceeds, the future residents of the area may be reliant on the services and amenities of Ballarat for their day-to-day needs. Development of Cambrian Hill may also impact transport and community infrastructure within the existing and future growth areas. Council must periodically review the progress of the development.

Victoria's Housing Statement

The Victorian Government prepared the Housing Statement which plans to build 800,000 homes in Victoria between 2024–2034. Part of the Housing Statement includes updates to Plan Melbourne which are currently being prepared. The new plan will focus on 70 per cent of new homes to be built in established areas, while 30 per cent of new homes delivered in growth areas. Local government targets for where those homes will be built are also being prepared.

Concurrent City of Ballarat Work

The following section outlines concurrent work being undertaken by the City of Ballarat that relates to the Growth Areas Framework Plan.

Housing Strategy

The *Ballarat Housing Strategy* will provide the city with a framework for managing population growth in line with the City of Ballarat's responsibility as planning authority to plan to accommodate housing growth for at least a 15-year period across the municipality. City of Ballarat has an aspirational target for half of these homes to be located within Greenfield Growth Areas and the other half in the existing city and townships. The *Ballarat Housing Strategy* focuses on opportunities available within infill areas.

Industrial Land Strategy

The *Industrial Land Strategy* summarises the current economic settings in the municipality and identifies opportunities for future employment land. The *HillPDA City of Ballarat Employment Lands Strategy Draft Report July 2021* outlines that Council should facilitate strategically justified rezoning of greenfield areas into industrial (employment) zoned land. Future employment land supply exploration areas are identified to the west of the North Western precinct and to the south-west of the Western precinct. At the time of this report, an updated assessment is being prepared.

Central Business District Urban Design Framework and Structure Plan

The *CBD Structure Plan* will include an Urban Design Framework (UDF) with a focus on future character and built form within the Ballarat CBD that balances the need to accommodate sustainable (residential and commercial) growth, while respecting the highly valued heritage values and character within the core of the CBD. The Structure Plan will identify areas suitable for higher density residential, commercial and mixed-use development.

Ballarat Biodiversity Strategy

The *Ballarat Biodiversity Strategy* will recommend a range of actions to identify, protect, and restore the natural environment for biodiversity gains. The Strategy will feature a review of the environmentally focused

planning controls. Outcomes from this work may influence the design of future housing development.

Ballarat Link Road Business Case

The Ballarat Link Road is a 12 kilometre arterial road to connect industrial and residential growth areas in Ballarat's west with the surrounding region. Stage 1 of the project was completed in 2018 and connects the existing section of Ballarat Link Road between Learmonth Road and Remembrance Drive. Stages 2 and 3 of project include the duplication of Dyson Drive, Alfredton. The City of Ballarat is seeking funding from the State and Federal governments to fund the construction of the next stages of the project.

Ballarat Airport Strategy and Master Plan

The City of Ballarat is considering the next stages of development for the Ballarat Airport which will establish its role and activities appropriate to Ballarat's status as a large regional city.

A central focus of the Master Plan will be the usage of aviation within the operations and supply chains of Ballarat's businesses and industry, together with demand for aviation services from the Ballarat community.

The Master Plan will include a revised Australian Noise Exposure Forecast (ANEF) and number-above or 'N' contours which illustrate the average number of events per day that exceed a certain sound level. The City of Ballarat in consultation with Airservices Australia will advise whether the updated noise surveys will necessitate an extension of the Airport Environs Overlay (AEO).

The Victorian Goldfields World Heritage Bid

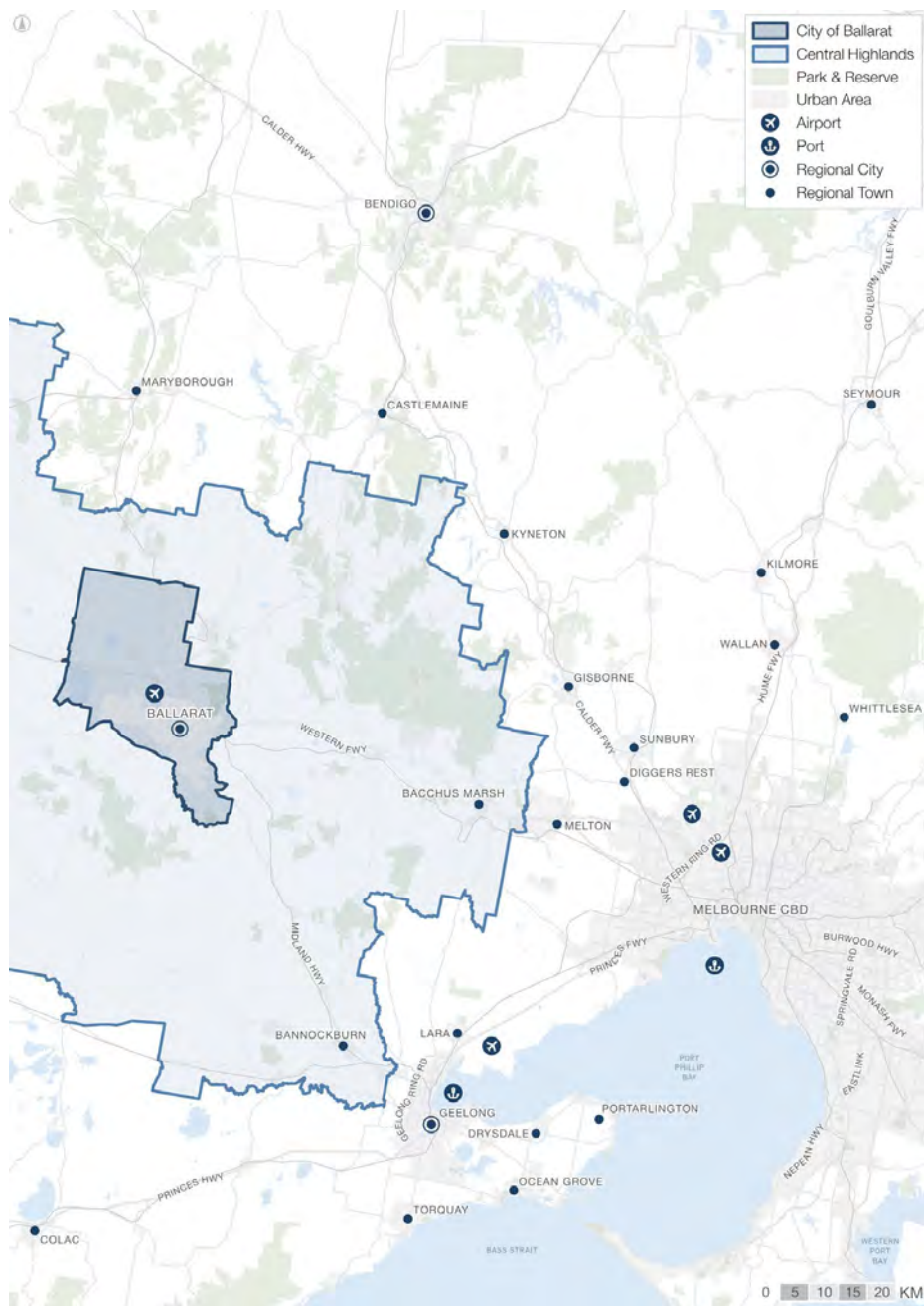
The Victorian Goldfield World Heritage Bid is a partnership between 15 local governments, regional organisations and the private sector on behalf of the Victorian Goldfields community. The bid seeks to achieve a World Heritage listing to celebrate the history and heritage of the Victorian Goldfields region.

Ballarat West PSP and DCP Review

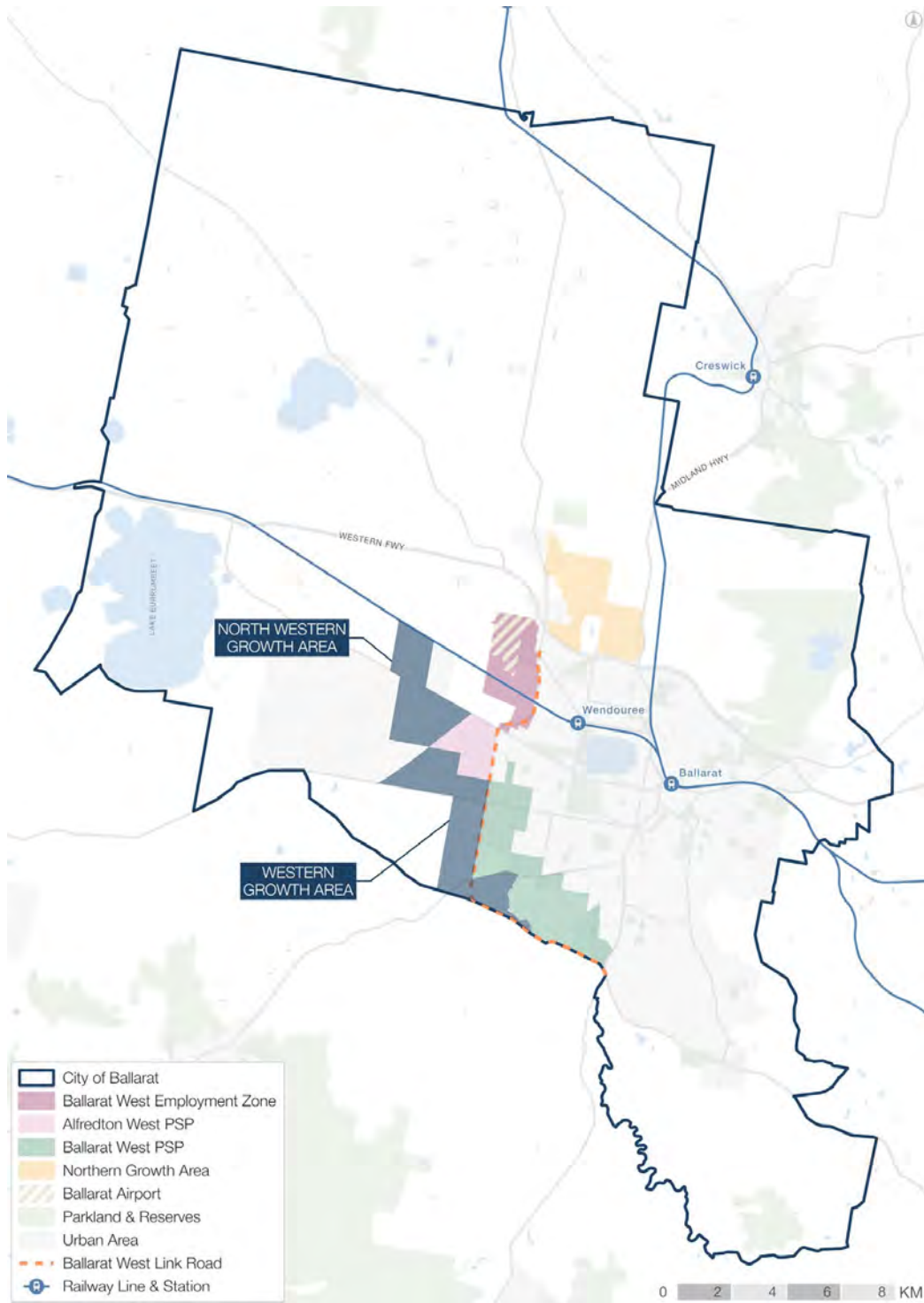
The Ballarat West PSP and DCP are currently being reviewed and updated as part of the City of Ballarat's obligation to review the documents every 5 years. It is anticipated that the updated documents will be gazetted in the Planning Scheme in 2026.

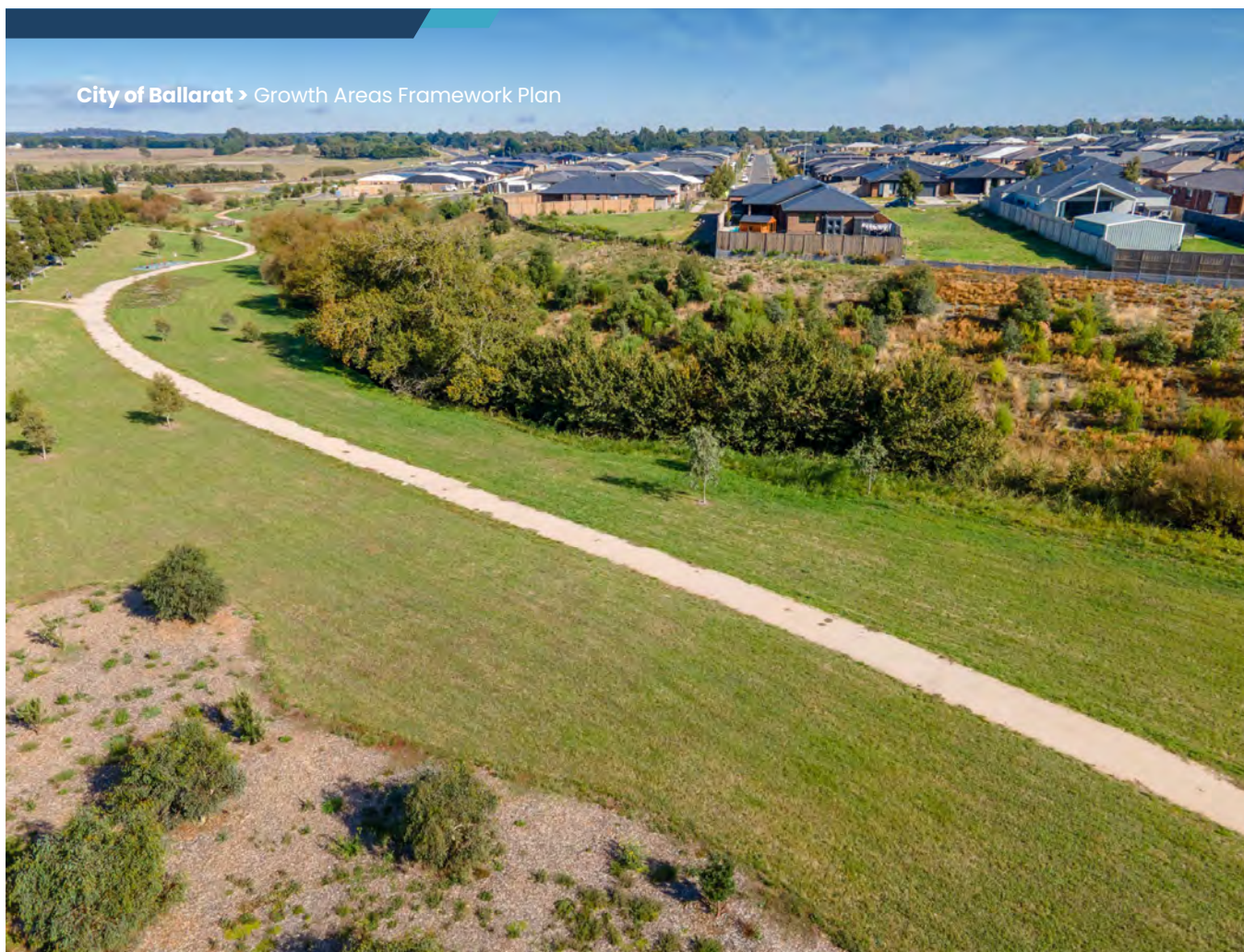
Existing Context

Map 2 Regional Context Plan



Map 3 Local Context Plan





City of Ballarat > Growth Areas Framework Plan

Regional Context

The Western and North Western Growth Areas are located to the west of Ballarat, beyond the existing urban area, extending from the north west to the south west.

Local Context

Western Growth Area

Irregular in shape, the Western Growth encompasses an area of 896 hectares and includes land within Cardigan, Lucas, Smythes Creek and Bunkers Hill. The area is currently zoned Farming Zone (FZ).

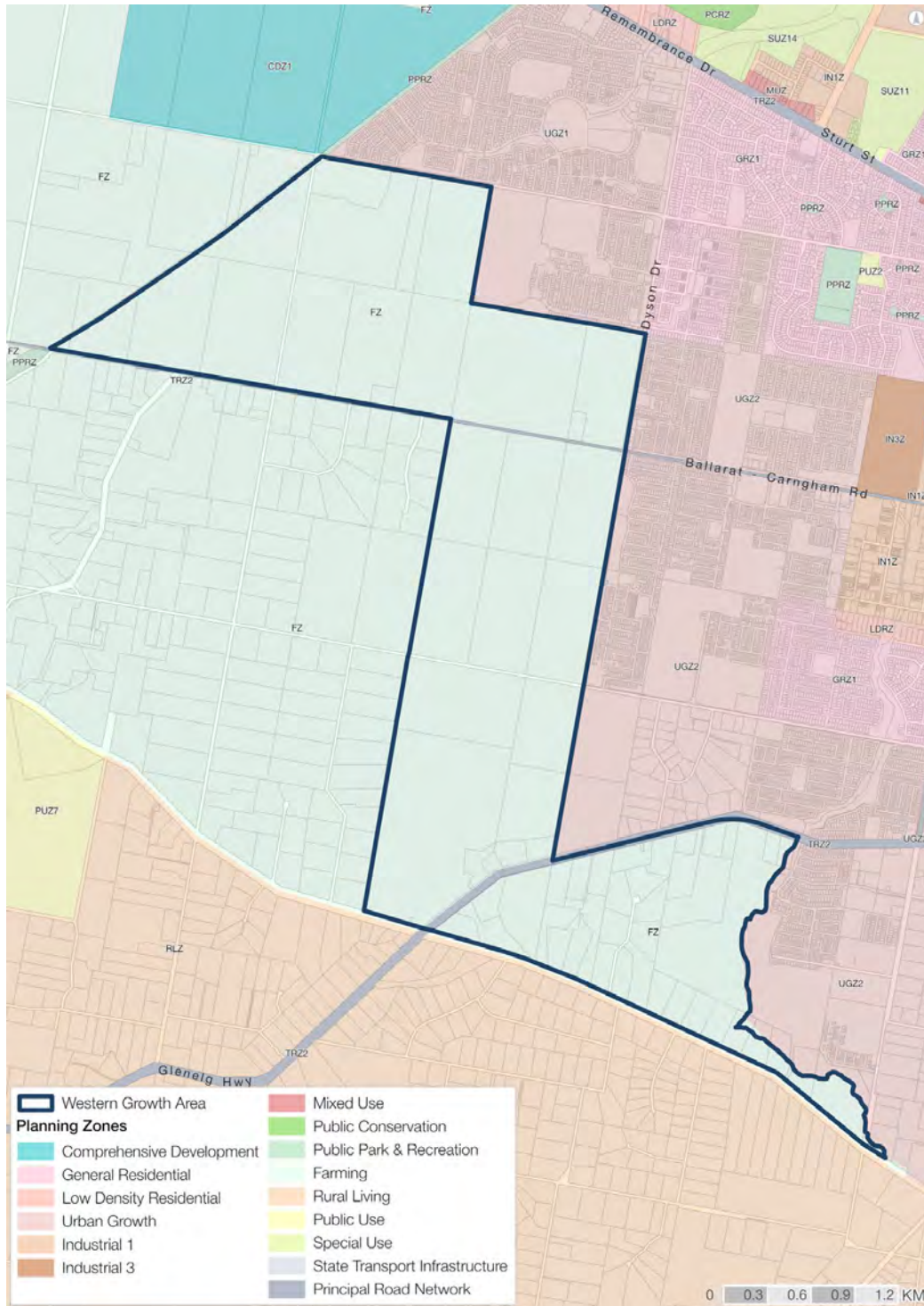
The area consists of relatively open, flat broad hectare rural land. Some large rural residential development is south. Ballarat-Carngham Road, Glenelg Highway and Greenhalghs Road intercept the precinct. The entire growth area interfaces with both the Ballarat West PSP area and Lucas. The outermost point of the Western Growth Area is 10.3km from the Ballarat Central Activity District.

Other land uses include a commercial tree plantation to the south of Ballarat-Carngham Road.

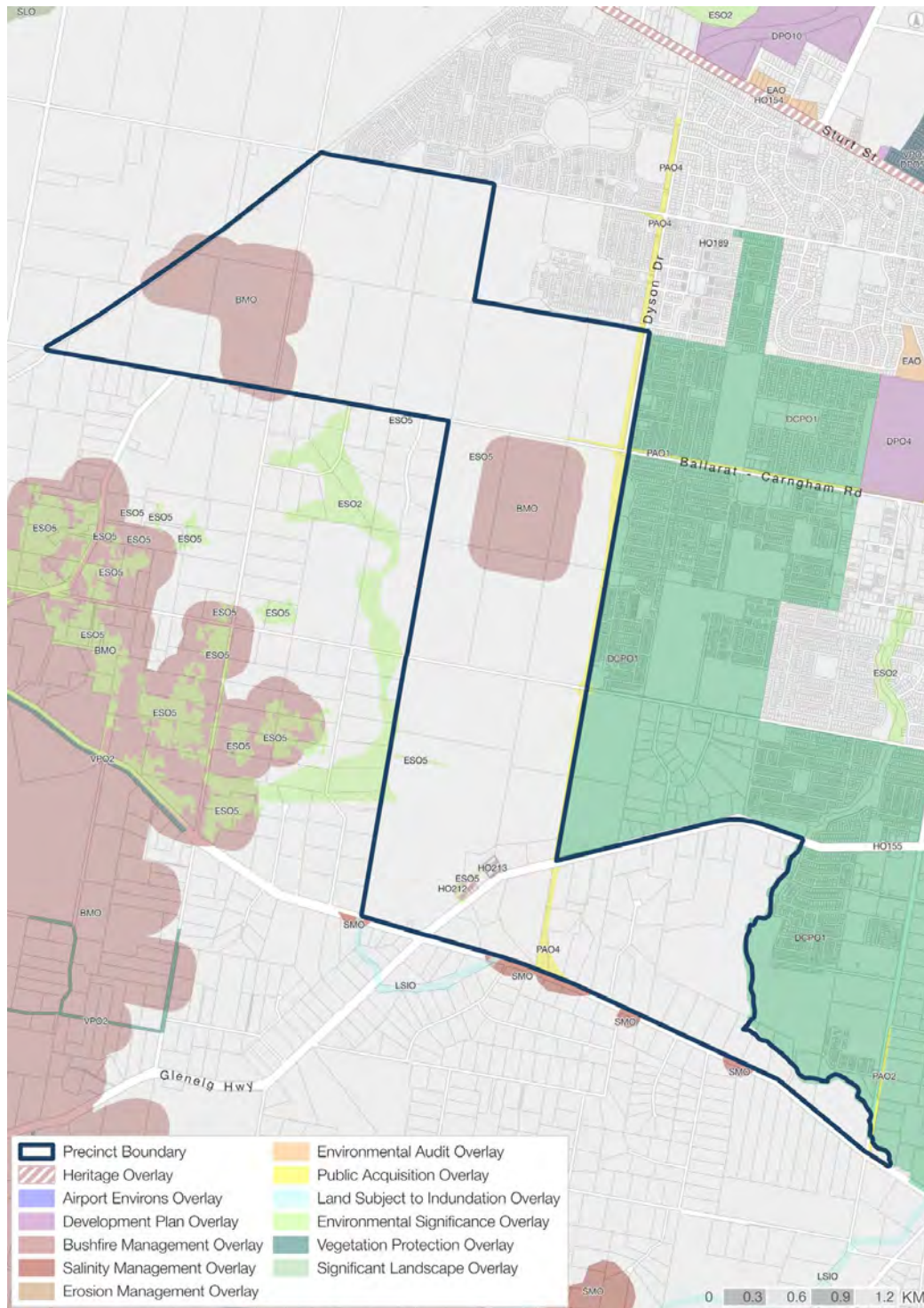
Surrounding land uses include:

- To the north is the North Western Growth Area and the existing Lucas suburb
- To the east of the study area, the Ballarat Link Road has been partially constructed. The area also adjoins the existing Ballarat West Growth Area
- To the south is Bells Road, the municipal boundary between the City of Ballarat and Golden Plains Shire. This area consists of large lot rural residential development
- To the west, open hectare rural land exists which is used for livestock grazing or is underutilised. There are also smaller clusters of rural living lots at Bunkers Hill, the Sago Hill Mine and Haddon Common Bushland Reserve.

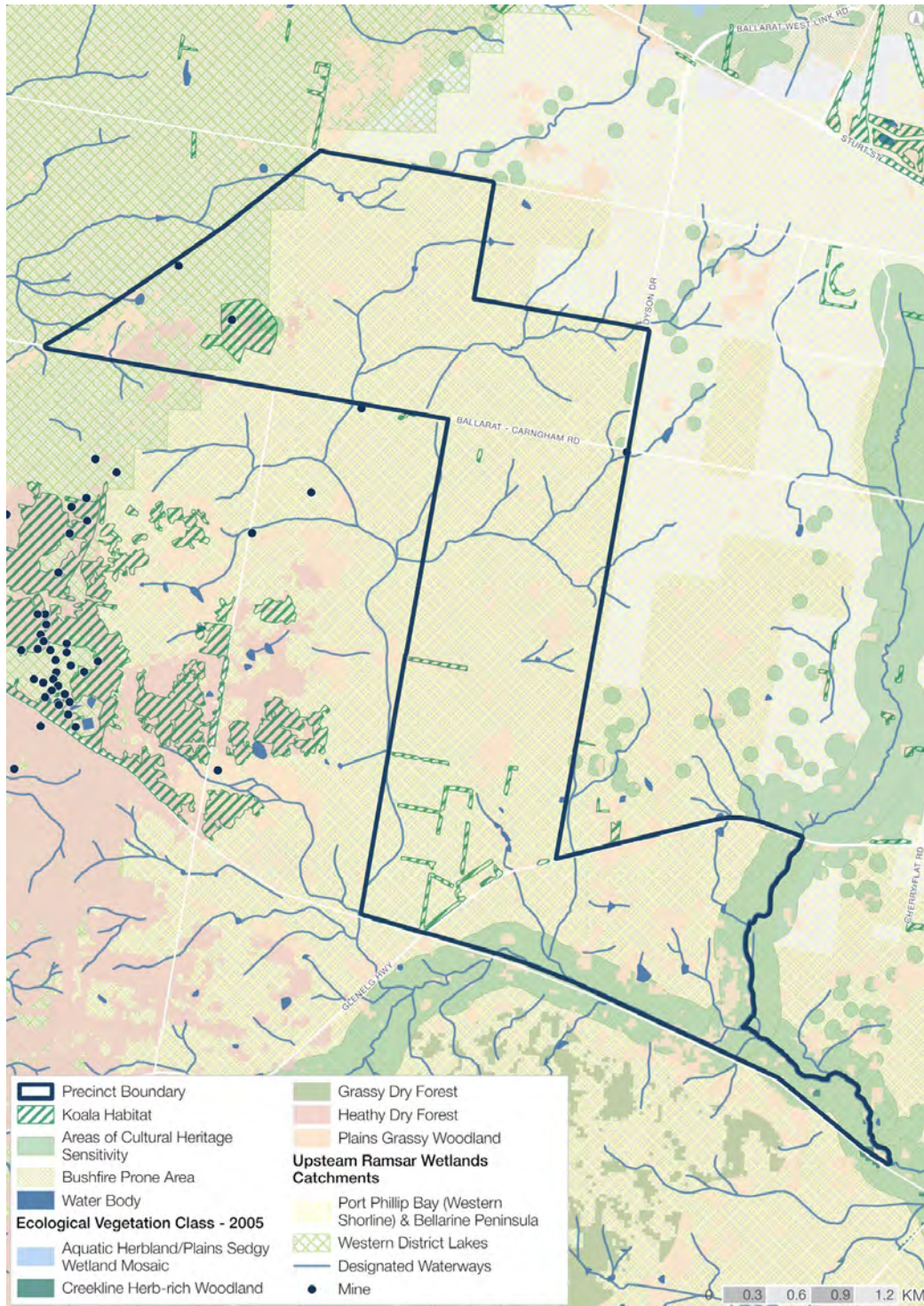
Map 4a Zoning



Map 4b Overlays



Map 4c Environment & Hydro Features



City of Ballarat > Growth Areas Framework Plan

North Western Growth Area

Irregular in shape, the North Western Growth Area encompasses an area of 500 hectares and is solely located within the suburb of Cardigan.

The area is zoned Comprehensive Development Zone (CDZ1) but there is no active planning control to facilitate development. A small portion of the Farming Zone (FZ) and Special Use Zone (SUZ5) exist within the eastern section.

The area consists of relatively open, flat broad hectare rural land. The area is separated in two by Remembrance Drive which bisects the site. The road is a VicRoads controlled roadway within the Transport Zone (TRZ2) and is also affected by the Heritage Overlay (HO154) which relates to the designation of the historic Ballarat Avenue of Honour. The southern part of the precinct interfaces with the Lucas estate, whilst the northern section interfaces rural living areas. The outermost point of the North Western Growth Area is 11.4km from the Ballarat Central Activity District.

Other land uses include a commercial tree plantation within the northern section of the area.

Surrounding land uses include:

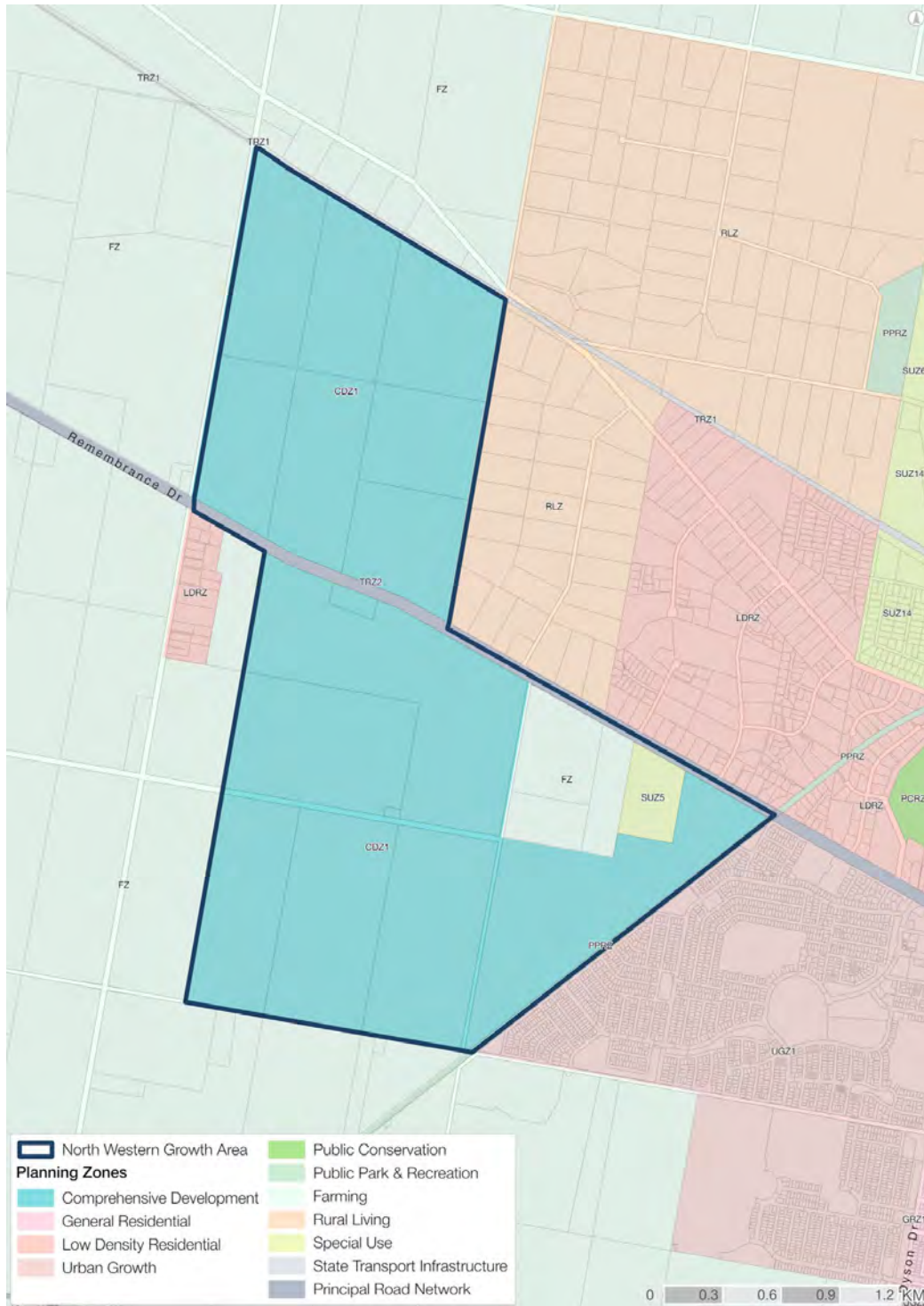
- The Maryborough-Ballarat Railway Line abuts the northern edge of the site
- Land to the west and south-west consists of broad hectare rural land. There is a small rural residential subdivision on the southeast corner of Remembrance Drive and Whites Road
- To the north east and east are large lot rural dwellings. The Ballarat Airport is further north east. Also to the east is the existing Lucas Estate
- To the south is the Western Growth Area.

Commentary on Boundaries

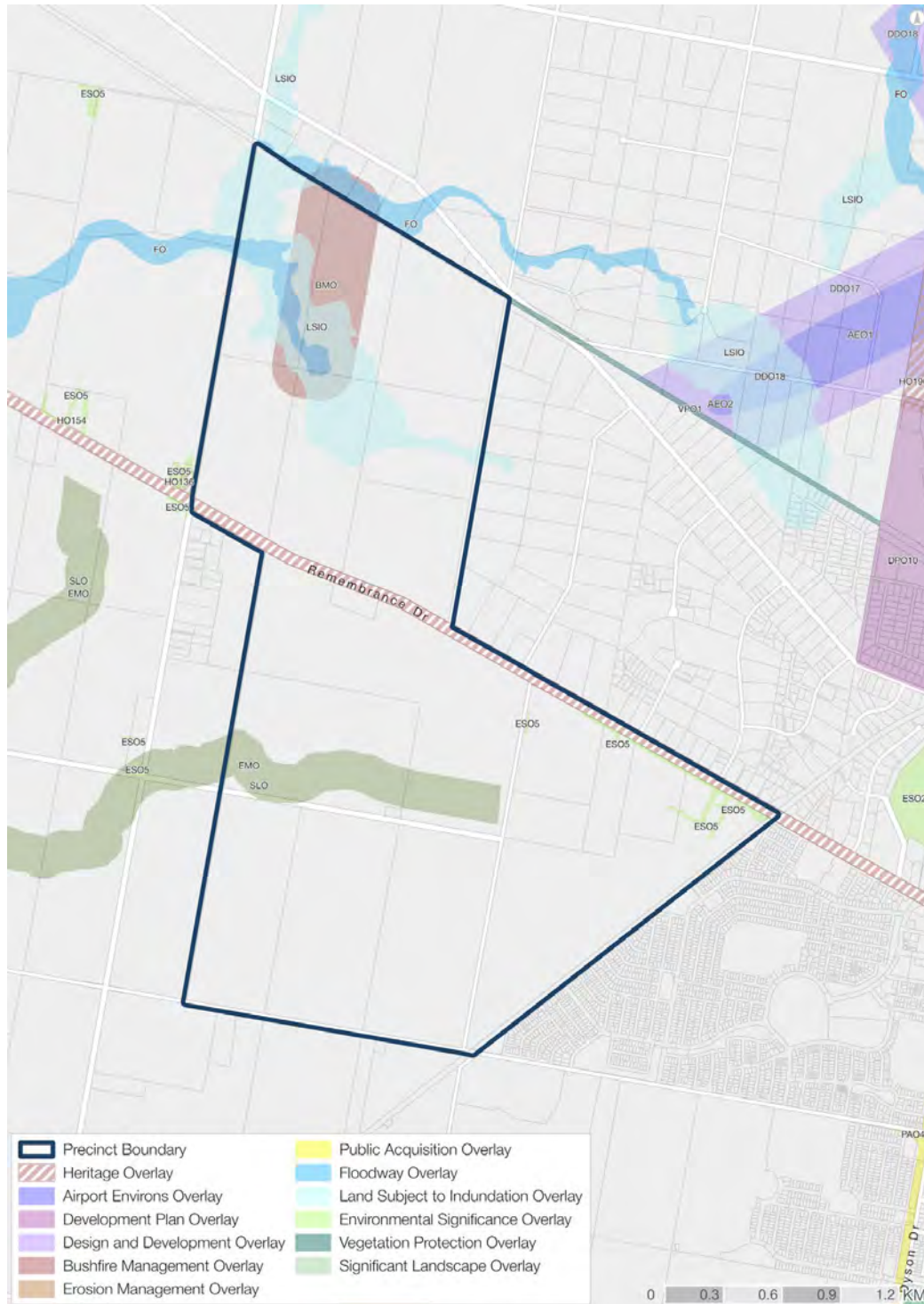
It is noted that at Council Meeting February 2022, incorrect boundaries were shown for the two Growth Areas. The triangular area bound by Remembrance Drive and the Skipton Rail Trail was shown incorrectly as being included within the Western Growth Area. The Growth Areas Framework Plan intends for this section of land to be included in the North Western Growth Area.



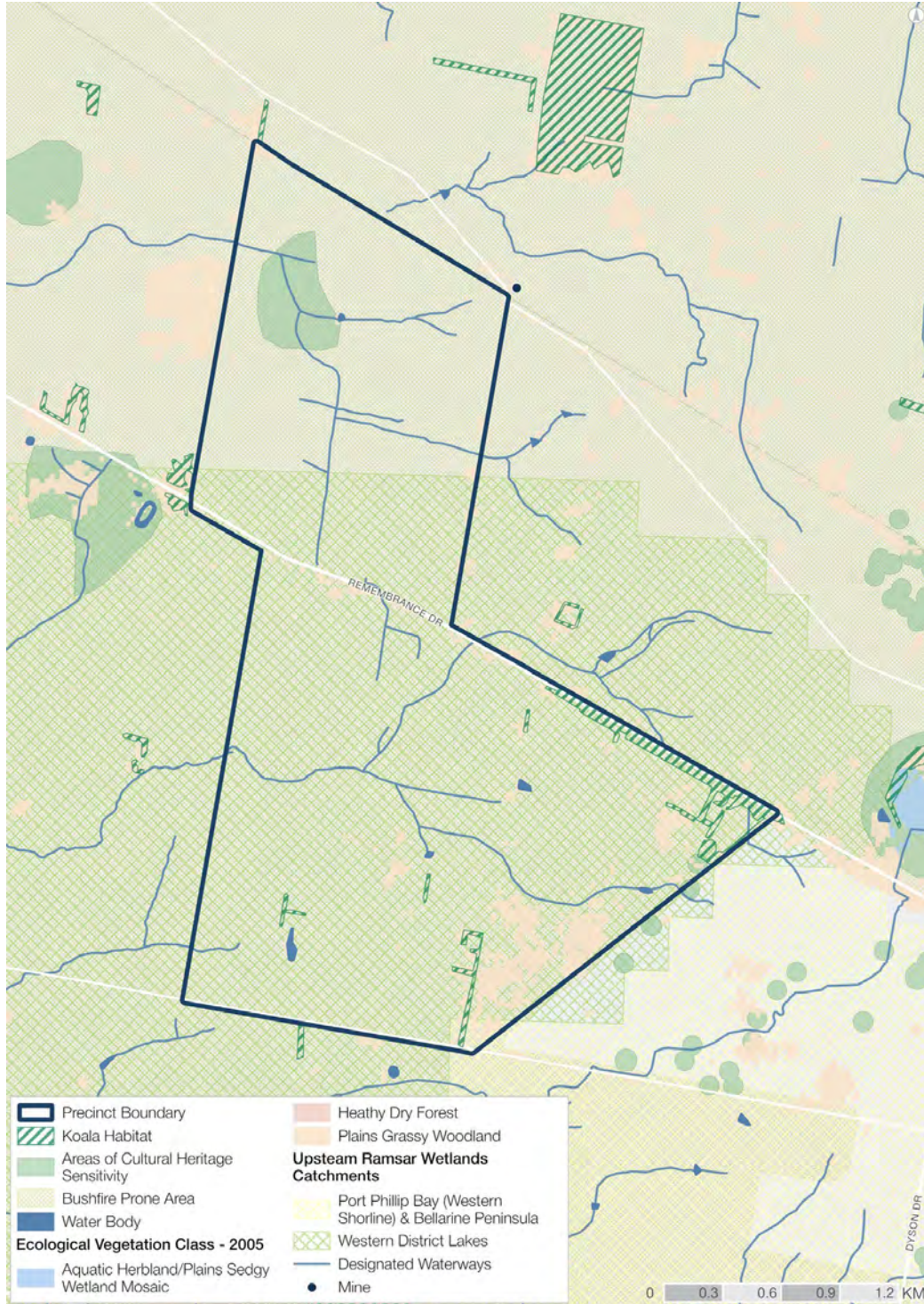
Map 5a Zoning



Map 5b Overlays



Map 5c Environment & Hydro Features



Precinct Features

The following section summarises the known existing conditions and capability to accommodate future development of the Growth Areas. The summary is based on the findings from the technical investigations undertaken as part of the Growth Areas Framework Plan and Long-Term Growth Options Investigation Paper. It is important to understand existing conditions to determine potential opportunities and constraints. The items discussed represent the known existing conditions and general planning considerations. Detailed analysis of these conditions will occur as part of the PSP development.

Western Growth Area

Natural Disaster Risk

- The Growth Area is affected by the Bushfire Prone Area
- The Bushfire Management Overlay has been applied to two portions of the site.

Environment

- The Environmental Significance Overlay (ESO5 Koala and Koala Habitat Protection) has been applied to some narrow strips in the north and south west of the site and a large area to the west of the precinct
- The Environmental Significance Overlay (ESO2 Streamside and Watercourse Protection) has been applied to the west of the precinct and runs along the precinct's western boundary
- Two likely primary koala habitats are identified in the precinct (either side of Ballarat-Carngham Road) with some scattered areas to the south of the precinct
- The Plains Grassy Woodland EVC is scattered throughout the growth area
- According to the Environment Protection and Biodiversity Conservation Act (EPBC) register, there are several matters of national significance known to occur within a 500 metre buffer of the growth area including wetlands of international importance, listed threatened ecological communities and listed migratory and marine species
- The Strategic Biodiversity Score for the importance of native vegetation in the precinct indicates that the area has a relatively low habitat value.

Water

- Several dams exist along waterways to the south
- Kensington Creek runs along the southern section of the eastern boundary
- Winter Creek runs along the southern boundary.
- Areas in the north are identified as being potentially impacted by the 1 in 100-year flood.

Landscape and Visual Sensitivity

- The area is sparsely vegetated, relatively flat, and low lying
- Low to moderate visual sensitivity is present throughout the area, with an area of high visual sensitivity in the south west due to the prevalence in views from elevated hillsides.

Heritage

- The Heritage Overlay (HO) does not apply to any land within the boundary or within 500 metres of the site boundary
- There are areas of Aboriginal cultural sensitivity along the Winter Creek and Kensington Creek in the southern part of the precinct
- Mapping Ballarat's Historic Urban Landscape (Context, 2013) identified that the area has multiple character areas including the Burrumbeet Plains Rural Character area, Haddon Hills Rural Character Area and the Bonshaw to Scotchman's Lead Mining Landscape Rural Character Area
- The Western Growth Area does not have any sites identified on the Heritage Inventory, under the Victorian Heritage Act 1995.

Existing Buffers

- No existing buffers extend into the precinct
- The Obstacle Limitation Surface (OLS) applies to a small portion of the site in the northern and eastern sections although is generally not applicable to structures below 45 metres in height.

Noise

- The Western Growth Area is located under the Ballarat Aerodrome primary runway (18/36 flight tracks), with the maximum event noise levels due to aircraft flyover predicted to be up to 80dB (A)
- The N contour study undertaken as part of the Master Plan will provide more accurate assessments of the effects of aircraft noise at ground level
- Road traffic noise from Glenelg Highway and future Western Link Road is also moderate.

Contamination

- No potentially contaminated land has been identified by an Environmental Audit Overlay (EAO)
- Historical mining activities and expired licenses and leases have not been identified on the site.

Geotechnical

- Most of the area consists of newer volcanic material which typically consists of basaltic clay overlying basaltic rock
- The southern portion of the area is a combination of hills of the underlying Castlemaine Supergroup bedrock with overlying recent alluvium and colluvium filling valleys and gullies
- Potential for land instability is considered low. Areas of localised instability may occur, particularly adjacent to the colluvial deposits in existing creeks and waterways.

Community Infrastructure and Open Space

- There are currently no community infrastructure, recreation or open space facilities within the Western Growth Area
- The closest community centres and early years facilities are located within the Ballarat West PSP area and Lucas
- The closest passive and open space facilities are the Skipton Rail Trail, Remembrance Drive trail and open space areas within the Ballarat West PSP area and Lucas
- The closest education facilities are within the Ballarat West PSP, Siena Catholic Primary School and Lucas Primary School
- The closest recreation reserves are Alfredton Recreation Reserve and Delacombe Stadium
- The closest art and cultural functions are located within the Ballarat CBD and include the Eureka Centre, Mining Exchange, Civic Hall, Her Majesty's Theatre and the Art Gallery of Ballarat.

Gateway Entrances

- The Western Growth Area forms a significant component of the south-western area of Ballarat. It interfaces with three major routes leading into central

Ballarat:

- Ballarat-Carngham Road
- Bells Road
- Glenelg Highway
- Cuthberts Road
- The routes provide a visual transition between rural and urban areas into Ballarat.

Drainage

- The overall topography within the Western Growth Area falls in a southern direction with a higher elevation area in the north and low point near Bells Road where it continues to fall east
- The precinct is under management by the Corangamite Catchment Management Authority.
- There are several designated waterways that have been previously defined
- The waterways in the area are ephemeral, meandering waterways that are slightly deeper and include occasional pools. These channels represent a chain of ponds type waterway but are too degraded to be considered of geomorphic value
- The major catchments within the Western Growth Area contribute to three different major watercourses
 - Burrumbeet Creek, Woody Yaloak River and Yarrowee River.

Activity Centres

- There are currently no activity centres within the Western Growth Area
- There are activity centres within the Ballarat West PSP area at Delacombe Town Centre and Lucas at Coltman Plaza – Lucas Shopping Centre.

Transport Network

- There are surrounding shared paths and on-road bike paths within the existing Ballarat West PSP and an off-road path along Remembrance Drive
- The Ballarat Skipton Rail Trail provides an unsealed dedicated cycleway which extends along the western interface of the site
- A Public Acquisition Overlay (PAO) affects a section of land to the west of the growth area and reserves land for the construction and widening of the road for the Ballarat Link Road.

Public Transport

- The closest point of the site is located approximately 2.5km from Wendouree Station and approximately 4.8km from Ballarat Station
- There are no existing bus services with any catchment within the site boundary
- The closest services are proposed bus routes located within the Ballarat West PSP.

City of Ballarat > Growth Areas Framework Plan



North Western Growth Area

Natural Disaster Risk

- The Bushfire Management Overlay applies to the northern part of the growth area and is associated with an existing tree plantation, where the associated fire risk would be removed once the plantation is harvested
- The Bushfire Prone Area applies to the whole site
- The Land Subject to Inundation Overlay (LSIO) and Flooding Overlay (FO) applies to a section of the site within the north and align with a remnant creek which has been significantly degraded due to rural activity in the area
- The Erosion Management Overlay affects a small portion of the 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
- A creek line with potential for erosion is north of Remembrance Drive.

Environment

- The Environmental Significance Overlay (ESO5 – Koala and Koala Habitat Protection) affects a section of land to the west of the Growth Area either side of Remembrance Drive, which is intended to prevent development within proximity of koala populations. There are also some small ESO5 areas in the southern portion of the precinct
- Regarding flora, a mosaic of Plains Grassy Woodland, Plains Grassland, Plains Grass Wetlands and Aquatic Herbland Ecological Vegetation Classes (EVCs), are noted to be concentrated mainly in the southeastern 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.

Noise

- The North Western Growth Area is located under the Ballarat Aerodrome primary runway (18/36 flight tracks), with the maximum event noise levels due to aircraft flyover predicted to be up to 85dB (A)
- The N contour study undertaken as part of the Master Plan will provide more accurate assessments of the effects of aircraft noise at ground level
- Road traffic noise from Remembrance Drive, Cuthberts Road and the Serviceton railway line is prominent.

Contamination

- No potentially contaminated land has been identified by an Environmental Audit Overlay (EAO) within the site
- With regard to expired mining licenses and leases, a mineshaft is located at the north east corner of the site (site ID 377047), however its current condition is unknown.

Geotechnical

- Based on topographical contours and geology, the potential for land instability over the site is generally considered to be very low. Areas of localised instability may occur, particularly adjacent to the colluvial deposits in existing creeks and waterways
- The Erosion Management Overlay (EMO) affects an area that extends beyond the growth area. This overlay aims to protect areas prone to erosion, landslip and other degradation by minimising land disturbance and inappropriate development
- The Significant Landscape Overlay (SLO) affects an area that extends beyond the growth area. This overlay aims to conserve and enhance the Yarrowee River Corridor Environs.

Community Infrastructure and Open Space

- There are currently no community infrastructure, recreation or open space facilities within the North Western Growth Area
- The closest community centres are located within the Ballarat West PSP area, Lucas and Cardigan Village
- The closest early years facilities are located within the Ballarat West PSP, Lucas and the Cardigan Village Uniting Kindergarten
- The closest passive and open space facilities are the Skipton Trail, Remembrance Drive Trail and open space areas within the Ballarat West PSP area and the suburb of Lucas
- The closest education facilities are within the Ballarat West PSP area and Siena Catholic Primary School and Lucas Primary School
- The closest recreation reserves are Alfredton Recreation Reserve and Delacombe Stadium
- The closest art and cultural functions are located within the Ballarat CBD and include the Eureka Centre, Mining Exchange, Civic Hall, Her Majesty's Theatre and the Art Gallery of Ballarat.

City of Ballarat > Growth Areas Framework Plan

Gateway Entrances

- The North Western Growth Area forms a significant component of the north-western area of Ballarat. It interfaces with two major routes leading into central Ballarat:
 - Remembrance Drive – significant tree lined street with a rural setting, transitioning from rural to urban Ballarat
 - Cuthberts Road – rural setting with a transition from rural to urban Ballarat.

Drainage

- The site generally falls in a north-western direction. The topography to the south of Remembrance Drive is separated and guided by ridge and trough lines which result in the land falling in south-western and north-western directions
- A portion of the northern section of the precinct is under management by Glenelg Hopkins CMA. The remainder of the precinct is under management by Corangamite Catchment Management Authority
- There are several designated waterways that have been previously defined
- Waterways in this area have been extensively modified by cropping activities and the presence of roads that dissect the flow paths. In many places the waterways do not have a clear and continuous channel and are instead wide, flat swampy areas. Many of the wet areas have had linear drainage structures excavated to promote drainage for agriculture
- The major catchments within the Western Growth Area contributes to three different major watercourses
 - Burrumbeet Creek, Woody Yalook River and Yarrooee River.

Activity Centres

- There are currently no activity centres within the North Western Growth Area
- The activity centres are within the Ballarat West PSP area at Delacombe Town Centre and Lucas at Coltman Plaza – Lucas Shopping Centre.

Landscape & Visual Sensitivity

- The area is sparsely vegetated with a gently sloping terrain and 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
- The Ballarat Avenue of Honour runs through the centre of the study area along Remembrance Drive and forms a significant feature of mature canopy trees. The adjacent areas provide a rural character setting for the Avenue

- Visual sensitivity across the area ranges from low to high. High visual sensitivity exists within the eastern and western portion of the area due to gently sloping terrain
- Mount Beckworth and Waubra Wind Farm are clearly visible from the site in the direction of north-west.

Heritage

- Heritage Overlay 154 (HO154) applies to the full extent of the Remembrance Drive Road corridor and relates to the Ballarat Avenue of Honour
- There are no Victorian Heritage Inventory (VHI) sites in the precinct
- Mapping Ballarat's Historic Urban Landscape (Context, 2013) identified that the area is within the Burrumbeet Plains Rural Character area
- There are also areas of Aboriginal cultural sensitivity within the North Western Growth Area including along the Ballarat Skipton Rail Trail. Four circular parcels of land, approximately 100 metres in diameter adjoin the trail. There is also a site to the north of the precinct around a waterway marked as an area of cultural sensitivity.

Public Transport

- The North Western Growth 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 services are proposed bus routes located within the Ballarat West PSP.

Walking and Cycling Networks

- There are no existing dedicated bicycle facilities between the site and the Ballarat Central Activity District
- The Ballarat Skipton Rail Trail provides an unsealed dedicated cycleway which borders the south east edge of the site
- There is also an off-road path along Remembrance Drive
- There are surrounding shared paths and on-road bike paths within the existing Ballarat West PSP that can be connected into as part of the future growth areas including along Dyson Drive.

Existing Buffers

- No existing buffers extend into the precinct
- The Obstacle Limitation Surface (OLS) applies to most of the site
- The extended centreline of Runway 05/23 of the Ballarat Airport extends directly over the Northwest Growth Area.

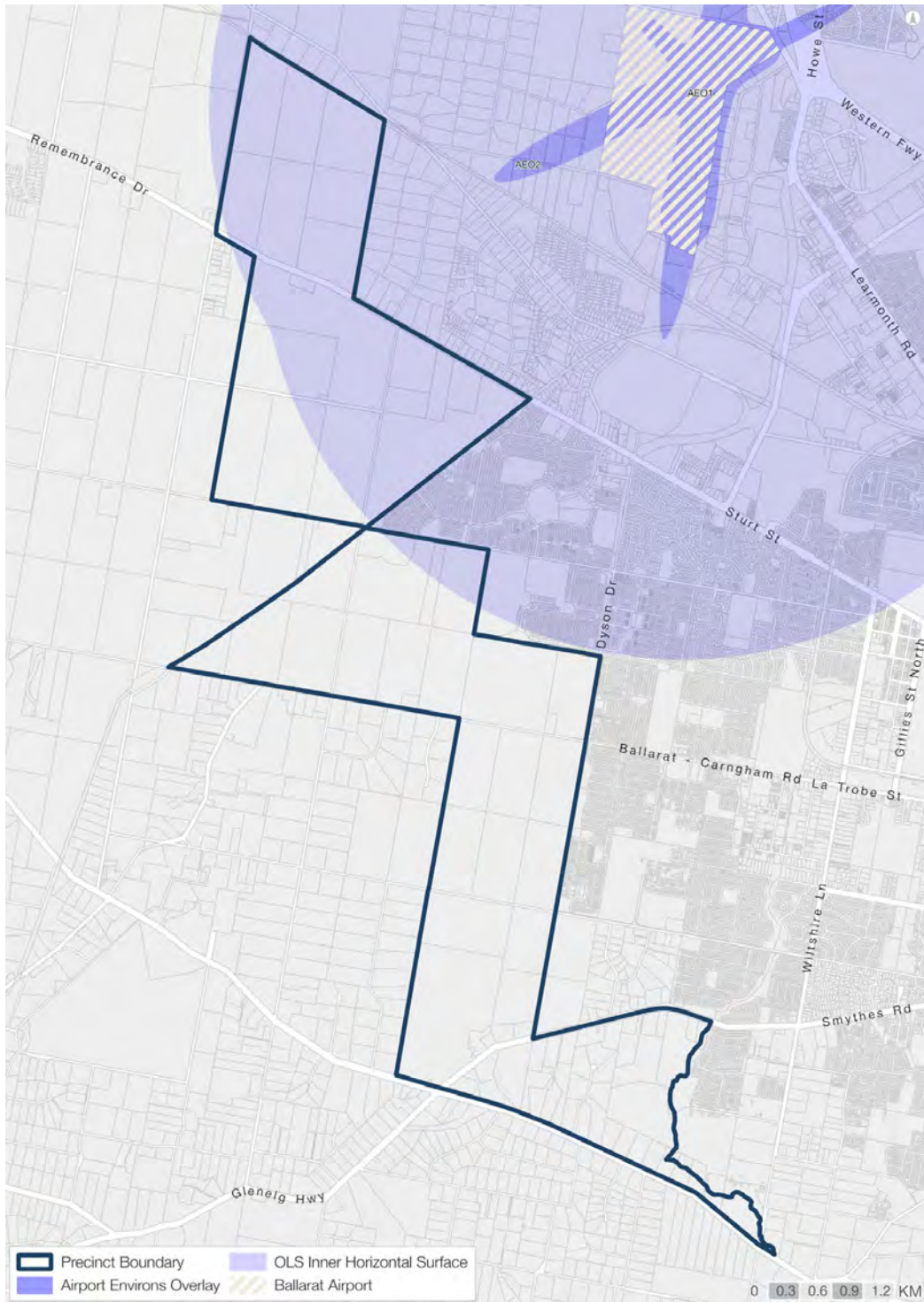
Map 6a Active Public Transport



Map 6b Community Context



Map 6c Aviation



Defining the Growth Area Framework Plan

Population and Dwelling Demand

The SGS Ballarat Future Housing Needs Analysis outlines Ballarat's population demand and was undertaken as part of the Ballarat Housing Strategy.

In 2021, there were 50,350 dwellings recorded in Ballarat.¹

Housing stock in Ballarat increased by 14,049 dwellings between 2006 and 2021 at an average rate of 2.2 per cent per annum.²

The SGS *Ballarat's Future Housing Needs Analysis* identified three population projection scenarios between 2021 - 2041:

- The low growth scenario (based on the Victoria in Future (VIF) population projections) estimates an increase of 43,423 people at an average annual growth rate of 1.6%
- The moderate growth scenario (based on historical growth rates and Centre for Population commentary) estimates an increase of 50,415 people at an average annual growth rate of 1.8%
- The high growth scenario (based on recent high population growth) estimates an increase of 57,947 people at an average annual growth rate of 2.1%.

City of Ballarat has determined that the high growth scenario is the most appropriate scenario to plan for.

The high growth scenario will result in demand for an additional 28,691 dwellings over the period 2021-2041 based on a household size of 2.0.

This equates to 1,448 dwellings required per year.

Based on the City of Ballarat's policy aspirations to achieve a 50:50 split of new dwellings across greenfield and infill, greenfield areas will need to provide 724 dwellings per year.

Based on a common scenario of 70:30 dwelling split between greenfield and infill areas, greenfield areas will need to provide 1014 dwellings per year.

In 2022, Ballarat West PSP provided 846 completed dwellings and 931 titles were issued.

1. Based on Victoria in Future (2023) and SGS Ballarat's Future Housing Needs Analysis (2023)

2. SGS Ballarat's Future Housing Needs Analysis (2023)

Existing Greenfield Zoned Land Supply

Existing Zoned Greenfield Land Supply	Dwelling Capacity Assumption	50:50 Annual Rate Years of Supply	70:30 Annual Rate Years of Supply
Ballarat West PSP ³	10,068	13.9 years	9.9 years
Alfredton West PSP ³	1,006	1.3 years	0.9 years
Northern Growth Area (Core Area) ⁴	6,600	9 years	6.5 years
Total	17,674	24.3 years	17.3 years

Unzoned Greenfield Land Supply

Unzoned Greenfield Land Supply	Dwelling Capacity Assumption	50:50 Annual Rate Years of Supply	70:30 Annual Rate Years of Supply
Northern Growth Area (Expanded Area)	2,600	3.6 years	2.5 years
Western Growth Area	17,203	23.8 years	16.9 years
North Western Growth Area	10,800	14.9 years	10.6 years
Total	30,603	42.3 years	30 years

Commentary

Under both scenarios, there is currently sufficient zoned residential land supply in the existing growth areas to accommodate 15 years of growth (consisting of greenfield and infill supply) as required by Victorian Government policy.

There are existing servicing constraints within the southern portion of Ballarat West that may limit supply for new housing. The City of Ballarat will continue to engage with Central Highlands Water to resolve potential servicing constraints.

The City of Ballarat will continue to review and monitor land supply on an annual basis to ascertain the take up rate of existing zoned greenfield land supply and whether PSP preparation needs to be brought forward.

Based on expected annual dwelling rates, the City of Ballarat currently has between 17.3 and 24.3 years of zoned land supply. This excludes the take up of the Northern Expanded Area and Cambrian Hill.

Depending on the dwelling uptake rate, in 2-9 years (2026 – 2033) there will be 15 years of greenfield land supply. The City of Ballarat's existing greenfield land supply will be fully depleted between 2041 and 2048.

The future growth areas will provide between 28 – 40 years of greenfield land supply.

3. As at 31 December 2023

4. PSP estimated to be gazetted in mid 2026

Urban Development Objectives

The Framework Plan provides high-level guidance for the development of Ballarat's future growth areas and represents the city's aspirations for the future growth areas. Urban Development Objectives have been developed and should be followed throughout the planning of these growth areas:

Enabling a logical and sequenced roll out of future greenfields land and supporting orderly planning:

- To achieve an appropriate split of new dwellings across greenfield and infill areas in line with planning policy where new housing is encouraged in areas where there is existing infrastructure and facilities
- To plan for well-designed, well-serviced and sustainable communities that create a unique sense of place, character and identity
- To integrate transport and land use planning
- To stage development to ensure the efficient and orderly provision of infrastructure and services to ensure that new development aligns with the delivery of necessary infrastructure and community facilities
- To enable '10 Minute City' communities that support complete, livable neighbourhoods where future residents have convenient and safe access to amenities and services
- To ensure that the urban design of new neighbourhoods promotes attractive, functional and well-planned environments
- Achieve a density of 20 dwellings per hectare.

Protecting and enhancing the landscape and visual amenity of the area:

- To protect and enhance important visual attributes and vistas, including landmarks, site features and gateways
- To protect and enhance natural assets and landscape features
- To reduce the visual impact of development within high visual sensitivity areas
- To recognise the urban/rural interface that the study area provides as the edge of Ballarat
- To manage interfaces with environmental assets, farming uses and rural living areas
- To provide a continuous development pattern in areas that are adjacent to the existing growth areas.

Providing useable and high-quality Open Space and Connectivity across the area:

- To provide an integrated open space network that incorporates environmental values, natural assets and existing landscape character
- To incorporate cycling and walking trails within the public open space network
- To connect new open space networks with existing networks.

Enhancing the local environment and integrating sustainable practices:

- To identify, enhance and protect significant flora and fauna habitats through an overarching biodiversity conservation strategy which will be prepared as part of each Precinct Structure Plan
- To ensure that flooding and stormwater management will maintain and enhance the predevelopment hydrology of the area and minimize downstream impacts
- To incorporate Kensington Creek and Winter Creek as future reserves and consider appropriate interfaces to protect and enhance biodiversity values
- To protect and rehabilitate waterway corridors and ensure their function and biodiversity values are not negatively impacted by development
- To support ecological and waterway corridors that provide habitat, riparian zones and climate resilient vegetation
- To incorporate integrated water management initiatives at the lot, street and precinct scale
- To achieve a net zero future for the precinct in line with the *City of Ballarat Net Zero Emissions Plan*
- To incorporate Environmentally Sustainable Design (ESD) principles across all future developments
- To incorporate the design of sustainable subdivision layouts and orientation which reduces energy consumption and encourages more resilient communities
- To encourage the adoption cleaner energy technologies and infrastructure across the growth area and implemented as suitable within each Precinct Structure Plan
- To achieve a 40 per cent tree canopy cover target by increasing density of planting in landscaped areas, public and active open spaces

- To encourage tree canopy in public realm is maximized and contribute successfully to neighbourhood amenity
- To ensure that existing significant vegetation is retained through the preparation of a Native Vegetation Precinct Plan or similar for each Precinct Structure Plan
- To encourage green-blue connections designed to promote flora and fauna by distributing water to soil through natural filtration and irrigation
- To provide a system of stormwater retardation systems and waterways to ensure that runoff rates achieve the pre-development peak flow rates
- To establish appropriately designed constructed waterways that connect with surrounding areas
- To co-locate wetlands and open space with other uses to support irrigation as an end use.

Fostering a thriving community and social wellbeing:

- To locate community infrastructure within walkable catchments of residential areas
- To plan for community infrastructure that supports projected population demand
- To design community infrastructure that is flexible, adaptable and multi-purpose
- To locate kindergartens within all multipurpose community centres and/or Government Primary Schools
- To provide arts and cultural facilities within all multipurpose community centres.

Supporting an integrated transport network which encourages walking and cycling, reduced car dependency and promotes community connectivity:

- To develop a connected, safe and efficient transport network that provides road, walking, cycling and public transport services that connect the growth areas to the existing Ballarat urban area
- To encourage walking and cycling as the central design element of all neighbourhoods to promote a shift from the private vehicle to active transport
- To promote public transport as a convenient alternative to the private vehicle, providing access across the City of Ballarat
- To limit car dependency, and provide active transport infrastructure options and connections to surrounding areas

- To plan for well-connected growth areas that enable multimodal trips, with sustainable transport as the dominant mode
- To provide dedicated and protected bicycle paths along arterial roads, separated from pedestrian facilities
- To provide shared alternate cycling and shared path facilities along waterways and reserves
- To provide an active and safe connection with the Ballarat-Skipton Rail Trail
- To ensure that the sequencing of new communities aligns with the delivery of public transport
- To ensure that new development does not compromise the safe operation or result in unreasonable levels of congestion for existing street networks.

Preserving the valued cultural heritage of the area:

- To preserve and manage important heritage assets in the region including places of significance for Aboriginal people and areas of post contact heritage significance
- To actively engage with the Wadawurrung Aboriginal Corporation as the Registered Aboriginal Party in relation to all Aboriginal cultural and heritage matters as required the Aboriginal Heritage Act 2006
- To provide visibility of aboriginal history and culture and promote suitable design features in the urban landscape
- To encourage the use of indigenous plants and traditional materials that have significance to the Aboriginal community in landscaping of public and open spaces
- To recognise the Avenue of Honour as a key valued post-contact heritage, specifically as it sits within the rural setting of the precinct
- To support the curtilage of registered heritage places and protect identified places, incorporating them into the urban landscape as suitable and appropriate.



Encouraging employment opportunities and establishment of accessible activity centres:

- To locate activity centres within walkable catchments of residential areas
- To locate services and activity centres on potential public transport routes
- To provide infrastructure and facilities that enable multimodality and sustainable transport modes as the dominant mode
- To provide local employment opportunities
- To plan for retail needs that supports projected population demand
- To consolidate a range of land uses and facilities
- To ensure that activity centres complement the existing activity centre network of Ballarat.

Supporting a continuous supply of housing and diversity of housing:

- To encourage medium density requirements which deliver a compact and well designed urban form
- To encourage new development which delivers a diverse mix of housing options throughout each neighbourhood
- To encourage higher density residential development in locations close to transport, infrastructure and services
- To create neighbourhoods with high amenity which promotes strong local identity and character
- To provide affordable housing options closer to jobs, transport and services
- To encourage delivery of affordable and social housing as appropriate across all neighbourhoods.

Future Growth Areas

The following section outlines anticipated growth supported by a Future Urban Structure Plan and expected infrastructure requirements.

Western Growth Area

Estimated Growth

- Total growth area - 1035ha
- Total residential area - 862ha
- Anticipated dwellings - 17,203
- Anticipated population - 43,000
- Total retail floorspace - 33,853 sqm
- Potential employment (FTE) - 1,258

Infrastructure Requirements

Transport

Road upgrades are required along:

- Finchs Road
- Cuthberts Road
- Ballarat-Carngham Road
- Latrobe Street
- Wiltshire Lane
- Greenhalghs Road
- Bells Road
- Dyson Drive
- Learmouth Street

Intersection upgrades required along:

- Finchs Road and Cuthberts Road
- Finchs Road and Ballarat Carngham Road
- Ballarat Carngham Road and North-South Collector Road
- Ballarat Carngham Road and Wiltshire Lane
- Bells Road and North-South Collector Road

Local roads, bicycle lanes and bus stops are also required within the Growth Area.

Drainage

- A network of 20 wetland retarding basins with waterway corridors and associated drains.

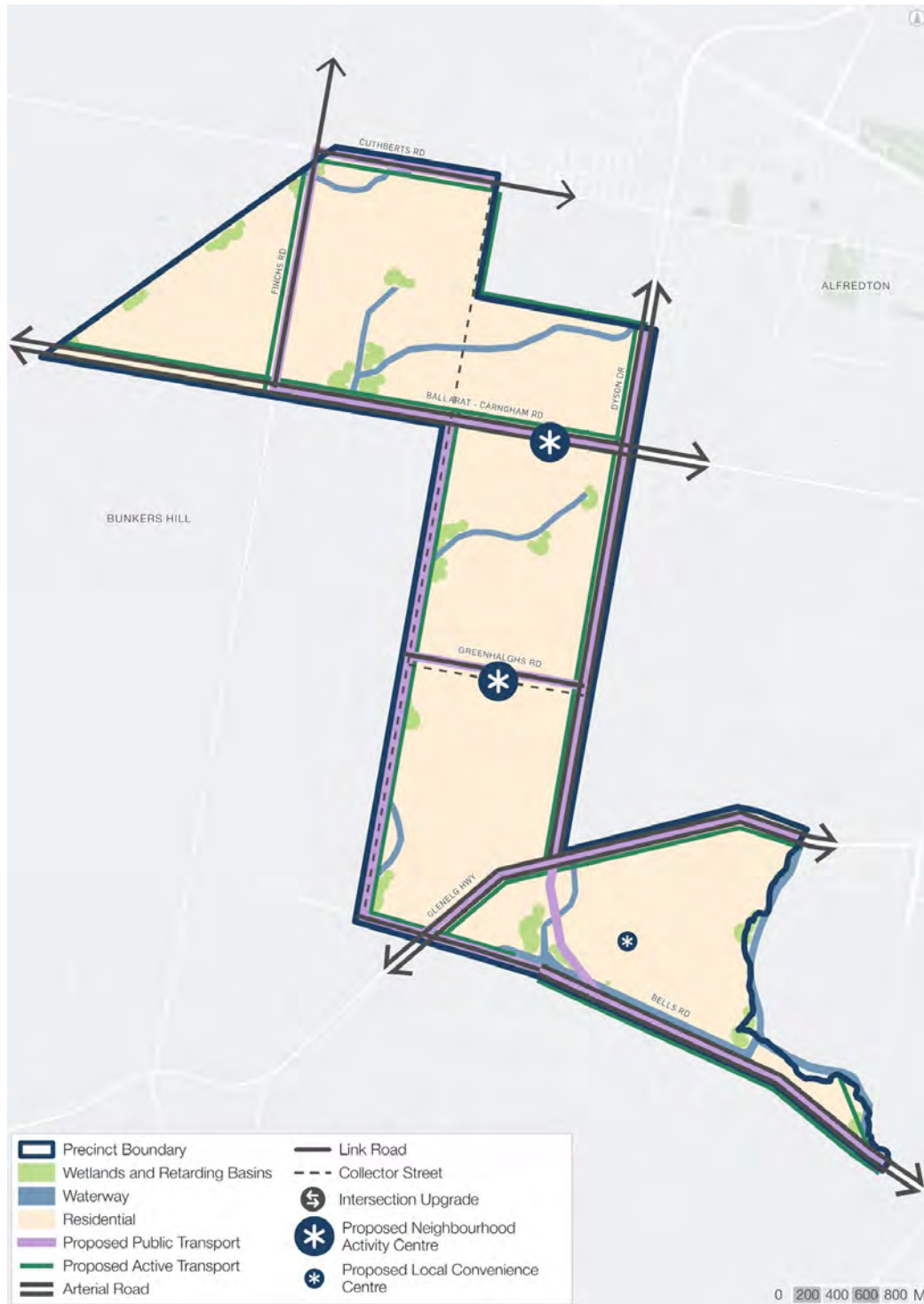
Community Infrastructure

- 2-3 (0.8 hectares each) x Level 1 Multipurpose Community Centre
- 2 (1.2 hectares each) x Level 2 Multipurpose Community Centre
- 5 (54 hectares in total) x Active Open Space
- 3 Sports Pavillions (serving 2 playing areas)
- 2 Sports Pavillions (serving 3 playing areas)
- 16-24 Sessional Kindergarten rooms
- 5.4 Maternal & Child Health rooms
- 6 Government Primary Schools
- 1.7 Government Secondary Schools

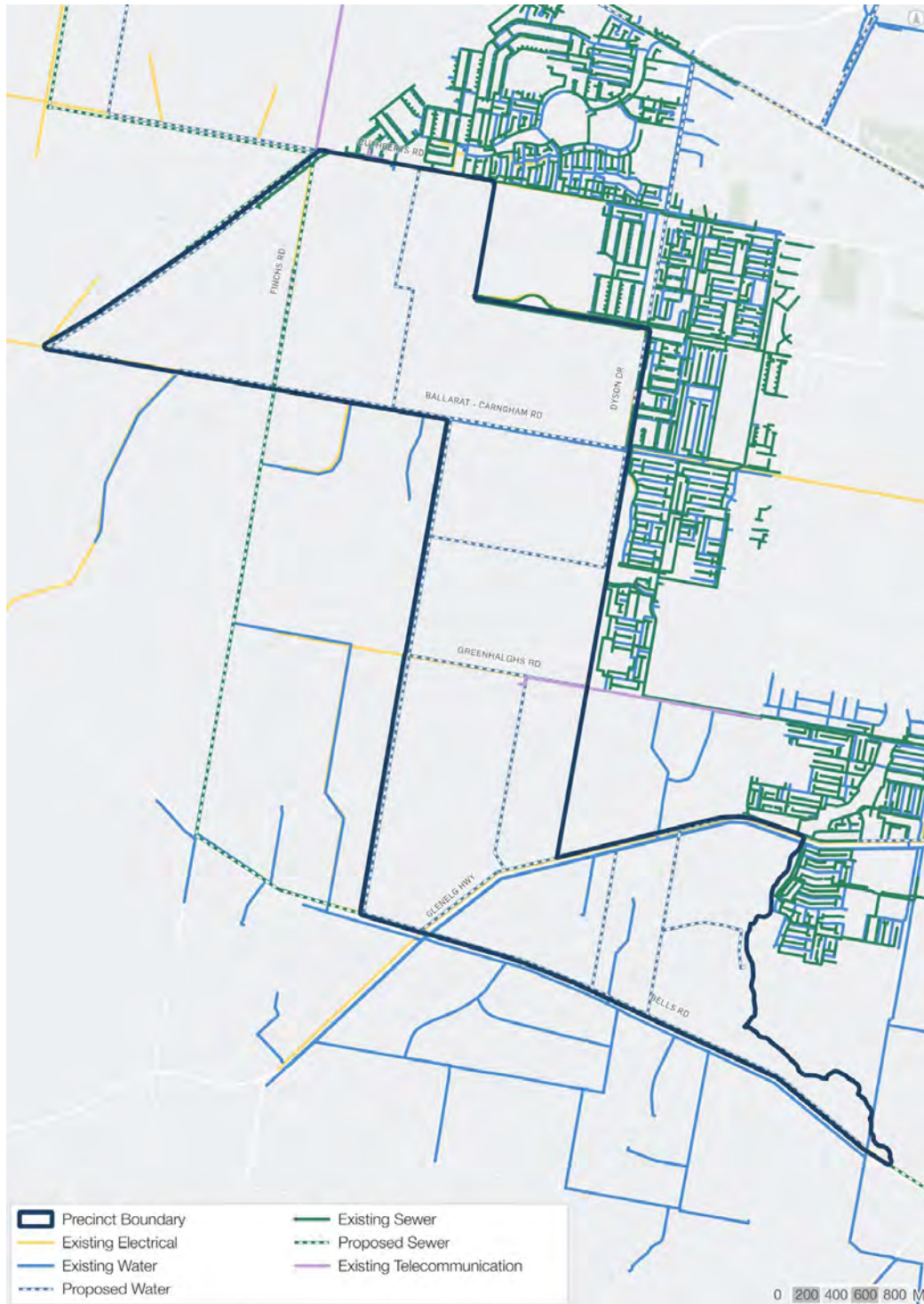
Retail

- 1 x Local Convenience Centre
- 2 x Neighbourhood Activity Centre

Map 7a Future Urban Structure Plan



Map 7b Utilities



North Western Growth Area

Estimated Growth

- Total growth area – 698ha
- Net developable area – 540ha
- Anticipated dwellings – 10,800
- Anticipated population – 27,000
- Total retail floorspace – 18,892 sqm
- Potential employment (FTE) – 777

Infrastructure Requirements

Transport

Road upgrades are required along:

- Draffins Road
- Dowling Road
- Railway Interface Road
- Remembrance Drive
- Finchs Road
- Cuthberts Road
- Ballarat Link Road
- Blind Creek Road
- Smarts Hill Road
- Skipton Rail Trail Interface Road

Intersection upgrades required along:

- Remembrance Drive and Ballarat Ring Road
- Remembrance Drive and Ballarat Link Road
- Sturt Street and Gillies Street
- Remembrance Drive and Skipton Rail Trail Interface Road
- Remembrance Drive and Finchs Road
- Remembrance Drive and Dowling Road
- Remembrance Drive and Draffins Road/Whites Road

Additional local roads are required within the Growth Area.

Drainage

- A network of 11 wetland retarding basins with waterway corridors and associated drains.

Community Infrastructure

- 1 (0.8 hectares each) x Level 1 Multipurpose Community Centre
- 1 (1.2 hectares each) x Level 2 Multipurpose Community Centre
- 1 (1.5 hectares each) x Level 3 Multipurpose Community Centre
- 3 (30 hectares in total) x Active Open Space
- 2 Sports Pavillions (serving 2 playing areas)
- 1 Sports Pavillion (serving 3 playing areas)
- 9-14 Sessional Kindergarten rooms
- 3.0 Maternal & Child Health rooms
- 3 Government Primary Schools
- 1 Government Secondary School

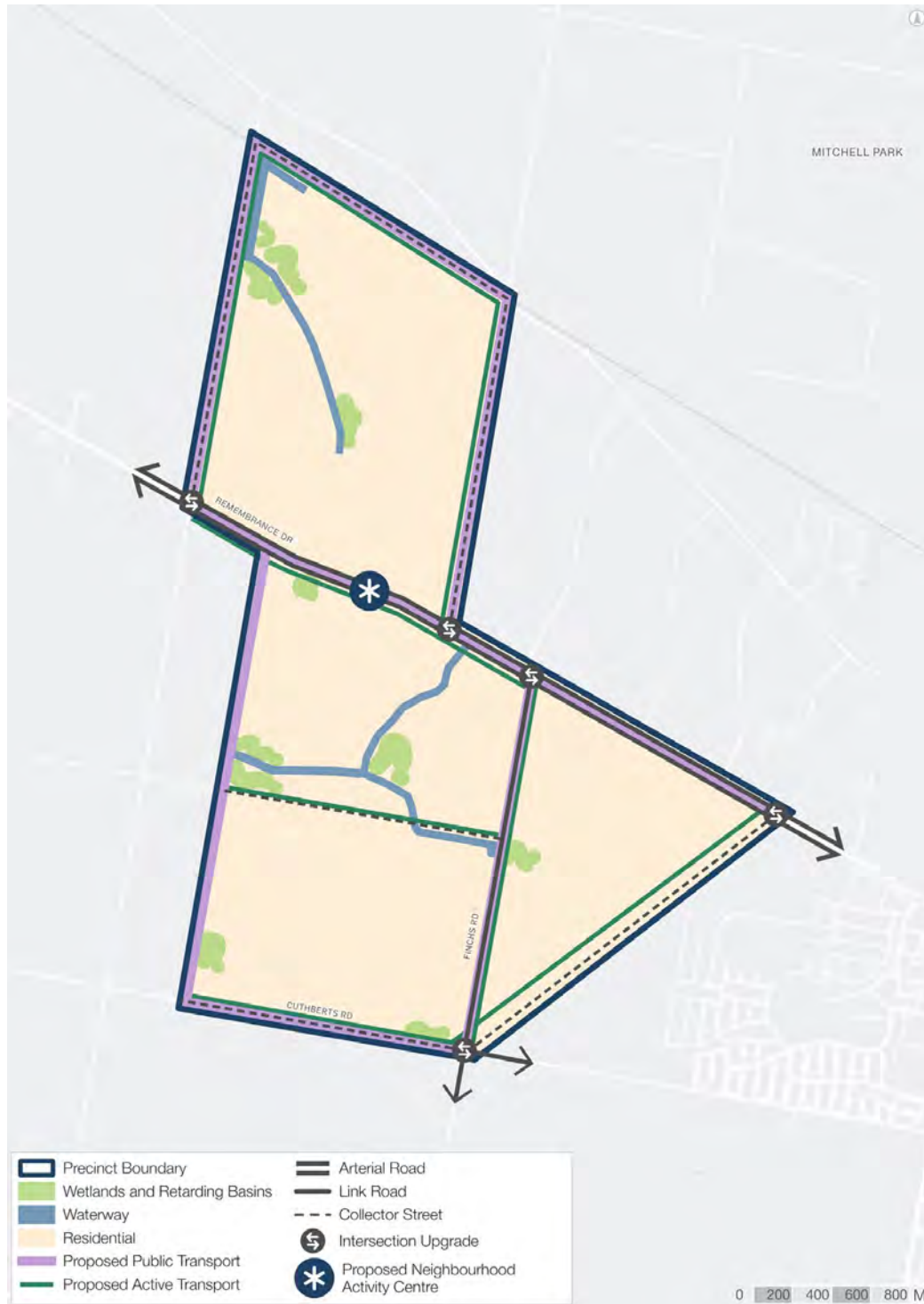
Retail

- 1 x Neighbourhood Activity Centre

Other Infrastructure Requirements

- 2 Non-Government Primary Schools and 1 Secondary School are also required for both growth areas
- A Regional Active Open Space of 30 hectares (for both growth areas) is required to be investigated
- An Indoor Recreation Centre (capable of catering for up to 8 courts under a high development scenario) may be required for both growth areas and should be in the North Western Growth Area
- Recommendations in this section should be largely followed throughout the planning process and should be further explored through technical work at a precinct level as part of the PSP preparation.

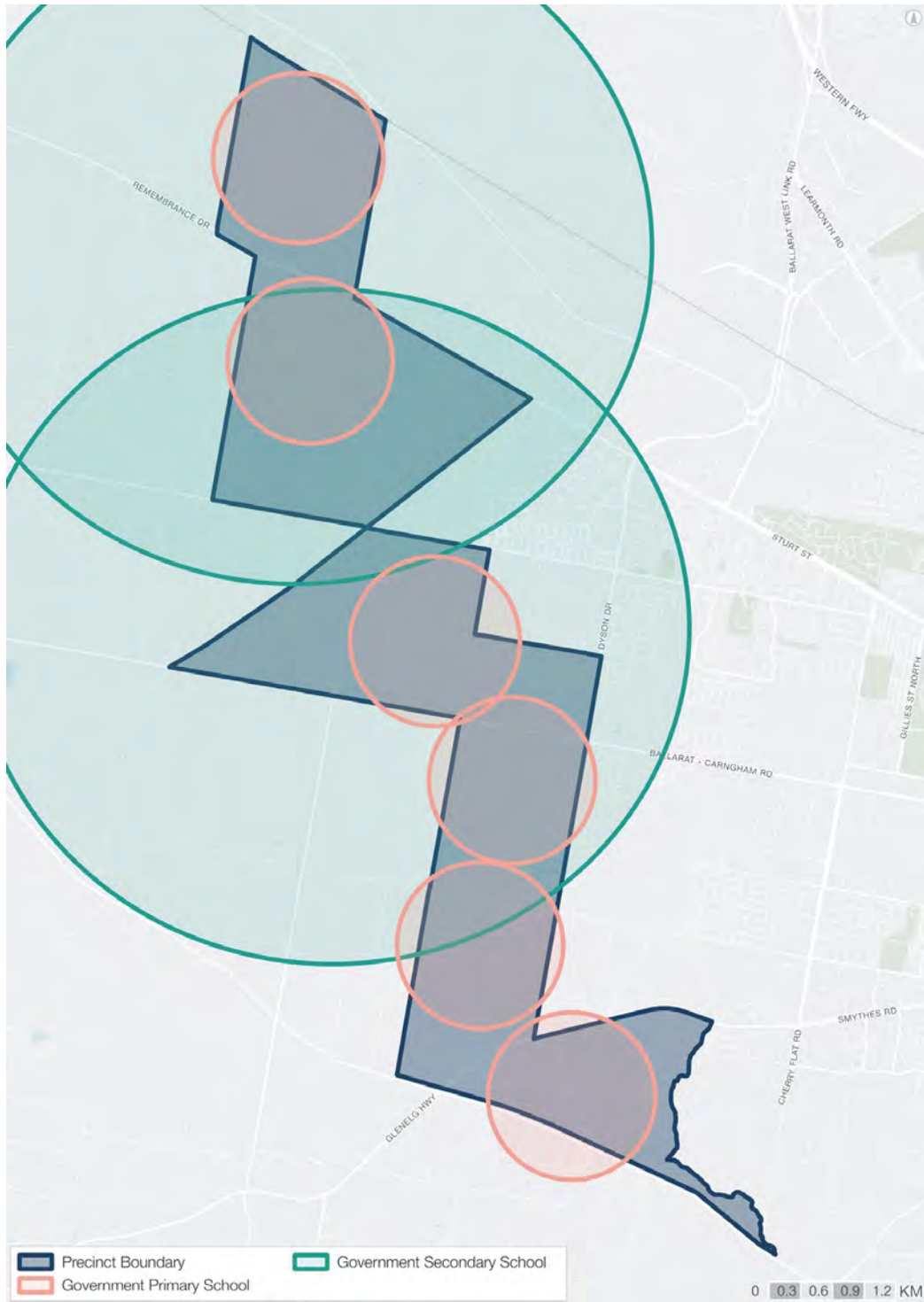
Map 8a Future Urban Structure



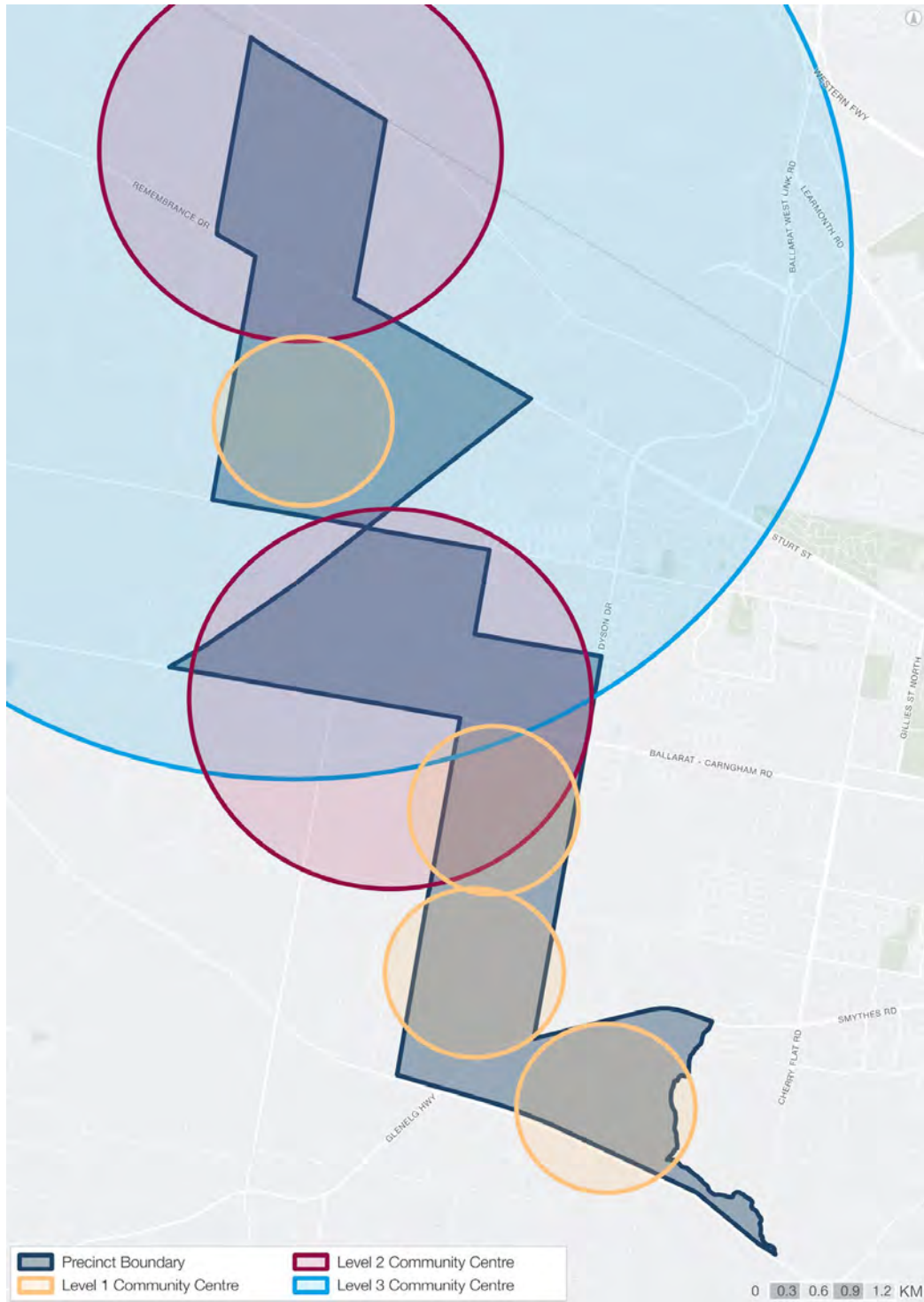
Map 8b Utilities



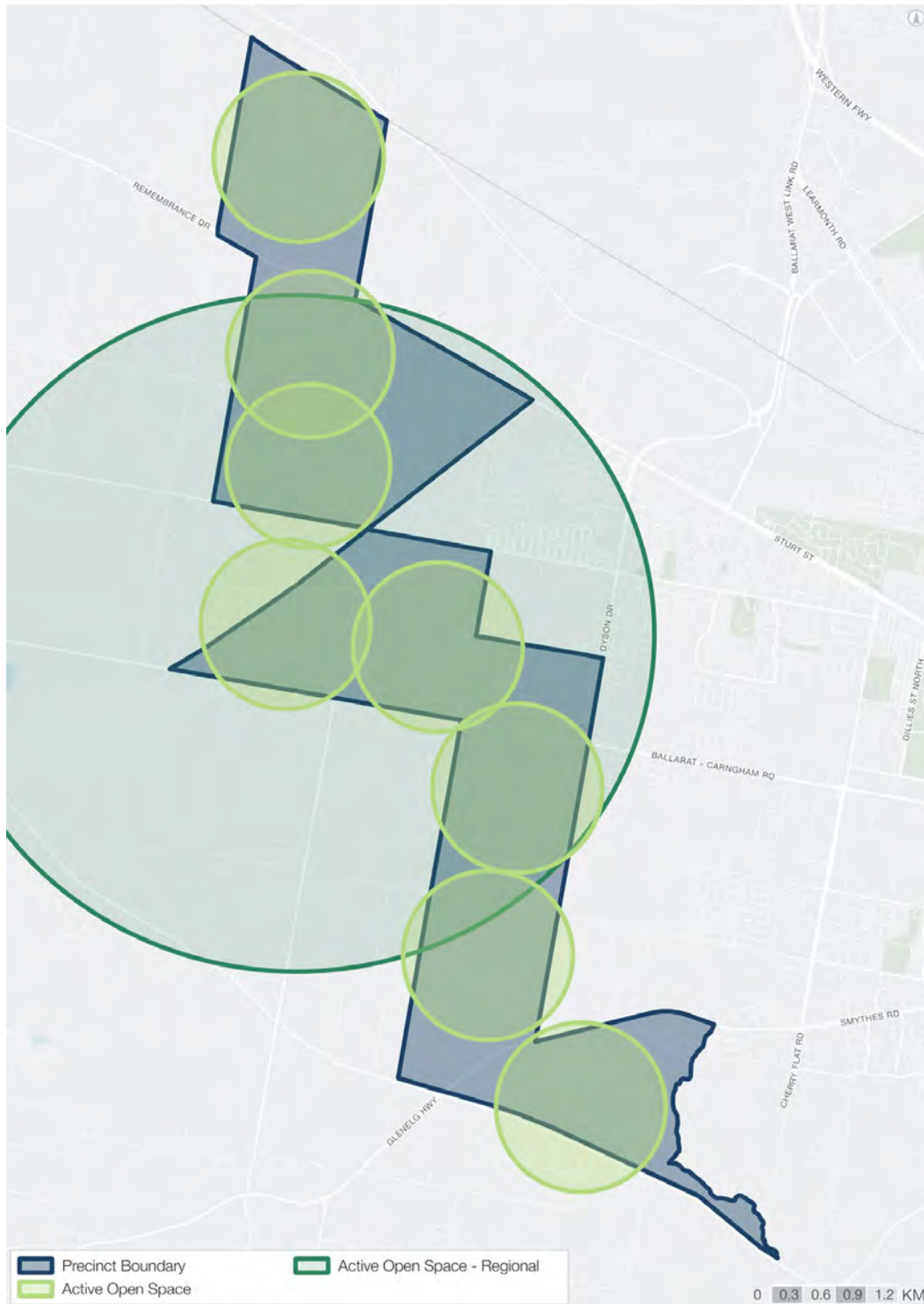
Map 9a Future Government Schools



Map 9b Future Community Centres



Map 9c Future Active Open Space



Key Growth Actions

The Key Growth Actions have been developed in response to the findings from the technical studies undertaken for the Growth Areas Framework Plan and Long-Term Growth Options Investigation. The actions represent known opportunities and issues that will need to be resolved as part of the PSP preparation and beyond.

Number	Action	Growth Area
HERITAGE		
1	Undertake Cultural Values Assessment of the growth areas prior to PSP preparation	W/NW
2	Undertake heritage technical investigations that test World Heritage management requirements and consider the Ballarat Avenue of Honour*	W/NW
3	Undertake heritage technical investigations that investigate potential areas of Aboriginal Cultural Heritage Sensitivity within the Growth Areas*	W/NW
4	Undertake heritage technical investigations that investigate historical mining, mining licenses and leases in the area*	W/NW
LAND CAPABILITY		
5	Undertake land capability investigations to determine whether mining occurred in the growth areas and what management is required of any potential hazards	W/NW
6	Investigate potential areas of land contamination and remediation required as part of urban development in accordance with EPA Victoria guidelines and local policy	W/NW
7	Investigate requirements for development proposed on basaltic clay	W
LANDSCAPE & VISUAL SENSITIVITY		
8	Investigate low density residential zoning in parts of sub precinct 2 to limit visual impact of development	NW
9	Investigate low density residential zoning in parts of the southern and western areas to limit visual impact of development	W
10	Undertake a design and planning study to manage the interface of urban and rural land uses	W/NW
BUSHFIRE		
11	Investigate bushfire risk by undertaking a detailed bushfire assessment in accordance with State Planning Policy Framework	W/NW
12	Investigate whether the existing Bushfire Management Overlays still apply based on the existing conditions of the site	W/NW
FLOOD RISK & MITIGATION		
13	Determine a flood risk and mitigation solution, building on the Alluvium Surface and Stormwater Management Strategy 2024	W/NW
14	As per the recommendation in the <i>Alluvium Surface and Stormwater Management Strategy 2024</i> , technical investigations should consider the Western Growth Area boundary to incorporate the entire waterway reach and determine whether the PSP should be expanded to include this area	W

Number	Action	Growth Area
BIODIVERSITY		
15	Investigate any potential impacts on the biodiversity value of the Haddon Common Bushland Reserve	W
16	If Growling Grass Frogs are identified in the area, habitat wetland areas are to be provided within drainage reserves to accommodate growing grass frog habitat together with an appropriate shared funding mechanism	W/NW
WATERWAYS		
17	In lieu of any local waterway corridor guidelines, use Melbourne Water's Waterway Corridor Guidelines to determine appropriate waterway corridor widths	W/NW
ADVERSE AMENITY		
18	Investigate the amenity impact (noise and odour) and health risks of residential development located adjacent to rail corridors, major roads, rural living and farming areas	W/NW
19	Consider the outcomes of the new Ballarat Airport Strategy and Master Plan and associated number-above or 'N' contours	W/NW
20	Investigate how the commercial tree plantations may impact development	W/NW
21	Determine whether the Employment Lands Strategy identifies future employment land supply near the growth areas and investigate its impact on potential development	W/NW
TRANSPORT		
22	Undertake a traffic and transport assessment building on the One Mile Grid Traffic and Transport Assessment 2024	W/NW
23	Undertake investigations to determine an alternative transport solution to Remembrance Drive upgrades	NW
24	Facilitate improved sustainable transport services that enable walking and cycling as viable and dominant transport modes, including: <ul style="list-style-type: none"> • Provision of dedicated off-road bicycle paths along arterial routes, separated from pedestrian facilities; • Provision of alternate cycling and shared path facilities for recreation along waterways and reserves. At the time of writing, these features are not yet identified; • Ballarat-Skipton Rail Trail as an active transport connection; • Priority crossings for shared paths and bicycle paths at uncontrolled side-road intersections; • Signalised pedestrian crossings where signalised intersections are otherwise not provided near major destinations; 	W/NW
25	Facilitate multimodality (considering private and shared modes available) and incorporate of mobility hubs in the transport network	W/NW
26	Work with Department of Transport (DTP) and relevant Government agencies to confirm the alignment, funding, delivery and construction of the Ballarat Link Road	W/NW
27	Work with DTP and relevant state agencies to investigate the potential opportunity for a railway station at the northern boundary of the North West precinct	NW

City of Ballarat > Growth Areas Framework Plan

Number	Action	Growth Area
TRANSPORT		
28	Work with PTV to determine a future public transport network that connects with the existing Ballarat bus network and includes: <ul style="list-style-type: none"> • High frequency routes along Ballarat–Carngham Road, Glenelg Highway, Remembrance Drive and the Link Road • Secondary bus routes along adjacent major roads to achieve increase coverage • Provision for bus head start infrastructure at all signalised intersection 	W/NW
29	Investigate interface treatments required along Skipton Rail Trail and Remembrance Drive	W/NW
30	Investigate interface treatments required along Ballarat West Link Road and Bells Road	W
OPEN SPACE		
31	Investigate the feasibility of a 30-hectare regional active open space reserve within one of the growth areas	W/NW
32	Investigate the merits of a smaller regional open space and/or land classified as encumbered open space within one of the growth areas	W/NW
33	Identify the hierarchy of open spaces proposed for the Ballarat West PSP in line with the hierarchy outlined by the Ballarat Open Space Strategy (BOSS) and clearly distinguish between Neighbourhood, District and Regional open spaces	W/NW
34	Determine what informal recreational opportunities exist as part of the development of encumbered open spaces	W/NW
35	Work with Department of Education to explore the potential to secure joint school and community active open space	W/NW
36	Investigate open space and active transport connections to basins along Cuthbert Road, Fawcett Road, Kensington Creek and Winter Valley Rise Playground	W
37	Investigate open space and active transport connections to basins along ballarat-Skipton Rail trail	NW
INTEGRATED WATER MANAGEMENT		
38	Investigate sustainable water management building on the recommendations of the <i>Alluvium Integrated Water Management Strategy 2024</i>	W/NW
39	Work with the traditional owners of the land, the Wadawurrung People to better understand the cultural and environmental values identified in the <i>Alluvium Integrated Water Management Strategy 2024</i>	W/NW
40	Determine whether an ecohydrology assessment of the Mulawallah Wetland (Winter Swamp) is required to understand the impact of development on cultural and environmental values	W/NW

Number	Action	Growth Area
	COMMUNITY INFRASTRUCTURE	
41	Investigate community and recreation infrastructure needs building on the ASR <i>Community Infrastructure Assessment 2024</i>	W/NW
42	Work with Department of Education to develop kindergarten provision strategy a shared approach to the delivery and funding of kindergarten facilities, co-location of facilities within schools and a kindergarten infrastructure services plan	W/NW
43	Identify one of the future community facilities to provide a youth service function	W/NW
44	Work with Department of Education to confirm provision strategy for Primary, Secondary and Government Specialist Schools	W/NW
45	Work with the Diocese of Ballarat Catholic Education Limited (DOBCEL) and other local independent schools to confirm provision needs	W/NW
46	Work with Department of Education, Federation University and Australian Catholic University to confirm provision needs for higher education	W/NW
47	Determine the need for a library facility (as part of a Level 3 Community Centre) depending on expected population assumptions and travel times	NW
48	City of Ballarat to investigate the feasibility of an independent and dedicated arts and cultural facility within one of the growth areas	W/NW
49	Investigate the capacity of the existing aquatic facility to accommodate the increased population and identify if any facility expansion or redevelopment is required.	W/NW
50	City of Ballarat to investigate the need for a splash park	W/NW
51	Work with the Department of Health and Grampians Health Services to determine health facility community health needs	W/NW
52	Work with Police Victoria to determine if a new Police Station is needed within the Growth Areas	W/NW
53	Work with Ambulance Victoria to determine if a new Ambulance Station is needed within the Growth Areas	W/NW
54	Work with CFA to determine if a new Fire Station is needed within the Growth Areas	W/NW
55	Work with Department of Justice and Community Safety (DJCS) to identify a suitable site for a new Vic SES facility within the Ballarat West PSP or the Western or North Western Growth Areas	W/NW
56	Determine the need to expand or redevelop the existing Ballarat Magistrates Court and increase its operational resources	W/NW

City of Ballarat > Growth Areas Framework Plan

Number	Action	Growth Area
UTILITIES		
57	Undertake a servicing assessment building on the <i>Taylor's Infrastructure Servicing Strategy</i>	W/NW
58	Work with Central Highlands Water to determine projects and costs to deliver upgrades for potable water supply and the sewer network	W/NW
59	Work with Powercor to determine projects and costs to deliver electricity supply	W/NW
60	Work with NBN to determine projects and costs to extend current infrastructure	W/NW
61	Investigate the need for gas supply for commercial and industrial uses based on current day policy	W/NW
RETAIL		
62	Undertake retail and economic technical investigation to determine a retail hierarchy for the Growth Areas based on Council's Retail Strategy, <i>Macroplan Retail Analysis 2024</i> and walkable catchments	W/NW
63	Ensure that any retail development along Remembrance Drive respects the existing urban interface character area	NW
OTHER		
64	Undertake required technical work as part of PSP preparation (including but not limited to Land Capability Assessment, Landscape and Visual Assessment, Adverse Amenity Assessment, Biodiversity Assessment, Post Contact Heritage Assessment, Bushfire Assessment, Utilities and Servicing Assessment, Flooding and Drainage Assessment, Community Infrastructure Needs Assessment, Cultural Values Assessment, Affordable Housing Needs Assessment, Economic and Retail Assessment, Arboricultural Assessment, Native Vegetation Precinct Plan, Integrated Transport Assessment, Infrastructure Costings)	W/NW
65	Future PSP's should incorporate innovation pathway initiatives as per the Ballarat North PSP or best practice equivalent at the time	W/NW
66	Future PSP's must include a Staging Plan showing the preferred order of development and include out of sequence criteria for the City of Ballarat to consider subdivision applications outside of the preferred order	W/NW
67	City of Ballarat to include the Growth Areas Framework Plan as a background document in the Ballarat Planning Scheme and make relevant changes to Clause 21.02 of the Local Planning Policy Framework	W/NW

*Subject to further investigation these actions may be undertaken prior to PSP preparation

Development Sequencing

Map 10 Development Staging



Context

The development of new residential neighbourhoods requires the delivery of infrastructure and services.

City of Ballarat is responsible for enabling infrastructure in new neighbourhoods in partnership with the Victorian Government, agencies and land developers.

Commencing residential development in proximity to existing neighbourhoods is preferred as it allows for nearby access to services prior to the delivery of local infrastructure.

Ballarat's growth areas will be planned and developed in an orderly sequence of medium and long-term precincts with recommended staging of sub precincts.

Sequencing of residential development is required to ensure success in Ballarat's new neighbourhoods. It also benefits the city's broader community and economy.

Recommended Sequencing

A Development Staging Plan has been prepared to represent the City of Ballarat's preferred direction for future growth through the development of PSPs and sub precinct sequencing. The Development Staging Plan is based on:

- Victorian Government and City of Ballarat policy direction
- Infrastructure needs
- Estimated infrastructure project costs
- Infrastructure project complexity
- Infrastructure project benefit to the wider Ballarat community
- Estimated yield
- Estimated cost per ha
- Advice from Service Authorities on the likely sequencing of infrastructure.

The commencement of PSPs in Ballarat will be undertaken in the following sequence:

- Western Growth Area (medium term)
- North Western Growth Area (long term).

Sequencing Directions

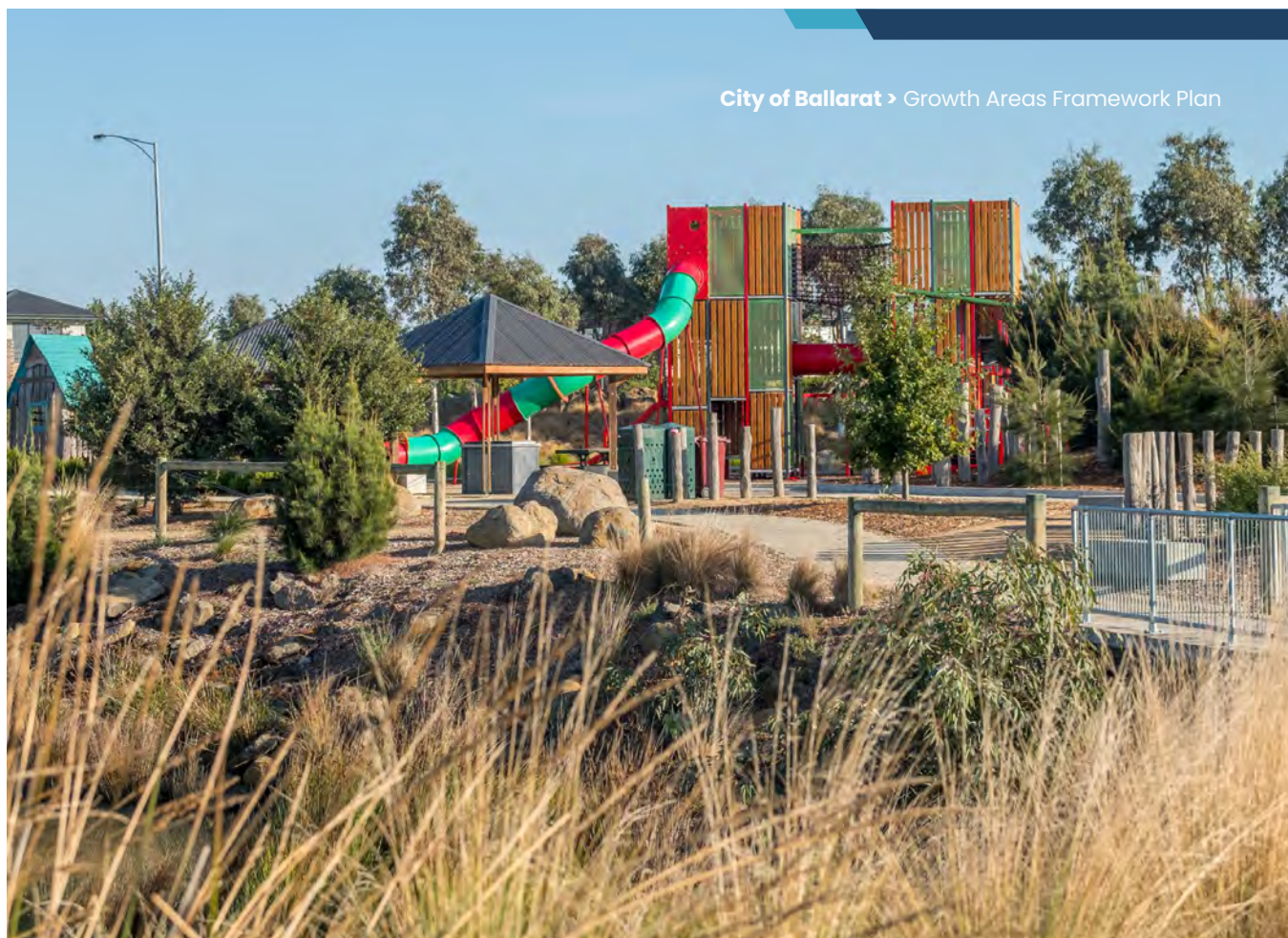
No rezoning or PSP development should occur in the short term.

The commencement of any PSP (and rezoning to Urban Growth Zone) will be initiated by City of Ballarat based on:

- Current and emerging State Government planning policy including
 - The Housing Statement
 - Plan for Victoria
 - IGAF
- The Ballarat Strategy 2040;
- Ballarat Housing Strategy 2024;
- Growth Areas Framework Plan;
- Supply of greenfield land;
- Execution of third party funding agreements with land developers;
- Whether or not a precinct is subject to major constraints or uncertainties that is likely to delay development;
- Whether or not the precinct is of a size that is likely to result in a substantial and predictable development yield;
- The pattern of land ownership and the potential for multiple landowners to coordinate the planning and development of the precinct;
- Whether a precinct's development will support the effective and early development of infrastructure.

The Northern Growth Area is Council's priority growth area as documented through the Council resolution of February 2022. In the event that the Expanded Area of the Northern Growth Area is not included in the Northern PSP, this area should be investigated as the next growth front prior to the Western and North Western Growth Areas. It is acknowledged that the Growth Areas Framework Plan has not undertaken technical investigation on the Expanded Area and that there may be constraints or uncertainties that affect the Expanded Area development potential.

Simultaneous preparation and multiple active PSPs will not be supported unless necessitated by strategic policy and considerations as listed above.



Future PSPs must have staging plans that outline the development staging of sub-precincts and infrastructure staging. Staging plans within PSPs should adopt the sub-precinct staging recommended by the Growth Areas Framework Plan, unless otherwise recommended by precinct scale technical work.

The preparation of PSP's, the associated Planning Scheme Amendment and future infrastructure delivery requires consideration of the impacts on Council's resourcing and administrative costs.

PSPs will be prepared by the City of Ballarat or Victorian Government (unless otherwise agreed to).

A government led PSP process will:

- Allow the city to plan and manage the impacts of growth;
- Ensure that PSPs are guided by community aspiration and development objectives;
- Respond to the development objectives and actions outlined in the Growth Areas Framework Plan;
- Execute individual third-party funding agreements with land developers to fund technical reports needed to inform each precinct structure plan;
- Deliver a suite of technical studies and supporting documents for the PSP;

- Incorporate a DCP to identify funding mechanisms for essential infrastructure;
- Manage the City of Ballarat's council's exposure to the financial risks associated with DCP funded infrastructure;
- Incorporate development criteria to be used to assess future applications for out of sequence development in the growth areas;
- City of Ballarat to review and monitor land supply of greenfield areas annually.

The Growth Areas Framework Plan and Development Staging Plan must be reviewed every 5 years and should be supported by an assessment of land supply, additional infrastructure needs and any consultation undertaken with the public or key agencies.

City of Ballarat to explore private sector investment and contributions toward early infrastructure provision to support the early stages of Ballarat's new neighbourhoods.

Out of Sequence Development

Any proposals for development outside of the growth areas, including any proposal to change or depart from the Development Staging Plan, must demonstrate the following:

- The proposal is of a size and scale to be considered a significant growth front for Ballarat's future. The site must be located within an identified growth area. The proponent must clearly demonstrate that there is a short-term need for additional land supply
- The developer or consortium represents most of the developable land area in that precinct (e.g. at least 70 per cent unless otherwise agreed by the planning authority)
- The proponent agrees to fund all necessary feasibility assessments to the satisfaction of the planning authority
- The proponent agrees to master-plan, involving a precinct structure plan or similar for the entire precinct, including areas beyond its ownership to the satisfaction of the planning authority
- The proposal is connected to the existing urban area.
- The location minimises impacts on Ballarat's historic urban land landscape, the environment and Ballarat's natural resource base to the satisfaction of the planning authority
- The proposal must provide an integrated transport strategy including an implementation plan showing how the proposal would contribute towards the delivery of alternative transport modes that reduces motor vehicle use to the satisfaction of the planning authority
- The proposal must demonstrate provision for social and affordable housing (as defined in the Planning and Environment Act 1987) as agreed with the planning authority
- If the proposed development represents a smaller portion of a larger precinct, the proposal must provide an infrastructure contributions assessment that considers impacts on, and demand for, infrastructure beyond the site boundary. Where the site is in an area already identified for growth, this assessment must have regard to the demand for infrastructure at a precinct scale. The infrastructure contributions assessment may need to make provisions for a "top-up" cash contribution for infrastructure external to the site to minimise any funding gap in a future precinct scale contributions plan
- If the proposed development requires upgrades and augmentation of infrastructure outside its boundaries, the proponent must demonstrate that its development will not create additional cost to City of Ballarat or Victorian Government or can demonstrate that the relevant authorities are ready to fund the augmentation. Interim measures may also be considered
- The proponent must demonstrate consistency with relevant targets in the PSP 2.0 Guidelines or as otherwise agreed to with the planning authority
- The proponent must demonstrate that the Key Growth Actions identified in the Framework Plan can be resolved as part of the PSP process
- Proponents must provide a response to these criteria to the satisfaction of the City of Ballarat and the Department of Transport and Planning.

Flexibility

The plan should function as a City of Ballarat policy direction and guideline for strategic planning and should be read in this manner.

The plan provides a basis for long term infrastructure planning by agencies which may be modified as time progresses.

The plan allows for changes to PSP boundaries at the PSP preparation stage and to sub precinct boundaries and sequencing at the PSP preparation stage.

Changes may be able to be made to the recommended direction of this plan in conjunction with the requirements of the Out of Sequence Development section of this report.

References

The Growth Areas Framework Plan has been prepared with reference to the following documents:

Alluvium for City of Ballarat (2023) Ballarat West and North West Growth Areas Integrated Water Management Strategy

Alluvium for City of Ballarat (2023) Surface and Stormwater Management Strategy

ASR Research for City of Ballarat (2023) Ballarat Western & North Western Growth Areas Framework Plan Community Infrastructure Assessment

City of Ballarat (2022) Ballarat Net Zero Emissions Plan

City of Ballarat (2008) Ballarat Open Space Strategy

City of Ballarat (2024) Ballarat Planning Scheme

City of Ballarat (1998) Ballarat Strategy Plan

City of Ballarat (2020) Ballarat West Growth Areas Update, Greenfield Growth Areas Council Meeting Agenda 16.09.2022

City of Ballarat (2016) Ballarat West Precinct Structure Plan

City of Ballarat (2019) Carbon Neutrality and 100% Renewables Action Plan 2019-2025

City of Ballarat (2021) Council Plan 2021 - 2025

City of Ballarat (2022) Growth Areas – Boundary Definition Council Meeting Agenda 23.02.2022

City of Ballarat (2023) Housing Strategy 2023 – 2041

City of Ballarat (2019) Urban Forest Action Plan

City of Ballarat (2015) Today Tomorrow Together: The Ballarat Strategy

Context Pty Ltd (2013) Mapping Ballarat's Historic Urban Landscape Stage 1 Final Report

Golden Plains Shire Council (2019) Northern Settlement Strategy

Hansen Partnership, Arup & Tim Nott (2018) Ballarat Long Term Growth Options Investigation

HillPDA Consulting & Hansen Partnership for the City of Ballarat (2012) Ballarat Activity Centres Strategy

HillPDA Consulting for the City of Ballarat (2021) Draft City of Ballarat Employment Lands Strategy

Hodyl & Co for the City of Ballarat (2021) Ballarat CBD Draft Urban Design Framework

Integra Group (2011) Alfredton West Precinct Structure Plan

Kevin Hazell for the City of Ballarat (2020) Strategic Planning for Bushfire in the City of Ballarat

Kneebush Planning Pty Ltd (2010) Ballarat Aerodrome Noise Modelling Study & Assessment of Impact on the Ballarat West Growth Area

Kneebush Planning Pty Ltd and Airports Plus Pty Ltd (2013) Ballarat Airport Master Plan 2013 – 2033

Macroplan for City of Ballarat (2024) Growth Areas Framework Plan Retail Assessment

One Mile Grid for City of Ballarat (2023) Ballarat Western & North Western Growth Areas Infrastructure Servicing Strategy – Traffic & Transport

Schlagloth R & Thomson H (2006) Comprehensive Koala Plan of Management, Ballarat: City of Ballarat and Australian Koala Foundation

SGS for City of Ballarat (2023) Ballarat's Future Housing Needs 2021 - 2041

Taylor's for City of Ballarat (2023) Services Investigation report Engineering Servicing Advice

United Nations (2015) Transforming our World: the 2030 Agenda for Sustainable Development

Urban Enterprise for the City of Ballarat (2014) Ballarat West Development Contributions Plan

Victorian Planning Authority (2021) Precinct Structure Planning Guidelines: New Communities in Victoria

Victoria Planning Authority (2023) Ballarat Infrastructure & Growth Alignment Framework (IGAF)

Victorian State Government (2014) Central Highlands Regional Growth Plan

Victorian State Government (2017) Plan Melbourne 2017-2050



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May 2024



Planning today for the communities of tomorrow

Ballarat Western and North-Western Growth Areas Framework Plan

Community Infrastructure Assessment

Final Report

November 1, 2023

Version 3

Prepared for Ballarat City Council
by ASR Research Pty Ltd
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Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Table of Contents

1	INTRODUCTION	4
1.1	BACKGROUND	4
1.2	ASSESSMENT OBJECTIVES.....	5
1.3	REVIEW SCOPE	6
2	METHODOLOGY.....	7
3	ADJOINING GROWTH AREAS	8
3.1	BALLARAT WEST PRECINCT STRUCTURE PLAN	8
3.2	CAMBRIAN HILL PRECINCT	10
4	OVERVIEW OF THE COMMUNITY INFRASTRUCTURE PLANNING PROCESS	11
4.1	KEY ELEMENTS OF COMMUNITY INFRASTRUCTURE PLANNING	11
4.2	COMMUNITY INFRASTRUCTURE PLANNING GUIDELINES.....	11
4.3	ISSUES WITH THE APPLICATION OF CURRENT PROVISION BENCHMARKS.....	12
4.4	PROVISION & COST BENCHMARKS.....	13
4.5	COST ESTIMATE BENCHMARKS FOR KEY DCP COMMUNITY INFRASTRUCTURE ITEMS	17
5.	REVIEW OF KEY POLICIES & STRATEGIC DOCUMENTS.....	19
5.1	OVERVIEW.....	19
5.2	CITY OF BALLARAT COMMUNITY INFRASTRUCTURE PLANNING POLICY (2020)	19
5.3	CITY OF BALLARAT COMMUNITY INFRASTRUCTURE NEEDS & GAP ANALYSIS REPORT.....	20
5.5	IMPLICATIONS	20
6	BALLARAT WESTERN AND NORTH-WESTERN GROWTH AREAS DEVELOPMENT & POPULATION ANALYSIS	21
6.1	OVERVIEW.....	21
6.2	FRAMEWORK PLAN GROWTH AREA DEVELOPMENT ASSUMPTIONS.....	21
6.3	CURRENT DWELLING AND POPULATION ESTIMATE FOR THE BALLARAT WEST PSP	23
7	EXISTING & PLANNED COMMUNITY INFRASTRUCTURE NEAR FRAMEWORK PLAN AREAS	24
7.1	OVERVIEW.....	24
8	PRELIMINARY COMMUNITY INFRASTRUCTURE ASSESSMENT	25
9	SUMMARY OF KEY FINDINGS & RECOMMENDATIONS	47
9.1	DWELLING & POPULATION OUTCOMES	47
9.2	PUBLIC OPEN SPACE & RECREATION	47
9.3	MULTIPURPOSE COMMUNITY CENTRES & COMMUNITY SERVICES	49
9.4	EDUCATION	51
9.5	LAW COURTS, POLICE & EMERGENCY SERVICES.....	52
9.6	HEALTH	53
9.7	AGED CARE & OTHER SERVICES FOR OLDER PERSONS.....	53
9.8	CONSISTENCY WITH STATUTORY POLICIES AND OTHER STRATEGIC DOCUMENTS	53
9.9	FURTHER PROCESS RECOMMENDATIONS.....	53
10	INDICATIVE COMMUNITY INFRASTRUCTURE HUB LOCATIONS & DCP COST IMPLICATIONS	54
10.1	INDICATIVE COMMUNITY INFRASTRUCTURE HUB LOCATIONS.....	54
10.2	INDICATIVE DCP COST IMPLICATIONS.....	57
	APPENDICES.....	59

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

LIST OF TABLES

Table 1 – Key Community Infrastructure Benchmark Cost Estimates for the 2023/2024 Financial Year (1 July 2023)	18
Table 2 – Ballarat West and North-Western Growth Area Framework Plan Dwelling and Population Assumptions	22
Table 3 – Potential Requirements within the Ballarat West Growth Area.....	26
Table 4 – Indicative DCP Community Infrastructure Project Cost Estimates for the Ballarat Western and North-Western Growth Areas (excluding land acquisition costs): Low Development Scenario.....	57
Table 5 – Indicative DCP Community Infrastructure Project Cost Estimates for the Ballarat Western and North-Western Growth Areas (excluding land acquisition costs): High Development Scenario.....	58
Table 6 – Key Elements of the PSP Guidelines Relevant to the Community Infrastructure Assessment Process	63
Table 7 - Ballarat City Council Strategic Documents Potentially Relevant to the Assessment	70
Table 8 - Non-Council Strategies and Plans	74
Table 9 - Typical PSP Active Open Space Specifications by Size	103
Table 10 - Typical PSP Sport Pavilion Specifications by Number of Playing Fields.....	104
Table 11 – Typical PSP Community Centre Configurations x Hierarchy Type	105

List of Figures

Figure 1- Location of Western and North-Western Growth Areas	4
Figure 2 – Location of Main Existing and Planned Community Infrastructure Items within the Ballarat West PSP.....	9
Figure 4 - Indicative Community Centre Facility Locations and Catchment Areas.....	54
Figure 5 - Indicative Active Open Space and Indoor Recreation Facility Locations and Catchment Areas.....	55
Figure 6 - Indicative Government Education Facility Locations and Catchment Areas.....	56
Figure 7 - Libraries, Community Centres, Cultural Facilities and Halls	80
Figure 8 - Early Years Facilities: Sessional Kindergarten (K) and Maternal & Child Health (M)	81
Figure 9- Early Years Facilities: Long Day Child Care (L)	82
Figure 10 – Outdoor Passive and Active Open Space Facilities	83
Figure 11 – Indoor Recreation Facilities	84
Figure 12 - Education Facilities	85
Figure 13 - Law Courts, Police and Emergency Services.....	86
Figure 14 - Acute and Community Health Services	87
Figure 15 - Residential Aged Care (R), Supported Residential Services (S) and Planned Activity Group Venues (P).....	88

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

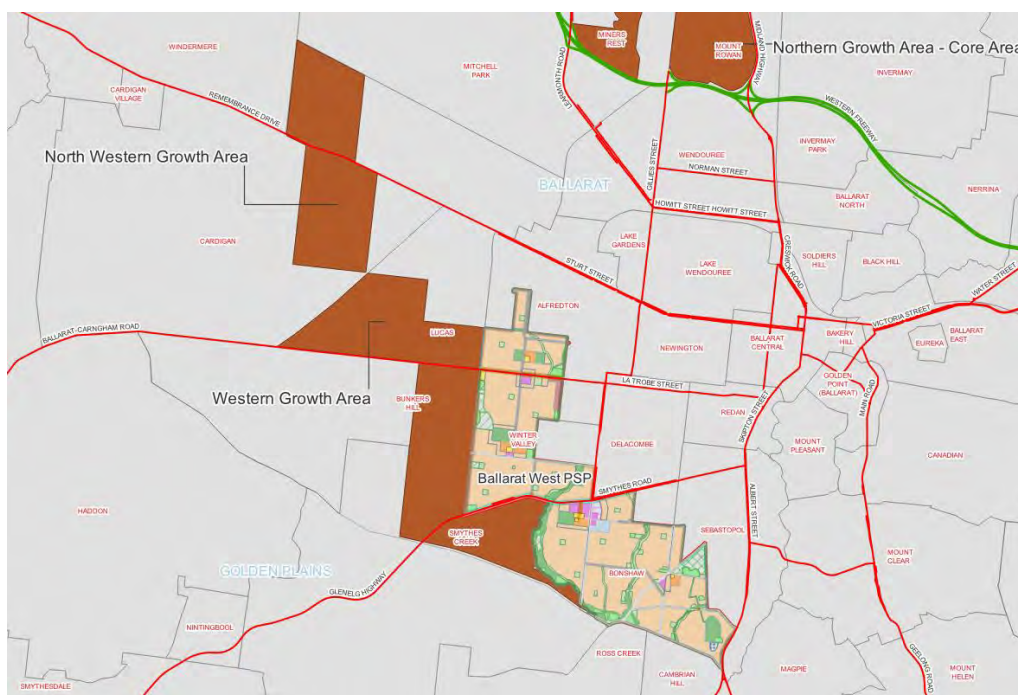
1 Introduction

1.1 Background

The City of Ballarat’s population is expected to grow to 185,000 by 2041. This is an increase of 72,611 persons requiring approximately 29,000 dwellings or 1,450 dwellings per year across the municipality. The Department of Environment, Land, Water and Planning¹ (DELWP) Practice Note 90 requires that Local Authorities plan to accommodate projected population growth over at least a 15-year period and provide clear direction on locations where growth should occur.

Key to future land supply will be the Ballarat Western and North-Western Growth Areas. The location and boundary of these growth Areas is shown in Figure 1 below.

Figure 1- Location of Western and North-Western Growth Areas



On 23 February 2022, Council resolved to prepare a Growth Area Framework Plan for the Western and North-western Growth Areas to guide the future urban development of these areas. The relevant parts of the resolution are as follows:

¹ Now the Department of Energy, Environment and Climate Action (DEECA) as of 2023

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

6. Notes that the 'Growth Areas Framework Plan' will be prepared to establish the most appropriate sequencing of Precinct Structure plan preparation for the western and north-western growth areas, aligned to sustainable development principles and the likely or planned construction of infrastructure or community facilities to support well-planned and sustainable communities.

7. Report back to Council, quarterly, on the progress of the rezoning to UGZ and the project plan including timeframes for the Growth Areas Framework Plan.

The Western and North-western Growth Areas were identified through earlier strategic investigations². The purpose of preparing a Growth Area Framework Plan is to identify high level infrastructure requirements, and to determine a logical sequence for future Precinct Structure Plan preparation in both the Western and North-western Growth Areas. In addition, the Framework Plan must also have regard to future proximate urban development within Golden Plains Shire (Cambrian Hill).

Other planning work occurring concurrently with the preparation of the Growth Area Framework Plan for the Western and North-western Growth areas includes City of Ballarat Housing Strategy, and a high level strategic review of land supply by the Victorian Planning Authority (VPA). The VPA has also been appointed as the planning authority for the Northern Growth Area Precinct Structure Plan

1.2 Assessment Objectives

The Ballarat Western and North-Western Growth Areas will embrace best practice planning to ensure that new communities are liveable, well connected and well serviced. Provision of appropriate community and recreation facilities will be critical to achieving this, and it is important that early work inform the development of the Growth Areas Framework Plan. The objectives of the assessment were to:

- Provide advice on future community and recreation infrastructure requirements for the Ballarat Western and North-Western Growth Areas to inform the preparation of the Growth Area Framework Plan. This work should reflect a base case (15 dwellings per hectare) and PSP 2.0 scenarios in relation to dwelling density, as well as other emerging trends and policy issues which will impact future demand and supply for such facilities.
- Consider the current suite of planned and existing community infrastructure in the adjoining Ballarat West Precinct Structure Plan and identify any gaps, shortfalls or other requirements which will need to be addressed as part of the development of the Ballarat Western and North-Western Growth Areas. Specific consideration should be given to potential constraints to community and recreation

² Refer Ballarat Long Term Growth Options Investigation, Hansen, Arup and Tim Nott, January 2016.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

infrastructure provision in the Ballarat West Precinct Structure Plan (PSP) and the extent to which this will impact future requirements in the Growth Areas to the west and north-west of the PSP.

- Provide advice on the amount of provision required for specific types of community and recreation facilities, likely land supply requirements and consideration of optimal locational criteria within the Western and North-western Growth Areas. A potential investment pipeline should be provided including indicative preliminary probable cost estimates.

1.3 Review Scope

The scope of community infrastructure assessed as part of this assessment is divided into two components: 1) primary community infrastructure items, and 2) secondary community infrastructure items.

Primary community infrastructure items consist of:

1. Passive and active open spaces (sports grounds) and indoor recreation facilities; and
2. The services and activities typically accommodated within Council multipurpose community centres.
The list of services and activities includes:
 - Kindergartens;
 - Maternal and child health;
 - Long day child care;
 - Occasional child care;
 - Playgroups;
 - Youth services;
 - General community meeting spaces made available for community hire;
 - Neighbourhood houses;
 - Libraries;
 - Arts and cultural activities / services; and
 - Aged care and disability services.
3. Education facilities.

Items 1 and 2 form represent the majority of community infrastructure forms identified in typical Precinct Structure Plans (PSPs) and Development Contributions Plans (DCPs). Education facilities are also typically identified in PSPs but do not form part of DCPs.

Secondary community infrastructure items consist of:

1. Law courts, police and emergency services;

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

2. Acute and community health services; and
3. Residential aged care.

Although these secondary items are not included in DCPs, they are important considerations for the health and well-being of local communities. The assessment findings associated with these items will allow Ballarat City Council to engage and consult with the relevant external agencies responsible for the funding, ownership, and management of these services to discuss future provision strategies for the Ballarat community.

2 Methodology

This report has been developed to ensure both City of Ballarat departments and external agency stakeholders have sufficient information to make informed decisions about future community infrastructure provision strategies for the Ballarat Western and North Western Growth Areas. To achieve this the following methodology was used to inform the preparation of the assessment:

1. Providing an overview of the community infrastructure planning process as it applies to growth areas.
2. Reviewing many of the more relevant statutory and strategic documents likely to have the most significant influence on the community infrastructure outcomes associated with the development of the Ballarat Western and North-Western Growth Areas.
3. Mapping the main existing and planned community infrastructure in surrounding established communities and the adjoining Ballarat West PSP, including those items specifically identified within the Ballarat West Development Contributions Plan (DCP).
4. Reviewing and analysing the implications of the current development and population assumptions for the Ballarat Western and North-Western Growth Areas on likely future community infrastructure needs.
5. Undertaking a preliminary assessment of potential DCP community infrastructure items for the Ballarat Western and North-Western Growth Areas.
6. Identifying indicative locations for future community infrastructure hub locations the Ballarat Western and North-Western Growth Areas.

3 Adjoining Growth Areas

This assessment provides an analysis of the relationship between the existing adjoining growth areas (i.e. the Ballarat West PSP and the proposed Cambrian Hill Precinct located in the Shire of Golden Plains) and the proposed Western and North-Western Growth Areas with a specific focus on the following matters.

- Any identified shortfall in community and recreation infrastructure provision in the existing Ballarat West PSP which should be provided for in the future growth areas in particular the Western.
- Any additional external demand on Ballarat West PSP infrastructure resulting from the proposed growth areas.
- Likely constraints on supply of future facilities within Ballarat West due to factors such as potential contamination of land, unsuitable former land uses (e.g., mining activity), or constraints on available land supply such as allotment size, access constraints etc.
- The extent to which the future Ballarat West Growth Area is to make provision for regional facilities that will meet the needs of both the population within the existing PSP area and the future population within the Ballarat West Growth Area and parts of Golden Plains Shire (Cambrian Hill Precinct).

3.1 Ballarat West Precinct Structure Plan

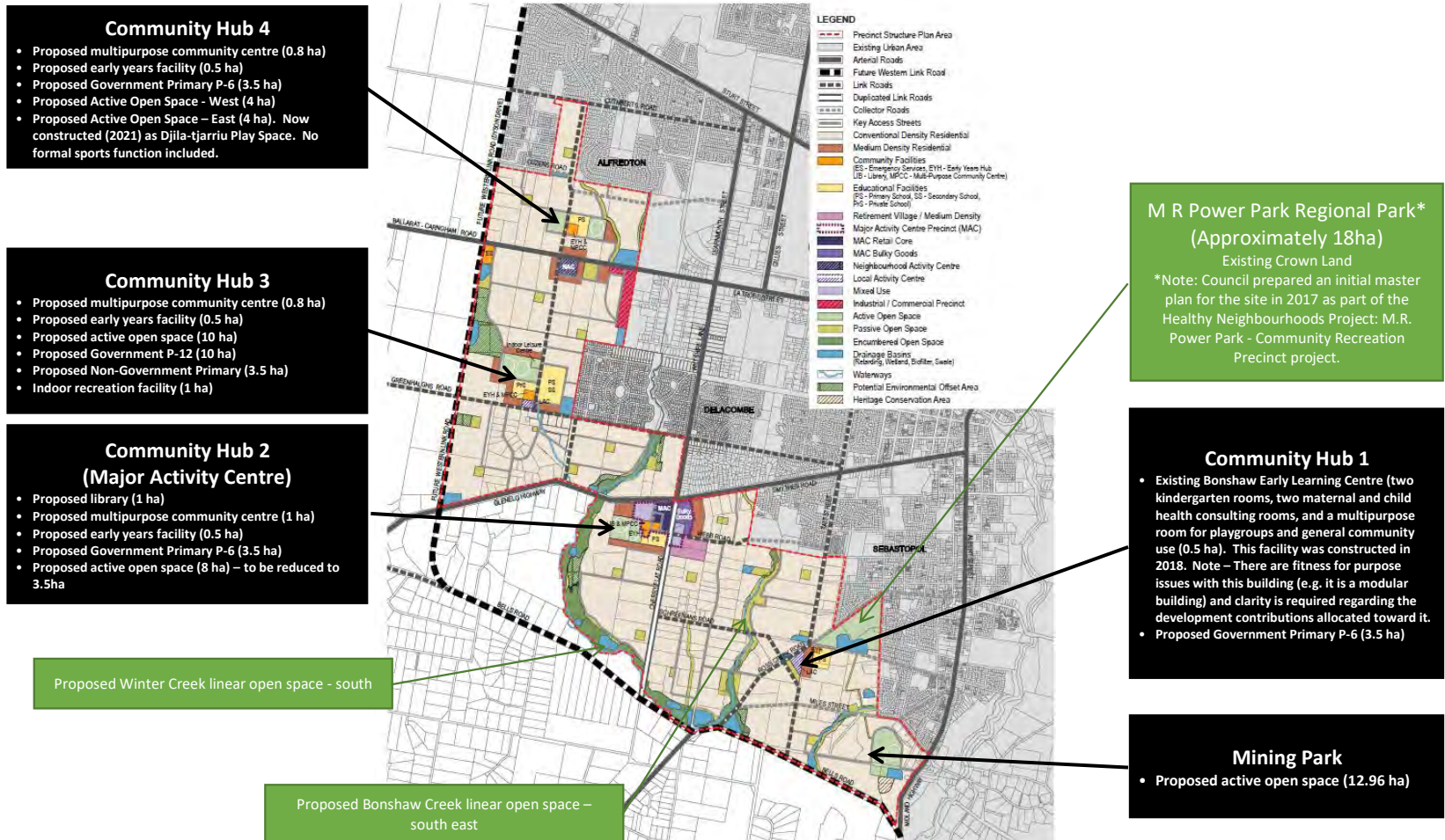
Figure 2 shows the location and distribution of community infrastructure items identified by the PSP. Most of the community infrastructure is to be delivered across 4 major community infrastructure hubs. In summary, the current PSP proposes to deliver the following community infrastructure:

- 26 neighbourhood / passive parks and 1 existing regional park;
- 4 new active open spaces (outdoor sports grounds);
- 2 Indoor recreation facilities;
- Linear open space including Winter Creek and Bonshaw Creek;
- 4 early years hubs and 3 multipurpose community centres;
- 1 Library³;
- 4 Government primary schools, 1 Government secondary school and 1 non-Government school site;
- An emergency services site; and
- A privately owned / operated retirement village site.

³ Note: Council also plans to construct the Wendouree Library and Learning Centre which is anticipated to service both the Ballarat Northern Growth Area and Ballarat West and North West Growth Areas. Design work is currently scheduled for 2029/30 financial year and construction for 2031/32. The location of the proposed library will provide easy access for residents in the Ballarat West and North West Growth Areas because of proposed link road upgrades.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Figure 2 – Location of Main Existing and Planned Community Infrastructure Items within the Ballarat West PSP



Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

It should be noted that a separate assessment reviewing the community infrastructure needs of the Ballarat West PSP was also being prepared concurrently with this assessment. This report titled the *Ballarat West Precinct Structure Plan Review – Community and Recreation Infrastructure*, was also being prepared by ASR Research on behalf of Ballarat City Council. It is anticipated there will be some key changes to the provision items shown in Figure 2.

It is anticipated that a large number of other services operated by the private and not-for-profit community sector will also be accommodated within the Ballarat West PSP. For the purposes of this assessment, the items identified in the PSP are distinct from these other services and facilities in the following manner:

- They reflect items which are to be either totally or partially funded by the DCP (either land or construction, or both); or
- Are proposed education sites with a specified land allocation and in a specific location that are to be purchased by either the Department of Education (DE) or a non-government education provider such as Catholic Education Ballarat.

3.2 Cambrian Hill Precinct

The proposed Cambrian Hill Precinct abuts the southern boundary of the Ballarat West Precinct Structure Plan area and is located in the Shire of Golden Plains. Planning is being progressed via a rezoning amendment concurrently with the development of the Golden Plains Settlement Strategy (GPSS).

At this preliminary stage of the planning process, it is assumed that the Cambrian Hill Precinct has capacity to accommodate 3,000 dwellings. A preliminary community infrastructure assessment prepared on behalf of the major land developer of the Precinct (Grange Development) indicates that the Precinct will include a range of local community infrastructure including:

- Public open space;
- A Council multipurpose community facility (which would include sessional kindergarten, maternal & child health services and community meeting spaces);
- A Government primary school (subject to Department of Education approval); and
- A private long day child care facility.

However, beyond this local infrastructure and the activities and services it will accommodate, it is reasonable to assume that the remaining community infrastructure demands (e.g. independent schools, hospitals, higher education, arts and cultural facilities and events, police and emergency services) of this new development will largely be met by existing and planned community infrastructure located in the City of Ballarat.

4 Overview of the Community Infrastructure Planning Process

4.1 Key Elements of Community Infrastructure Planning

The community infrastructure planning process typically involves an interrelated set of considerations. These include:

- Scope - Defining what services and facilities to plan for.
- Policy and regulation – Government policies and regulation play a significant role in the provision of both public and private social infrastructure provision.
- Demand – what the future demand for a given service or facility is likely to be. Demand calculations are often associated with the use of provision benchmarks (refer to Section 4.4 for more details).
- Supply – what existing and planned provision is required to service the demand. As with demand calculations, supply calculations are often associated with the use of provision benchmarks (refer to Section 4.4 for more details).
- Models of provision – how are services and facilities best configured / arranged to meet demand (e.g. land size, facility type, multiservice / shared use of resources etc) and by whom (e.g. public / private).
- Distribution and location – how the facility or service should best be geographically / spatially delivered (i.e. catchment area).
- Timing of provision – when should services and facilities be delivered and by whom.
- Funding – how will services and facilities be funded.

4.2 Community Infrastructure Planning Guidelines

4.2.1 Victorian Planning Authority Endorsed Guidelines

Community infrastructure objectives are a central element of many key State Government planning policies and strategies such as *Plan Melbourne 2017-2050*. The Victorian Planning Authority (VPA) plays an important role in implementing many of the directions contained within Melbourne's metropolitan strategy. There are also a number of reports that have been prepared on behalf of the VPA that focus on or include community infrastructure planning guidelines. The key documents include:

- Precinct Structure Planning Guidelines (2021);
- Planning for Community Infrastructure in Growth Areas Communities – PCIGAC (2008);

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

- Kindergarten Infrastructure Needs Assessment in Greenfield Growth Areas (2015)⁴;
- A Short Guide to Growth Area Community Infrastructure Planning (2009);
- A Strategic Framework for Creating Liveable New Communities – April 2008;
- A Strategic Framework for Creating Liveable New Communities – The Framework at a Glance;
- Community Infrastructure – Liveability Planning Checklist – April 2008; and
- Creating Liveable New Communities Promising Practice: A book of good practice – case studies.

Of these documents the Precinct Structure Planning Guidelines (PSP Guidelines), the Planning for Community Infrastructure in Growth Areas Communities (PCIGAC) and the Kindergarten Infrastructure Needs Assessment in Greenfield Growth Areas contain most of the key provision guidelines or benchmarks used by the VPA in the planning of greenfield sites. Key provision guidelines contained within these documents are used throughout this assessment.

4.3 Issues with the Application of Current Provision Benchmarks

Although community infrastructure covers a potentially wide variety of services and facilities provided by all forms of Government, the private for-profit sector and not-for-profit organisations, much of what is planned for within PSP locations largely focus on the following six infrastructure forms:

1. Passive and active open space (bundled together under the term unencumbered public open space);
2. Indoor recreation facilities;
3. Local multipurpose community centres which can have many potential configurations but are typically classified into two main types (Levels 1 & 2 - refer to Section 4.4.3 for more details);
4. Higher order community centres (Level 3 centres which can accommodate services such as libraries, youth programs and Planned Activity Groups - refer to Section 4.4.3 for more details);
5. Government primary and secondary Schools; and
6. Non-Government Schools.

Although indicative provision benchmarks exist for many of these infrastructure forms, there remain many issues with the acceptance of benchmarks as a tool for planning in greenfield locations, ranging from whether specific benchmarks are too high or too low to whether there are better methods for determining and responding to community infrastructure need. Some of the key issues are summarised below:

- Benchmarks provide simplicity but are often ‘narrow’ (i.e. linked to only a population or dwelling number as a trigger for provision) when other variables and criteria are not taken into account (e.g.

⁴ Note: The Kindergarten Infrastructure Needs Assessment in Greenfield Growth Areas report was developed in 2015, prior to the introduction of the Universal Access policies (i.e. 15 hours of 3 year old kindergarten and 30 hours of pre-prep).

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

age cohort profiles) and used in isolation from other important assessment steps (e.g. the existing capacity of the nearest facilities to a PSP location).

- Most benchmarks are currently expressed as an infrastructure driven model (e.g. 1 Government Primary School per 3,000 dwellings) rather than a demand based model (e.g. 66 4 year olds per 4 year old Kindergarten room).
- Some forms of community infrastructure are more difficult to quantify the demand for (e.g. community meeting spaces, youth services and arts / cultural activities) and thus make the task of assigning a benchmark far more difficult.
- Explicit policies stating preferred provision standards and models of delivery across PSP growth area remains in varying states of 'maturity'.
- There is often a lack of clarity about preferred provision levels and models with many forms of State based social infrastructure (e.g. health and emergency services).

4.4 Provision & Cost Benchmarks

4.4.1 Overview

This section provides a brief description of the key community infrastructure provision benchmarks, facility configuration models and cost benchmarks used to assess both the likely number of facilities likely to be required within the Ballarat Western and North-Western Growth Areas, and the preliminary DCP cost implications for these Growth Areas.

4.4.2 Open Space & Recreation

The VPA PSP Guidelines include some key provision targets for open space and recreation planning. Its focus has largely (but not exclusively) been on 'local' scale provision as opposed to regional / sub-regional provision.

Key guidelines are:

- Unencumbered passive open space (3 to 5% of Net Developable Area or NDA); and
- Active open space - sports grounds and outdoor court based facilities such as tennis and netball (5 to 7% of NDA).

In addition to these documented measures, are other less well documented factors / guidelines influencing open space and recreation outcomes include:

- Encumbered open space, particularly open space set aside for drainage purposes and as part of linear networks along rivers and creeks, typically represent a significant proportion of the gross area of a

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

PSP site. The contribution these assets provide by way of informal recreation outcomes and improved physical and mental health is considerable. Encumbered open space provision outcomes are not prescriptively derived as each PSP site provides unique topographical, hydrological and environmental characteristics.

- There has been the occasional application of a regional active open space benchmark in previous growth area planning exercises (30 hectares per 50,000 people), but the benchmark is not contained within the current PSP guidelines.

In addition to these PSP guideline provision benchmarks this review includes demand-based estimates for organised sport derived from the AusPlay Survey⁵ (AusPlay) which provides the major source of participation data for sport and other informal physical activities in Australia. These estimates are contained within Appendix 3 of this report and referred to in Section 8.

4.4.3 Multipurpose Community Centres

For the purposes of this assessment a multipurpose community centre is defined as a building owned and or managed by Local Government which accommodates a range of services and offers flexible community spaces made available to local residents and community groups for a variety of potential uses.

In the context of greenfield locations community centres have primarily incorporated a range of early years services and offered flexible community meeting spaces. However, the potential range of services and functions a community centre can incorporate is very broad. In order to ensure the effective and efficient use of capital and operational resources contemporary community centres are multipurpose (i.e. offering more than one service and function) rather than stand-alone (i.e. dedicated to one service or function only), and, where practical, co-located with other community infrastructure and public open space. Land area allocations in greenfield locations are reasonably generous in comparison to the actual building footprint provided in order to allow for sufficient on-site car parking and facilitate longer term expansion requirements as local needs evolve and change and shifts in government policy occur (e.g. the Victorian State Government's proposed introduction of 15 hours per week of funded 3 year old Kindergarten over the coming decade).

Other key characteristics and issues associated with multipurpose community centres are outlined below.

- Although not all multipurpose community centres are identical, it is possible to describe the types of services and functions typically incorporated into such facilities.

⁵ Ausplay is a large scale national population tracking survey funded and led by Sport Australia. AusPlay collects participation data; not membership data. The club sport data in AusPlay relates to how participation took place (e.g. survey respondents who self-identified that they participated in an activity through a sports club or association).

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

- Typically, such facilities are a combination of a few (but rarely all) of the following services and functions: Kindergarten; Maternal & child health; Playgroups; Occasional child care; long day child care; community meeting spaces; Planned Activity Groups; Neighbourhood houses / adult education; and Library.
- Multipurpose community centres can vary greatly in size depending on the services and activities to be accommodated within it and can typically range from 500 square metres to 2,500 square metres.
- Unlike public open space (both passive and active), the VPA PSP Guidelines do not specify a quantitative measure of how many facilities should be provided either using an area based standard (as applies to public open space) or a population based standard. Municipal Planning schemes do not provide any guidance on this matter either.
- In the absence of specific PSP Guidelines and statutory requirements, the VPA has tended to rely on the provision guidelines outlined in the Planning for Community Infrastructure in Growth Area Communities (2008).
- However, it is possible to estimate the level of demand for specific service types likely to be generated by a PSP.

The *Planning for Community Infrastructure in Growth Area Communities* – PCIGAC (2008) report includes guidelines for many discrete services and functions that would typically be accommodated within a Council multipurpose community centre. However, it is assumed that most of these could be included as part of two main types of community centre:

- Level 1 Community Centres provided @ 1 centre per 8,000 to 10,000 people on 0.8 hectare sites; and
- Level 3 Community Centres @ 1 centre per 40,000 to 50,000 people on 1.5 hectare sites.

The *Kindergarten Infrastructure Needs Assessment in Greenfield Growth Areas* (2015) refers to two key benchmarks in relation to the provision of Kindergarten programs, of which Local Government is a major provider:

- 1 kindergarten room per 1,400 households at the peak; and
- 1 kindergarten room per 2,100 households in the long term.

Under the proposed roll-out of the Victorian State Government's Best Start, Best Life Policy (June 2022), the City of Ballarat will adopt a provision of ratio of one licenced kindergarten place per 1 child aged 4 years of age and one licenced kindergarten place per 2 children aged 3 years of age. Council kindergarten facilities will aim to accommodate 75% of 3 and 4 year demand for sessional kindergarten. Council's preferred kindergarten room size equates to a room with capacity to accommodate 33 licenced places (based on 3.25 square metres per

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

licenced place). A Level 1 community centre will typically include 3 to 4 kindergarten rooms each. Council intends to operate with 3 rooms.

It should be noted that this assessment evaluates the impact of the proposed roll-out of the Victorian State Government's Best Start, Best Life Policy (June 2022) which assumes 15 hours of 3 year old kindergarten and 30 hours of pre-prep per week.

Due to the large variety of possible community configuration options the analysis focuses on the following 3 types of community centres:

- Level 1 community facility (1,200 m2 building footprint & 0.8 ha of land) @ 1 centre per 9,000 people;
- Level 2 community facility (1,500 m2 building footprint & 1 ha of land) @ 1 centre per 25,000 people; and
- Level 3 community facility (2,500 m2 building footprint & 1.5 ha of land) @ 1 centre per 50,000 people.

For the purposes of this assessment the following community centre provision ratios have been adopted:

- 1 Level 1 community centre per 10,000 people on 0.8 ha of land;
- Every second Level 1 Centre (approximately 20,000 people) is upgraded into a larger community centre with larger community meeting space that is capable of accommodating a neighbourhood house, and is provided on 1.2 ha of land;
- 1 Level 3 community centre per 60,000 people on 1.5 ha of land.

The scope of services and activities covered by these facilities include Kindergarten, Maternal & Child Health, Playgroups, Occasional Child Care, Neighbourhood Houses, Libraries and a variety of flexible community meeting spaces and consulting rooms.

Appendix 4 shows indicative community centre configurations for each of the 3 types of community centres considered by the review and which are included in the VPA commissioned *Benchmark Infrastructure and Costs Guide* (prepared by Cardno). Level 1 and 2 community centres both include Kindergarten and Maternal and Child Health rooms as well as multipurpose community meeting spaces. Level 2 centres have larger community meeting spaces that are capable of accommodating a neighbourhood house service. Level 3 community centres differ from Level 1 centres by not including early years services such as Kindergarten and Maternal and Child Health. Instead, these facilities include higher order services (i.e. services provided to a larger population catchment) such a Library and specialised community space for other service forms and population target groups.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

4.4.4 Government Education Provision

There are two key Government education provision benchmarks used for PSP planning purposes. These are:

- 1 Government Primary School per 3,000 dwellings (3.5 ha site); and
- 1 Government Secondary School per 10,000 dwellings (8.4 ha site).

The Department of Education and Training (DET) also identifies a long-term enrolment (LTE) objective for each primary and secondary school. These are:

- Government Primary Schools: 450-475 long term enrolments and generally with a maximum capacity of 600 enrolments; and
- Government Secondary Schools: 1,100 long term enrolments and generally with a maximum capacity to accommodate 50% more (approximately 1,600 to 1,700 enrolments).

4.5 Cost Estimate Benchmarks for Key DCP Community Infrastructure Items

The VPA has also prepared the Benchmark Infrastructure and Costs Guide (prepared by Cardno) to provide context and to guide us in the use of benchmark designs and costs in preparing an Infrastructure Contributions Plan (ICP), the term now used instead of Development Contributions Plan (DCP) when preparing new PSPs. The Guide covers:

- The role of scope and cost estimates in ICPs;
- The development of the benchmark design and costs;
- Role of the Benchmark Infrastructure and Costs Guide in preparing ICPs, including how to adjust the estimates to deal with scope variations if needed; and
- How the Benchmark Infrastructure and Costs Guide will be reviewed and kept up to date; and
- Reproduces the results of the Cardno work.

The use of the guide was approved by the VPA Board on 9 October 2019.

The benchmark cost estimates for the development of community centres, sports reserve and sporting pavilions are used by this report to review the adequacy of cost estimates for key DCP community infrastructure items identified in the Ballarat West DCP.

A summary of the key community infrastructure benchmark costs for the 2023/2024 financial year are presented in Table 1 on the following page and includes 1 July 2023 index costs.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Table 1 – Key Community Infrastructure Benchmark Cost Estimates for the 2023/2024 Financial Year (1 July 2023)

Community Infrastructure BIC

ITEM	CATEGORY	DESCRIPTION	STANDARD	COST APPLICATION	ESTIMATE P50	ESTIMATE P90
37	Community Facilities	Level 1 Facility	Contemporary standard	Bldg floor area	\$7,980,915	\$8,894,189
38	Community Facilities	Level 2 Facility	Contemporary standard	Bldg floor area	\$9,429,758	\$10,440,090
39	Community Facilities	Level 3 Facility	Above contemporary standard allowing for place making architectural features	Bldg floor area	\$12,583,535	\$13,833,587

Sports Pavilion BIC

40	Sports and Recreation Facilities	Sports Pavilion 2 playing areas	Contemporary standard multi-purpose facility	Bldg floor area	\$1,887,355	\$1,936,468
41	Sports and Recreation Facilities	Sports Pavilion 3 playing areas	Contemporary standard multi-purpose facility	Bldg floor area	\$3,142,083	\$3,219,262

Sports and Recreation Facility BIC

42	Sports and Recreation Facilities	Sports and recreation facility 5 to 6 hectare site	Contemporary senior and junior sporting competition standard	Per Reserve	\$8,117,731	\$9,379,476
43	Sports and Recreation Facilities	Sports and recreation facility 8 to 10 hectare site	Contemporary senior and junior sporting competition standard	Per Reserve	\$10,537,147	\$12,108,773

BENCHMARK INFRASTRUCTURE COST ITEM	BENCHMARK ITEMS	1 JULY 2023 INDEX
Roads and Intersection	1 to 16	1.24
Bridges and Culverts	17 to 36	1.24
Community Infrastructure	37 to 39	1.17
Sports Pavilion	40 to 41	1.17
Sports & Recreation Facility	42 to 43	1.17

Source: Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing, Prepared for VPA by Cardno (1 July 2022)

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

5. Review of Key Policies & Strategic Documents

5.1 Overview

This section reviews many of the more relevant statutory and strategic documents likely to have the most significant influence on the community infrastructure outcomes associated with the development of the Ballarat West PSP. The material reviewed includes:

- City of Ballarat Community Infrastructure Needs & Gap Analysis Report (June 2021);
- City of Ballarat Community Infrastructure Plan 2022 to 2037;
- Precinct Structure Planning (PSP) Guidelines (2021), prepared by the Victorian Planning Authority (VPA);
- Other City of Ballarat strategic documents of relevance to this review; and
- Non-Council strategic documents of relevance to this review.

A more detailed summary of the PSP Guidelines, Council and non-Council strategic documents are presented in Appendix 1 of this Background Report.

5.2 City of Ballarat Community Infrastructure Planning Policy (2020)

City of Ballarat (Council) is a provider of community infrastructure including community centres, public halls, sports pavilions, aquatic facilities, libraries, early years facilities, senior citizens centres and playgrounds. It owns and manages community facilities and delivers services to the community through those facilities. Council also supports the provision of community infrastructure by other providers through direct funding and/or advocacy. A holistic and strategic planning approach ensures that Council understands communities' current and future needs for community infrastructure and enables it to meet those needs effectively and efficiently.

This policy outlines Council's commitment to an integrated and strategic planning process for the delivery of Community Infrastructure across the Ballarat municipality. The purpose of this policy is to:

- Provide the general community, stakeholder organisations and Council employees with an understanding of Council's objectives and approach to providing for community services infrastructure in Ballarat;
- To direct sound decision making about planning, funding, delivering and negotiating for community infrastructure;

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

- To demonstrate commitment to community and stakeholder engagement when planning for community infrastructure; and
- To assist with a coordinated approach within Council to undertake this work.

The Community Infrastructure Planning Policy provides a set of agreed guiding principles which set out the underlying philosophy that should be followed in the prioritisation, planning, design and provision of community infrastructure to promote more consistent understanding and practice.

5.3 City of Ballarat Community Infrastructure Needs & Gap Analysis Report

The Community Infrastructure Needs and Gap Analysis Report was prepared as a key source of evidence to inform the development of the 2022-2037 City of Ballarat Community Infrastructure Plan (see Section 5.3 for more details). This report has collated information gathered in the community infrastructure audit phase of the process and considered it in relation to the provision and service standards, agreed hierarchies, and demand assessments to identify both current and future gaps in community infrastructure provision. It has included a review of existing plans, strategies, policies, and known projects, recognising the contributions that have already been made by the community to these processes. It also offered an opportunity for community facility managers to provide information and feedback. The analysis is presented by both service area and planning area.

Both the Western and North Western Growth Areas are largely located within the West Planning Area (refer to report for detailed analysis and recommendations for this Planning Area) except for a small portion of the south east component of the Western Growth Area which is located within the South West Planning Area (refer to report for detailed analysis and recommendations for this Planning Area).

5.5 Implications

The implications of the documents reviewed are referred to, where applicable, throughout the course of the review process.

6 Ballarat Western and North-Western Growth Areas Development & Population Analysis

6.1 Overview

This section provides an overview of the indicative development and population assumptions for the Western and North-Western Growth Areas which underpin the community infrastructure provision estimates identified by this assessment. These assumptions are indicative only and subject to change once formal Precinct Structure Planning processes commence in these locations. For this reason, the community infrastructure provision requirements identified in this report need to be interpreted with caution. For example, it is common for the Net Developable Area (NDA) estimates to change once formal planning processes commence and more detailed investigations such as drainage studies are undertaken. This, in turn, can impact on the amount of unencumbered and encumbered public open space each growth area is likely to yield.

Although public open space provision requirements are largely determined by the amount of NDA available in any given PSP, community infrastructure provision levels are largely based on dwelling and population assumptions. Therefore, if the underlying dwelling and population assumptions significantly change in future, then the number of community infrastructure items, or the capacity of existing planned items may need to also change.

6.2 Framework Plan Growth Area Development Assumptions

This assessment considers two development scenarios for the Framework Plan Growth Areas: 1) based on current conventional densities occurring in the City of Ballarat growth areas (i.e. 15 dwellings per hectare); and 2) residential densities proposed by the Victorian Planning Authority (i.e. ranging from 20 dwellings per hectare in across a PSP area).

The Victorian Planning Authority's recently released *Precinct Structure Planning Guidelines: New Communities in Victoria* (October 2021) includes a chapter on "Viable Densities" (Part 3 – Constructing a PSP). The purpose of this chapter is to outline a model for the delivery of affordable and accessible housing choices for Victoria's rapidly growing population. The Guidelines assert that the model for housing density and diversity presented by the Guidelines is an opportunity to change the form of streets and neighbourhoods to support lot and housing diversity for future communities. It states that planning for new communities should ensure:

- housing densities beyond current levels for land supply to last beyond 2050;

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

- diversity of housing close to where people want to live to create communities that cater to people as they move through different stages of life;
- compact and walkable neighbourhoods through the alignment of housing density and diversity with precinct structure, to ensure benefits for health, sustainability and community cohesion; and
- delivery of housing and population at densities that make local services and transport viable.

The Guidelines provide for the following two major dwelling density targets (T1 & T2):

1. T1 - The PSP should facilitate increased densities with an average of 30 dwellings or more per Net Developable Hectare (NDHA) within:
 - 400m walkable catchment of an activity centre or train station
 - 50m of open space, (both credited and encumbered open space), boulevards and major public transport routes, including but not limited to the Principal Public Transport Network (PPTN) or similar.
2. T2 - The PSP should facilitate increased densities with an average of 20 dwellings or more per NDHA across the entire PSP area.

Table 2 below summarises the two development scenarios for the Western and North-Western Growth Area. It reveals a combined developable area of approximately 1,400 hectares and a population capacity ranging from a base case of approximately 54,000 people (approximately 20,000 dwellings) to 72,000 people (27,000 dwellings). The largest share of this population will reside in the Western Growth Area (64%) which also accounts for approximately 64% of the total developable area. When the two growth areas are combined with the current Ballarat West PSP population capacity estimate (40,000 people), the broader Ballarat West Growth Area has the capacity to accommodate approximately 94,000 to 112,000 people.

Table 2 – Ballarat West and North-Western Growth Area Framework Plan Dwelling and Population Assumptions

	Ballarat Western Growth Area		Ballarat North-Western Growth Area		Total Western & North-Western Growth Areas	
Net Developable Hectare Area (NDHA)	896 hectares		500 hectares		1,396 hectares	
NDHA Non-Residential	36		20		56 hectares	
NDHA Residential	860		480		1,340 hectares	
Dwelling yield	Base Case (@ 15 dwellings per ha)	PSP 2.0 Scenario (@ 20 dwellings per ha)	Base Case (@ 15 dwellings per ha)	PSP 2.0 Scenario (@ 20 dwellings per ha)	Base Case (@ 15 dwellings per ha)	PSP 2.0 Scenario (@ 20 dwellings per ha)
	12,902	17,203	7,200	9,600	20,102	26,803
Average overall household size⁶	2.7	2.7	2.7	2.7	2.7	2.7
Population yield	34,835	46,448	19,440	25,920	54,275	72,368

⁶ Average household size assumptions have been derived from Council's *Population and household forecasts, 2021 to 2036*, prepared by .id (informed decisions), January 2023.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

6.3 Current Dwelling and Population Estimate for the Ballarat West PSP

According to 2021 Census of Population and Housing⁷, the Ballarat West PSP area accommodated approximately 2,200 dwellings and had a population of approximately 6,200 residents.

Based on Council's most recently updated planning data (February 2023), the Ballarat West PSP has 8,390 lots which have either been completed, partially completed or have received planning approval (approximately 53% of the total revised dwelling capacity of the PSP). This supply consists of:

- 5,380 Completed lots;
- 1,950 lots under construction;
- 1,060 lots with planning permits issued;

A further 2,120 planning permits have been lodged or at the pre-application stage. The remaining supply of lots is estimated at 5,270 (or 33% of total lots).

When the two growth areas are combined with the current Ballarat West PSP population capacity estimate (40,000 people), the broader Ballarat West Growth Area has the capacity to accommodate between 94,000 to 112,000 people.

⁷ Source: Australian Bureau of Statistics (ABS), using Mesh Block geographic units which encompass the Ballarat West PSP area. Mesh Blocks are the smallest geographic areas defined by the ABS and form the building blocks for the larger regions of the Australian Statistical Geography Standard (ASGS). They broadly identify land use such as residential, commercial, primary production and parks.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

7 Existing & Planned Community Infrastructure Near Framework Plan Areas

7.1 Overview

This section identifies both the main existing and planned community infrastructure nearest to the Framework Plan Growth Areas including the Ballarat West PSP.

Appendix 2 of this assessment provides a series of maps showing the extent of existing and planned community infrastructure surrounding both the Western and North-Western Growth Areas.

The maps presented are:

- Figure 5 - Libraries, Community Centres, Cultural Facilities and Halls;
- Figure 6- Early Years Facilities: Sessional Kindergarten and Maternal & Child Health;
- Figure 7- Early Years Facilities: Long Day Child Care;
- Figure 8 – Outdoor Passive and Active Open Space Facilities;
- Figure 9 – Indoor Recreation Facilities;
- Figure 10 - Education Facilities;
- Figure 11 - Law Courts, Police and Emergency Services;
- Figure 12 - Acute and Community Health Services; and
- Figure 13 - Residential Aged Care, Supported Residential Services and Planned Activity Group Venues.

The location of facilities has been considered as part of the detailed assessment presented in Section 8 of this report.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

8 Preliminary Community Infrastructure Assessment

Table 3 on the following pages provides a detailed assessment of the implications of the revised dwelling and population assumptions for community infrastructure provision within the Ballarat West PSP. The detailed calculations, benchmarks (e.g. for sessional kindergarten demand) and data sources used to inform the assessment are presented in Appendix 3 of this report.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Table 3 – Potential Requirements within the Ballarat West Growth Area

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Early years services						
Sessional 3 and 4 year old Kindergarten	<p>Although the Ballarat West PSP / DCP does not specify the number of kindergarten rooms to be provided within the PSP, there are 4 proposed early years facilities, all of which will include kindergarten services. These facilities are:</p> <ul style="list-style-type: none"> Community Hub 1 Early Years Hub – the already constructed Bonshaw Early Years Centre (0.5 ha). This facility includes two kindergarten rooms. Community Hub 2 Early Years Hub (0.5 ha). Community Hub 3 Early Years Hub (0.5 ha). Community Hub 4 Early Years Hub (0.5 ha). 	<p>Approximately 12 kindergarten rooms under the present kindergarten policy environment (15 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week) and 18 kindergarten rooms under the proposed kindergarten policy environment⁸ (30 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week).</p> <p>Response measures based on the implementation of the proposed policy change to kindergarten services will require further input from the Department of Education prior to confirming the</p>	<p>Approximately 16 kindergarten rooms under the present kindergarten policy environment (15 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week) and 24 kindergarten rooms under the proposed kindergarten policy environment (30 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week).</p> <p>Response measures based on the implementation of the proposed policy change to kindergarten services will require further input from the Department of Education prior to confirming the</p>	<p>Approximately 7 kindergarten rooms under the present kindergarten policy environment (15 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week) and 10 kindergarten rooms under the proposed kindergarten policy environment (30 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week).</p> <p>Response measures based on the implementation of the proposed policy change to kindergarten services will require further input from the Department of Education prior to confirming the</p>	<p>Approximately 9 kindergarten rooms under the present kindergarten policy environment (15 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week) and 14 kindergarten rooms under the proposed kindergarten policy environment (30 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week).</p> <p>Response measures based on the implementation of the proposed policy change to kindergarten services will require further input from the Department of Education prior to confirming the</p>	<p>Sessional Kindergarten demand will largely be met by the delivery of proposed Level 1 and Level 2 Community Centres across both growth areas and potentially supplemented by additional provision at future Government Primary Schools and Catholic Primary Schools.</p> <p>At this early stage of planning, it is anticipated that 28 (under a low development scenario) to 38 (under a high development scenario) sessional kindergarten rooms will need to be included in as many as six Council community centres (@ 4 to 6 rooms per facility) and supplemented by an additional 6 to 8 rooms at Government Primary / Catholic Primary Schools.</p>

⁸ Victorian State Government Best Start, Best Life Policy (June 2022).

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Maternal & Child Health	<p>Although the Ballarat West PSP / DCP does not specify the number of MCH rooms to be provided within the PSP, there are 4 proposed early years facilities, some of which will include MCH services. These facilities are:</p> <ul style="list-style-type: none"> Community Hub 1 Early Years Hub – the already constructed Bonshaw Early Learning Centre 	<p>kindergarten provision strategy for the future PSPs delivered across the two growth areas. Kindergartens are to be located within all proposed multipurpose community centres and / or proposed Government Primary Schools (containing kindergarten rooms licensed for 33 places each) and co-located with proposed government primary schools⁹.</p> <p>The demand estimates indicate a need for 4.1 MCH consulting rooms to satisfy demand in the Western Growth Area.</p>	<p>kindergarten provision strategy for the future PSPs delivered across the two growth areas. Kindergartens are to be located within all proposed multipurpose community centres and / or proposed Government Primary Schools (containing kindergarten rooms licensed for 33 places each) and co-located with proposed government primary schools.</p> <p>The demand estimates indicate a need for 5.4 MCH consulting rooms to satisfy demand in the Western Growth Area.</p>	<p>kindergarten provision strategy for the future PSPs delivered across the two growth areas. Kindergartens are to be located within all proposed multipurpose community centres and / or proposed Government Primary Schools (containing kindergarten rooms licensed for 33 places each) and co-located with proposed government primary schools.</p> <p>The demand estimates indicate a need for 2.3 MCH consulting rooms to satisfy demand in the Western Growth Area.</p>	<p>kindergarten provision strategy for the future PSPs delivered across the two growth areas. Kindergartens are to be located within all proposed multipurpose community centres and / or proposed Government Primary Schools (containing kindergarten rooms licensed for 33 places each) and co-located with proposed government primary schools.</p> <p>The demand estimates indicate a need for 3.0 MCH consulting rooms to satisfy demand in the Western Growth Area.</p>	<p>It is recommended Council engage with DoE to discuss adopting a shared approach to the delivery and funding of future kindergarten facilities within both growth areas.</p> <p>Maternal & Child Service (MCH) demand will largely be met by the delivery of proposed Level 1 and Level 2 Community Centres across both growth areas.</p> <p>At this early stage of planning, it is anticipated that 6 consulting rooms (under a low development scenario) to 8 consulting rooms (under a high development scenario) will</p>

⁹ It is State Government policy that new government primary schools must have a kindergarten co-located with the school (Source: Victorian Government School Site Selection Criteria – Toolbox, October 2021, Department of Education & Training, page 2)

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Long Day Child Care	<p>(0.5 ha). This facility has been built and includes two kindergarten rooms.</p> <ul style="list-style-type: none"> • Community Hub 2 Early Years Hub (0.5 ha). • Community Hub 3 Early Years Hub (0.5 ha). • Community Hub 4 Early Years Hub (0.5 ha). <p>Ballarat City Council has a policy position that it will not be a direct provider of new long day child care services in the municipality. Therefore, it can be assumed that all provision will need to be met by the private or not-for-profit community sector.</p>	The Western Growth Area may generate demand for as many as 1,100 long day child care places, the equivalent of 9 large sized long day child care centres.	The Western Growth Area may generate demand for as many as 1,480 long day child care places, the equivalent of 12 large sized long day child care centres.	The North-Western Growth Area may generate demand for as many as 620 long day child care places, the equivalent of 5 large sized long day child care centres.	The North-Western Growth Area may generate demand for as many as 830 long day child care places, the equivalent of 7 large sized long day child care centres.	<p>need to be included in as many as three Council community centres (@ 3 rooms per facility). However, Council may wish to amend the configuration options when formal planning processes commence across both growth areas.</p> <p>Continue to encourage private and community based long day child care provision across both growth areas, especially close to community infrastructure hubs.</p> <p>At this early stage of planning, it is anticipated that as many as 14 (under a low development scenario) to 19 (under a high development scenario) long day child care centres will be needed to satisfy demand across both growth areas.</p>
Youth	The Ballarat West PSP does not refer specifically to youth service or youth facility provision.	Although there are no specific youth service facility benchmarks or demand estimators, this assessment recommends Council	Although there are no specific youth service facility benchmarks or demand estimators, this assessment recommends Council	Although there are no specific youth service facility benchmarks or demand estimators, this assessment recommends Council	Although there are no specific youth service facility benchmarks or demand estimators, this assessment recommends Council	Confirm with Council which of the proposed future community centres will perform a youth service role.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
		identify which of the future community facilities can and should provide a youth service function.	identify which of the future community facilities can and should provide a youth service function.	identify which of the future community facilities can and should provide a youth service function.	identify which of the future community facilities can and should provide a youth service function.	
Education facilities						
Government Primary Schools	<p>The Ballarat West PSP includes provision for 4 Government Primary Schools. These facilities are:</p> <ul style="list-style-type: none"> • Community Hub 1 Government Primary School (3.5 ha). • Community Hub 2 Government Primary School (Major Activity Centre – included as part of a 10 ha P-12 Government School site). • Community Hub 3 Government Primary School site (3.5 ha). • Community Hub 4 Government Primary School site (3.5 ha). 	This assessment estimates the need for potentially 4 Government Primary school sites (2,100 enrolments).	This assessment estimates the need for potentially 6 Government Primary school sites (2,800 enrolments).	This assessment estimates the need for potentially 2 Government Primary school sites (1,200 enrolments).	This assessment estimates the need for potentially 3 Government Primary school sites (1,600 enrolments).	<p>This assessment indicates a potential combined need for 6 (low scenario) to 9 (high scenario) Government Primary Schools to service the demands generated by the Western and North-Western Growth Area.</p> <p>Further consultation with the Department of Education will be required once formal planning processes commence in both growth areas to confirm provision strategies.</p>
Government Secondary Schools	The Ballarat West PSP includes provision for 1 Government Secondary School to be located within Community Hub 2 (Major	This assessment estimates the need for 1.3 Government Secondary school sites (1,300 enrolments).	This assessment estimates the need for 1.7 Government Secondary school sites (1,700 enrolments).	This assessment estimates the need for 0.7 Government Secondary school sites (710 enrolments).	This assessment estimates the need for 1.0 Government Secondary school sites (950 enrolments).	This assessment indicates a potential combined need for 2 Government Secondary Schools (under both a low and high

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Government Specialist Schools	Activity Centre – included as part of a 10 ha P-12 Government School site). The Ballarat West PSP does not include provision for a Government Specialist School.	No formal facility provision benchmarks exist for Government Specialist Schools.	No formal facility provision benchmarks exist for Government Specialist Schools.	No formal facility provision benchmarks exist for Government Specialist Schools.	No formal facility provision benchmarks exist for Government Specialist Schools.	development scenario) across the two growth areas. Further consultation with the Department of Education will be required once formal planning processes commence in both growth areas to confirm provision strategies. Given the absence of formal facility provision benchmarks for Government Specialist Schools it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with DoE is recommended once formal planning processes commence across both growth areas to confirm its provision strategy.
Non-Government Schools	The Ballarat West PSP includes provision for 1 non-Government School site.	The following enrolment demands are anticipated for the Western Growth Area: <ul style="list-style-type: none">• 1,100 Catholic Primary School enrolments;	The following enrolment demands are anticipated for the Western Growth Area: <ul style="list-style-type: none">• 1,500 Catholic Primary School enrolments;	The following enrolment demands are anticipated for the North-Western Growth Area: <ul style="list-style-type: none">• 600 Catholic Primary School enrolments;	The following enrolment demands are anticipated for the North-Western Growth Area: <ul style="list-style-type: none">• 800 Catholic Primary School enrolments;	This assessment considers there will be a likely need to set aside land for potentially as many as three non-Government school sites (two primary schools and one secondary school).

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Higher Education	The Ballarat West PSP does not include provision for a higher education facility.	<ul style="list-style-type: none"> 470 other non-Government Primary school enrolments; 900 Catholic Secondary School enrolments; and 650 other non-Government Secondary school enrolments. <p>The following enrolment demands are anticipated for the Western Growth Area:</p> <ul style="list-style-type: none"> 730 TAFE enrolments; and 1,500 university enrolments. 	<ul style="list-style-type: none"> 630 other non-Government Primary school enrolments; 1,200 Catholic Secondary School enrolments; and 860 other non-Government Secondary school enrolments. <p>The following enrolment demands are anticipated for the Western Growth Area:</p> <ul style="list-style-type: none"> 980 TAFE enrolments; and 2,000 university enrolments. 	<ul style="list-style-type: none"> 260 other non-Government Primary school enrolments; 500 Catholic Secondary School enrolments; and 360 other non-Government Secondary school enrolments. <p>The following enrolment demands are anticipated for the North-Western Growth Area:</p> <ul style="list-style-type: none"> 410 TAFE enrolments; and 820 university enrolments. 	<ul style="list-style-type: none"> 350 other non-Government Primary school enrolments; 680 Catholic Secondary School enrolments; and 480 other non-Government Secondary school enrolments. <p>The following enrolment demands are anticipated for the North-Western Growth Area:</p> <ul style="list-style-type: none"> 550 TAFE enrolments; and 1,100 university enrolments. 	<p>However, early engagement with the Diocese of Ballarat Catholic Education Limited (DOBCCEL) and other local independent schools is recommended once formal planning processes commence across both growth areas to confirm provision needs.</p> <p>Given the absence of formal provision benchmarks for higher education facilities it is too early to estimate future needs generated by the Western and North-Western Growth Areas.</p> <p>However, Early engagement with the Department of Education, Federation University and Australian Catholic University is recommended to confirm provision needs.</p>
Libraries, community centres, learning centres, community meeting spaces and arts / cultural facilities						
Library	The current Ballarat West PSP includes provision for a	The Western Growth Area generates a need	The Western Growth Area generates a need	The North-Western Growth generates a	The North-Western Growth generates a	Given that there are two proposed future libraries

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Level 1 multipurpose community centre	<p>new Library facility (1,800 square metres) within Community Hub 2 (Major Activity Centre) on a 1-hectare site and co-located with a Level 3 multipurpose community centre and an early years facility.</p> <p>Council also plans to construct the Wendouree Library and Learning Centre which is anticipated to service both the Ballarat Northern Growth Area and Ballarat West and North West Growth Areas. Design work is currently scheduled for 2029/30 financial year and construction for 2031/32. The location of the proposed library will provide easy access for residents in the Ballarat West and North West Growth Areas because of proposed link road upgrades.</p> <p>The Ballarat West PSP includes provision for 2 Level 1 Multipurpose</p>	for 0.9 library facility and will generate the equivalent of 188,000 loans per annum and 153,000 visits per annum.	for 1.2 library facilities and will generate the equivalent of 260,000 loans per annum and 204,000 visits per annum.	need for 0.5 library facilities and will generate the equivalent of 105,000 loans per annum and 85,500 visits per annum.	need for 0.7 library facilities and will generate the equivalent of 140,000 loans per annum and 114,000 visits per annum.	<p>(Ballarat West PSP and the Wendouree Library) that are likely to service the demands generated by the Western and North-Western Growth Areas additional library provision in these areas is unlikely to be needed. However, as a contingency, it is recommended that Council continue to monitor the need for a facility (potentially in the North-Western Growth Area as part of a Level 3 Community Centre) depending on changes to population assumptions and travel times.</p> <p>Depending on the development scenario, this assessment supports the need for three to four Level</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Level 2 multipurpose community centre	<p>Community Centres located in:</p> <ul style="list-style-type: none"> Community Hub 3 (0.8 hectare); and Community Hub 4 (0.8 hectare). <p>The Ballarat West PSP does not identify any proposed Level 2 Community Centres.</p>	Level 1 multipurpose community centres.	Level 1 multipurpose community centres.	Level 1 multipurpose community centres.	Level 1 multipurpose community centres.	1 Community Centres to service the demands generated by the Western and North-Western Growth Areas.
Level 3 multipurpose community centre	<p>The Ballarat West PSP does not identify any proposed Level 2 Community Centres.</p> <p>The Ballarat West PSP includes provision for 1 Level 3 Multipurpose Community Centre in Community Hub 2 (1 hectare site in the proposed MAC).</p>	The Western Growth Area generates a population catchment sufficient to justify 1.7 Level 2 multipurpose community centres.	The Western Growth Area generates a population catchment sufficient to justify 2.3 Level 2 multipurpose community centres.	The North-Western Growth Area generates a population catchment sufficient to justify 1 Level 2 multipurpose community centres.	The North-Western Growth Area generates a population catchment sufficient to justify 1.3 Level 2 multipurpose community centres.	Depending on the development scenario, this assessment supports the need for two to three Level 2 Community Centres to service the demands generated by the Western and North-Western Growth Areas and, ideally, one in each growth area.
Neighbourhood House / Learning centre	<p>The Ballarat West PSP does not identify any proposed Neighbourhood House / Learning Centre facilities.</p>	The Western Growth Area generates a population catchment sufficient to justify 0.6 of a Level 3 multipurpose community centre.	The Western Growth Area generates a population catchment sufficient to justify 0.8 of a Level 3 multipurpose community centre.	The North-Western Growth Area generates a population catchment sufficient to justify 0.3 of a Level 3 multipurpose community centre.	The North-Western Growth Area generates a population catchment sufficient to justify 0.4 of a Level 3 multipurpose community centre.	This assessment supports the need for one Level 3 Community Centre to service the demands generated by the Western and North-Western Growth Areas. Ideally, this facility should be located centrally within the North-Western Growth Area.
		The Western Growth Area generates a population catchment sufficient to justify 1.2 Neighbourhood Houses.	The Western Growth Area generates a population catchment sufficient to justify 1.7 Neighbourhood Houses.	The North-Western Growth Area generates a population catchment sufficient to justify 0.7 Neighbourhood Houses.	The North-Western Growth Area generates a population catchment sufficient to justify 0.9 Neighbourhood Houses.	This assessment supports the need for at least two additional Neighbourhood House facilities to service the demands generated by the Western and North-

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Arts / cultural facilities	<p>The Ballarat West PSP does not identify any dedicated arts and cultural facilities. However, it is feasible to allocate and configure arts and cultural spaces within one or more of the multipurpose community centres proposed for the PSP.</p> <p>Council’s Arts and Cultural Infrastructure Report (2021) identifies how the proposed Ballarat West PSP community facilities will support arts and cultural activities. These include:</p> <ul style="list-style-type: none"> The new Delacombe Library and Community Hub is a \$18.1 million project expected to be designed in FY25-26 which is identified in the Ballarat West Development Contributions Plan. Similar to the Ballarat 	<p>By full development approximately 9,800 people may participate in activities such as drama, singing or playing a musical instrument, dance and art and craft activities. Although it is difficult to determine where such activities will be undertaken, it is reasonable to assume that proposed Council community centres can play a significant role in meeting some of the demand for arts and cultural activities.</p>	<p>By full development approximately 13,100 people may participate in activities such as drama, singing or playing a musical instrument, dance and art and craft activities. Although it is difficult to determine where such activities will be undertaken, it is reasonable to assume that proposed Council community centres can play a significant role in meeting some of the demand for arts and cultural activities.</p>	<p>By full development approximately 5,500 people may participate in activities such as drama, singing or playing a musical instrument, dance and art and craft activities. Although it is difficult to determine where such activities will be undertaken, it is reasonable to assume that proposed Council community centres can play a significant role in meeting some of the demand for arts and cultural activities.</p>	<p>By full development approximately 7,300 people may participate in activities such as drama, singing or playing a musical instrument, dance and art and craft activities. Although it is difficult to determine where such activities will be undertaken, it is reasonable to assume that proposed Council community centres can play a significant role in meeting some of the demand for arts and cultural activities.</p>	<p>Western Growth Areas. Ideally, these facilities should be incorporated into the two proposed Level 2 Community Centres.</p> <p>It is recommended that Council ensure that arts and cultural facilities are embedded in all proposed multipurpose community centre spaces and recreation facilities including:</p> <ul style="list-style-type: none"> Soundproofing meeting rooms to make them dual rehearsal spaces / recording spaces; Provision of wet spaces (such as large kitchen environments) which can be used as wet work spaces (ceramics, mosaics, painting) with wipe clean surfaces; Improved WIFI network service permitting good upload and download capacity for creative businesses; and Sprung floors in large sporting areas (such as a basketball court) to make

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
	<p>Library model, it is expected that the development will include dedicated spaces for arts and cultural programming, including multipurpose meeting rooms, coworking spaces and maker spaces.</p> <ul style="list-style-type: none"> Alfredton Early Years and Community Hub (Ballymanus). The Alfredton Early Years and Community Hub is a project identified in the Ballarat West Development Contributions plan which is expected to commence construction in FY22-23. The development is expected to include an early years kindergarten and a number of multipurpose community rooms which could have the potential to service arts and cultural programming and activities. Greenhaulghs Road Sub-precinct (Winter Valley). A community hub and kindergarten is planned for development in FY31- 					<p>it suitable for dance rehearsal.</p> <p>It is also recommended that Council identify which of the seven proposed multipurpose community centres recommended by this assessment (4 Level 1 facilities, 2 Level 2 facilities and 1 Level 3 facility) should incorporate a more dedicated arts and cultural function (e.g. gallery spaces in the Level 3 facility).</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
	32 in the Greenhaulghs Road Sub-precinct which is identified in the Ballarat West Development Contributions Plan. There is an opportunity to service arts and cultural needs through the community hub.					
Major open space reserves (active and passive)						
Regional open space	The current Ballarat West PSP includes the existing MR Power Park (18 hectares) which is identified as a regional open space with a major focus on the provision of active open space. However, since the preparation of the PSP, a Council prepared Master Plan for the site has indicated a preference for a predominantly passive open space and informal recreation role for MR Power Park.	No provision benchmark for regional open space.	No provision benchmark for regional open space.	No provision benchmark for regional open space.	No provision benchmark for regional open space.	Given the projected shortfall in active open space identified as part of the Ballarat West PSP Review process currently being undertaken by Council, it is recommended that a Council investigate the feasibility of establishing a 30-hectare regional active open space reserve within the boundaries of either the Western or North-Western Growth Areas. Subject to funding and planning constraints, Council should also assess the merits of a smaller regional open space and / or land potentially classified as encumbered open space but does not

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Local passive open space	<p>The current Ballarat West PSP includes provision for 58.15 hectares of unencumbered passive open space and linear open spaces.</p> <p>The overall supply of proposed passive open space within the Ballarat West PSP will increase significantly because of a number of key changes that have occurred since approval of the original PSP including:</p> <ul style="list-style-type: none"> Council's preference to identify and configure MR Power Park (18 hectares) as a predominantly passive open space performing a range of natural and 	<p>The Western Growth Area generates a need equating to approximately 34 hectares based on the application of 4% of NDA for passive open space, distributed across a network of local parks generally located within 400 metres of residential dwellings).</p>	<p>The Western Growth Area generates a need equating to approximately 34 hectares based on the application of 4% of NDA for passive open space, distributed across a network of local parks generally located within 400 metres of residential dwellings).</p>	<p>The North-Western Growth Area generates a need equating to approximately 19 hectares based on the application of 4% of NDA for passive open space, distributed across a network of local parks generally located within 400 metres of residential dwellings).</p>	<p>The North-Western Growth Area generates a need equating to approximately 19 hectares based on the application of 4% of NDA for passive open space, distributed across a network of local parks generally located within 400 metres of residential dwellings).</p>	<p>require permanent water to be stored.</p> <p>It is recommended that the revised Ballarat West PSP identify MR Power Park as regional open space with a predominantly passive open space and informal recreation role.</p> <p>This assessment indicates a potential combined need of 53 hectares of unencumbered passive open space to service the demands generated by the Western and North-Western Growth Areas. However, there may be a need to trade-off some of the supply of passive open space for active open space due the shortfall of active open space identified as part of the Ballarat West PSP Review process currently being undertaken by Council.</p> <p>It is recommended Council identify the hierarchy of open spaces proposed for the Ballarat West PSP in line with the hierarchy outlined</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Local Formal & informal active open space	<p>informal recreational functions; and</p> <ul style="list-style-type: none"> A reduction in the size of the Community Hub 4 active open space reserve allocation (originally a proposed allocation of 8 hectares of active open space split across two reserve sites, now reduced to 4 hectares at one site only). <p>These changes will result in an additional 22 hectares of passive open space provision for the Ballarat West PSP and increase overall supply to 80.15 hectares.</p> <p>The current Ballarat West PSP includes provision for approximately 57 hectares of active open space to be delivered across the following five sites:</p> <ul style="list-style-type: none"> M R Power Regional Park (An existing 18 hectare reserve will perform a dual regional / local sports reserve role. The outdoor 	<p>The Western Growth Area generates a need equating to approximately 52 hectares of local active open space based on the application of 6% of NDA for active open space guideline. This equates to approximately 5 larger sized active open space reserves (each 10.8 hectares in size).</p>	<p>The Western Growth Area generates a need equating to approximately 52 hectares of local active open space based on the application of 6% of NDA for active open space guideline. This equates to approximately 5 larger sized active open space reserves (each 10.8 hectares in size).</p>	<p>The North-Western Growth Area generates a need equating to approximately 29 hectares of local active open space based on the application of 6% of NDA for active open space guideline. This equates to approximately 3 larger sized active open space reserves (each 10 hectares in size).</p>	<p>The North-Western Growth Area generates a need equating to approximately 29 hectares of local active open space based on the application of 6% of NDA for active open space guideline. This equates to approximately 3 larger sized active open space reserves (each 10 hectares in size).</p>	<p>by the Ballarat Open Space Strategy (BOSS) and clearly distinguish between Neighbourhood, District and Regional open spaces.</p> <p>Given the net developable area estimates for the two growth areas, and the projected shortfall in active open space supply in the Ballarat West PSP, the following indicative provision strategy is recommended for each growth area:</p> <ul style="list-style-type: none"> Indicatively, the Western Growth Area

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
	<p>formal sports function will reduce to approximately 4 hectares).</p> <ul style="list-style-type: none"> • Mining Park (a 12.96 hectare); • Community Hub 2 (originally a proposed 8 hectare reserve, now reduced to 3.5 hectares); • Community Hub 3 (a proposed 10 hectare reserve); and • Community Hub 4 (a proposed 8 hectare reserve split across two reserve sites). <p>The overall supply of proposed active of open space within the Ballarat West PSP will significantly reduce because of a number of key changes that have occurred since approval of the original PSP. Overall supply will decrease from 57 hectares to 33.5 hectares leaving a shortfall of 25.5 hectares (note: this shortfall has been offset by a large corresponding surplus of</p>					<p>should include 52 hectares of active open space which can be configured in any number of ways Council deems appropriate of the time formal PSP planning commences and 1 regional active open space (30 hectares); and</p> <ul style="list-style-type: none"> • Indicatively, the North Western Growth Area should include 29 hectares of active open space which can be configured in any number of ways Council deems appropriate of the time formal PSP planning commences. <p>The potential to secure joint school / community active open space should also be explored by Council on a case by case basis.</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
	<p>41.5 hectares of passive open space).</p> <p>In response to this reduced supply of active open space it is recommended that Council assess implementing a number of measures including investigating opportunities to secure active open space land in the adjoining future growth areas.</p>					
Indoor recreation facilities						
Multipurpose indoor court facility	<p>The Ballarat West PSP includes two proposed Council indoor recreation centres. These are:</p> <ul style="list-style-type: none"> Community Hub 3 indoor recreation facility (8 courts) on a 1 hectare site. MR Power Regional Park indoor recreation facility (4 courts). <p>Given the demand and supply requirements generated by the Ballarat West PSP, and Council's current position on the future role and function</p>	<p>The demand generated by the Western Growth Area is equivalent to approximately 4 indoor multipurpose courts.</p>	<p>Equivalent to approximately 5 indoor multipurpose courts.</p>	<p>The demand generated by the North-Western Growth Area is equivalent to approximately 2 indoor multipurpose courts.</p>	<p>Equivalent to approximately 3 indoor multipurpose courts.</p>	<p>Although some of the indoor recreation needs of the Western Growth Area are likely to be catered for by the proposed 8 court indoor facility earmarked for Community Hub 3 in the Ballarat West PSP, it is recommended that one additional indoor recreation centre (with capacity to cater for up to 8 courts under a high development scenario) be established to service the demand generated by the Western and North Western Growth Areas. Ideally, this facility should be located centrally</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Aquatic leisure centres	<p>MR Power Park as an informal regional passive open space, the proposed indoor recreation facility earmarked for MR Power Park will be removed as a requirement of the Ballarat West PSP.</p> <p>The Ballarat West PSP does not include an existing or planned Council aquatic leisure centre. The nearest Council indoor aquatic leisure facility is the Ballarat Aquatic & Lifestyle Centre located approximately 6 kilometres north of the Delacombe Major Activity centre.</p>	The demand generated by the Western Area is equivalent to approximately 178,000 Council aquatic leisure centre visits per annum and 0.3 Council aquatic leisure centre facilities.	Equivalent to approximately 237,000 Council aquatic leisure centre visits per annum and 0.4 Council aquatic leisure centre facilities.	The demand generated by the North-Western Area is equivalent to approximately 99,000 Council aquatic leisure centre visits per annum and 0.2 Council aquatic leisure centre facilities.	Equivalent to approximately 132,000 Council aquatic leisure centre visits per annum and 0.2 Council aquatic leisure centre facilities.	<p>within the North-Western Growth Area.</p> <p>Given its reasonable proximity to the Ballarat Aquatic & Lifestyle Centre no additional aquatic leisure centre provision is recommended for the Western and North-Western Growth Areas. However, it is recommended that Council undertake an assessment of the capacity of the existing aquatic facility to absorb the future demands generated by an additional 56,000 to 75,000 people and identify what, if any, facility expansion / redevelopment needs might be required.</p> <p>It is also recommended that Council assess the potential need for a Splash Park in the Ballarat West Growth Areas.</p>
Health services						

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Local GP Clinics	Although not specifically identified in the Ballarat West PSP, it can be assumed that private GP clinics will be established within proposed activity centres, especially the proposed Major Activity Centre.	Equivalent to 10 medical centres delivered by the private sector.	Equivalent to 14 medical centres delivered by the private sector.	Equivalent to 6 medical centres delivered by the private sector.	Equivalent to 8 medical centres delivered by the private sector.	Local GP clinics will be delivered by private and or / not for profit service providers (e.g. community health). However, it is recommended that Council determine preferred locations for further medical centre provision across both growth areas with an aspirational target of accommodating up to 16 to 22 GP clinics depending on the development scenario. However, the provision of these services is not typically shown in a PSP.
Acute / Sub-acute services	The Ballarat West PSP does not include an existing or planned acute / subacute health service site.	The demand generated by the Western Growth Area is equivalent to approximately 120 public/private hospital beds.	Equivalent to approximately 170 public/private hospital beds.	The demand generated by the North-Western Growth Area is equivalent to approximately 70 public/private hospital beds.	Equivalent to approximately 90 public/private hospital beds.	Given the absence of formal provision benchmarks for acute/sub-acute health facilities it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with the Department of Health and Ballarat Health Service.
Community health services	The Ballarat West PSP does not include an existing or planned community health service site.	Equivalent to approximately 1,000 community health service clients.	Equivalent to approximately 1,300 community health service clients.	Equivalent to approximately 560 community health service clients.	Equivalent to approximately 740 community health service clients.	Given the absence of formal provision benchmarks for community health facilities it is too early to estimate future needs generated by

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
						the Western and North-Western Growth Areas. However, early engagement with the Department of Health and Ballarat Community Health.
Police & Emergency services						
Police Station	The Ballarat West PSP originally included provision for an emergency services hub site on the north western boundary of the PSP, but was subsequently relocated to the north eastern boundary in Lucas which includes the Ballarat West Police Station located adjacent to the Ballarat West Fire Station. The first stage of the Ballarat West Police Station was built in 2015 and Stage 2 in 2016.	No formal facility provision benchmarks exist for police stations.	No formal facility provision benchmarks exist for police stations.	No formal facility provision benchmarks exist for police stations.	No formal facility provision benchmarks exist for police stations.	The existing Ballarat West Police Station, located within the north east section of the Ballarat West PSP operates as a 16 hour police station. Although this existing facility is not located in, or adjacent to an activity centre (the preferred location for police stations), there is unlikely to be a need to establish a new Police Station within the Western and North Western Growth Areas. However, as population in Ballarat West continues to grow it is likely that the existing 16 hour Ballarat West Police Station will need to be increased to a 24 hour operation.
Ambulance Station	There is no ambulance station located within the Ballarat West PSP. The nearest existing ambulance	No formal facility provision benchmarks exist for ambulance stations.	No formal facility provision benchmarks exist for ambulance stations.	No formal facility provision benchmarks exist for ambulance stations.	No formal facility provision benchmarks exist for ambulance stations.	Although there are no existing or planned ambulance stations for the Ballarat West PSP, the

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Fire Services	<p>stations are located to the east of the PSP in Sebastopol (approximately 4 kilometres east of the Delacombe Town Centre) and Bakery Hill (approximately 8 kilometres from the Delacombe Town Centre).</p> <p>The Ballarat West PSP originally included provision for an emergency services hub site on the north western boundary of the PSP, but was subsequently relocated to the north eastern boundary in Lucas and is co-located with the Ballarat West Police Station. The Lucas Fire Station was constructed in 2019.</p>	No formal facility provision benchmarks exist for fire stations.	No formal facility provision benchmarks exist for fire stations.	No formal facility provision benchmarks exist for fire stations.	No formal facility provision benchmarks exist for fire stations.	<p>proximity of the PSP to existing facilities to the east (Sebastopol and Bakery Hill) indicates that emergency response times to the PSP will remain adequate. However, additional provision may be required as part of the future planning of the Ballarat Western and North Western Growth Areas. This will be confirmed with the relevant agencies when PSP processes formally commence.</p> <p>The existing Ballarat West Fire Station will be sufficient to meet the future needs of the Ballarat West PSP. However, additional provision may be required as part of the future planning of the Ballarat Western and North Western Growth Areas. This will be confirmed with the relevant agencies when PSP processes formally commence.</p>
VicSES	There is no VICSES facility located within the Ballarat West PSP. The nearest existing facility is located a	No formal facility provision benchmarks exist for VicSES facilities.	No formal facility provision benchmarks exist for VicSES facilities.	No formal facility provision benchmarks exist for VicSES facilities.	No formal facility provision benchmarks exist for VicSES facilities.	There is a need to identify a new location for the existing Ballarat VICSES facility currently operating from

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
Law courts	<p>short distance east of the PSP boundary in Alfredton (115B Gillies St, Alfredton) and operates from a leased site owned by Ballarat City Council. The Department of Justice and Community Safety (DJCS) has indicated that Ballarat City Council will not renew the lease at the existing site.</p> <p>There are no law courts located within the Ballarat West PSP. The nearest existing law court facility is the Ballarat Magistrates Court located approximately 8 kilometres east of the Delacombe Town Centre (approximately 12-minute drive time).</p>	No formal facility provision benchmarks exist for law court facilities.	No formal facility provision benchmarks exist for law court facilities.	No formal facility provision benchmarks exist for law court facilities.	No formal facility provision benchmarks exist for law court facilities.	<p>leased premises owned by Ballarat City Council which it will not renew. The Ballarat West PSP, along with the future Ballarat West Growth Area, provides an opportunity to identify a new site location for VICSES. This review recommends that Council and the Department of Justice and Community Safety (DJCS) undertake a coordinated and collaborative planning exercise to identify a suitable site either within the Ballarat West PSP or the Western or North Western Growth Areas.</p> <p>Given the scale of projected population growth and the proximity of the PSP to the existing Ballarat Magistrates Court (approximately 8 kilometres east of the Delacombe Town Centre) indicates the need for a new law court facility in the Western and North Western Growth Areas is not justified. However, as the population of Ballarat continues to grow over the coming decades there may</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Nearest Existing and Planned Provision including the Ballarat West PSP	Potential Requirements within the Ballarat Western Growth Area		Potential Requirements within the Ballarat North-Western Growth Area		Implications for Future Community Infrastructure Provision
		Low Population Scenario	High Population Scenario	Low Population Scenario	High Population Scenario	
						be a new to expand and / or redevelop the existing Ballarat Magistrates Court and increase its operational resources.
Residential aged care and other older persons services						
Residential aged	The Ballarat West PSP includes provision of a retirement village site.	Equivalent to approximately 390 aged care places (equivalent to 3 to 4 facilities).	Equivalent to approximately 520 aged care places (equivalent to 5 to 6 facilities).	Equivalent to approximately 220 aged care places (equivalent to 2 to 3 facilities).	Equivalent to approximately 290 aged care places (equivalent 3 to 4 facilities).	Residential aged care provision will be delivered by private and or / not for profit service providers. However, it is recommended that Council determine preferred locations for further residential aged care provision across both growth areas with an aspirational target of accommodating 5 to 10 facilities depending on the development scenario. However, the provision of these services is not typically shown in a PSP.

9 Summary of Key Findings & Recommendations

Based on the information presented and analysed in the previous sections of this report a summary of key findings and recommendations is summarised below.

9.1 Dwelling & Population Outcomes

1. It is currently estimated that the Ballarat Western and North-Western Growth Areas has a combined developable area of approximately 1,400 hectares and a population capacity ranging from of approximately 54,000 people (approximately 20,000 dwellings) to 72,000 people (27,000 dwellings). The largest share of this population will reside in the Western Growth Area (64%) which also accounts for approximately 64% of the total developable area.
2. When the two growth areas are combined with the current Ballarat West PSP population capacity estimate (40,000 people), the broader Ballarat West Growth Area has the capacity to accommodate approximately 94,000 to 112,000 people.

9.2 Public Open Space & Recreation

Encumbered Open Space

3. When future PSP processes formally commence in both growth areas, and more details about the extent and location of encumbered land becomes known, it is recommended that Council confirm what informal recreational opportunities exist as part of the development of encumbered open spaces.

Regional Open Space

4. Given the projected shortfall in active open space identified as part of the Ballarat West PSP Review process currently being undertaken by Council, it is recommended that a Council investigate the feasibility of establishing a 30-hectare regional active open space reserve within the boundaries of either the Western or North-Western Growth Areas.
5. Subject to funding and planning constraints, Council should also assess the merits of a smaller regional open space and / or land potentially classified as encumbered open space (but where the site does not require permanent water to be stored).

Passive Open Space

6. This assessment indicates a potential combined need of 56 hectares of unencumbered passive open space to service the demands generated by the Western and North-Western Growth Areas. However, there may be a need to trade-off some of the supply of passive

open space for active open space due the shortfall of active open space identified as part of the Ballarat West PSP Review process currently being undertaken by Council.

7. When future PSP processes formally commence in both growth areas, it is recommended that Council identify the hierarchy of open spaces for both areas in line with the hierarchy outlined by the Ballarat Open Space Strategy (BOSS) to clearly distinguish between Neighbourhood, District and Regional open spaces.

Active Open Space

8. Given the net developable area estimates for the two growth areas, and the projected shortfall in active open space supply in the Ballarat West PSP, the following indicative provision strategy is recommended for each growth area:
 - Indicatively, the Western Growth Area should include 52 hectares of active open space which can be configured in any number of ways Council deems appropriate of the time formal PSP planning commences and 1 regional active open space (30 hectares); and
 - Indicatively, the North Western Growth Area should include 29 hectares of active open space which can be configured in any number of ways Council deems appropriate of the time formal PSP planning commences.
9. The potential to secure joint school / community active open space should also be explored by Council on a case by case basis.

Indoor Recreation

10. Although some of the indoor recreation needs of the Western Growth Area are likely to be catered for by the proposed 8 court indoor facility earmarked for Community Hub 3 in the Ballarat West PSP, it is recommended that one additional indoor recreation centre (with capacity to cater for up to 8 courts under a high development scenario) be established to service the demand generated by the Western and North Western Growth Areas. Ideally, this facility should be located centrally within the North-Western Growth Area.
11. Given its reasonable proximity to the Ballarat Aquatic & Lifestyle Centre no additional aquatic leisure centre provision is recommended for the Ballarat West PSP. However, it is recommended that Council undertake an assessment of the capacity of the existing aquatic facility to absorb the future demands generated by an additional 56,000 to 75,000 people and identify what, if any, facility expansion / redevelopment needs might be required.
12. It is also recommended that Council assess the potential need for a Splash Park in the Ballarat West Growth Areas.

9.3 Multipurpose Community Centres & Community Services

Multipurpose Community Centres

13. Depending on the development scenario, this assessment supports the need for three to four Level 1 Community Centres to service the demands generated by the Western and North-Western Growth Areas.
14. Depending on the development scenario, this assessment supports the need for two to three Level 2 Community Centres to service the demands generated by the Western and North-Western Growth Areas and, ideally, at least one in each growth area.
15. This assessment supports the need for one Level 3 Community Centre (which could include a library) to service the demands generated by the Western and North-Western Growth Areas. Ideally, this facility should be located centrally within the North-Western Growth Area.

Early Years Services – Long Day Child Care

16. At this early stage of planning, it is anticipated that as many as 15 (under a low development scenario) to 20 (under a high development scenario) long day child care centres will be needed to satisfy demand across both growth areas.

Early Years Services – 3 & 4 Year Old Sessional Kindergarten

17. Sessional Kindergarten demand will largely be met by the delivery of proposed Level 1 and Level 2 Community Centres across both growth areas and potentially supplemented by additional provision at future Government Primary Schools and Catholic Primary Schools.
18. At this early stage of planning, it is anticipated that 24 (under a low development scenario) to 32 (under a high development scenario) sessional kindergarten rooms will need to be included in as many as six Council community centres (@ 4 to 6 rooms per facility) and supplemented by an additional 6 to 8 rooms at Government Primary / Catholic Primary Schools.
19. It is recommended Council engage with DoE to discuss adopting a shared approach to the delivery and funding of future kindergarten facilities within both growth areas and develop a kindergarten infrastructure services plan.

Early Years Services – Maternal & Child Health

20. In Maternal & Child Service (MCH) demand will largely be met by the delivery of proposed Level 1 and Level 2 Community Centres across both growth areas.
21. At this early stage of planning, it is anticipated that 7 consulting rooms (under a low development scenario) to 9 consulting rooms (under a high development scenario) will

need to be included in as many as three Council community centres (@ 2 to 3 rooms per facility). However, Council may wish to amend the configuration options when formal planning processes commence across both growth areas.

Early Years Services – Youth

22. Confirm with Council which of the proposed community centres will perform a youth service role.

Neighbourhood Houses / Adult Education

23. This assessment supports the need for at least two additional Neighbourhood House facilities to service the demands generated by the Western and North-Western Growth Areas. Ideally, these facilities should be incorporated into two proposed Level 2 Community Centres.

Libraries

24. Given that there are two proposed future libraries (Ballarat West PSP and the Wendouree Library) that are likely to service the demands generated by the Western and North-Western Growth Areas additional library provision in these areas is unlikely to be needed. However, as a contingency, it is recommended that Council continue to monitor the need for a facility (potentially in the North-Western Growth Area as part of a Level 3 Community Centre) depending on changes to population assumptions and travel times.

Arts & Cultural Facilities

25. It is also recommended that Council ensure that arts and cultural facilities are embedded in the proposed multipurpose community centre spaces and recreation facilities including:

- Soundproofing meeting rooms to make them dual rehearsal spaces / recording spaces;
- Provision of wet spaces (such as large kitchen environments) which can be used as wet work spaces (ceramics, mosaics, painting) with wipe clean surfaces;
- Improved WIFI network service permitting good upload and download capacity for creative businesses; and
- Sprung floors in large sporting areas (such as a basketball court) to make it suitable for dance rehearsal.

22. It is also recommended that Council identify which of the seven proposed multipurpose community centres recommended by this assessment (4 Level 1 facilities, 2 Level 2 facilities and 1 Level 3 facility) should incorporate a more dedicated arts and cultural function (e.g. gallery spaces in the Level 3 facility).

9.4 Education

Government Primary

23. This assessment indicates a potential combined need for 7 (low scenario) to 9 (high scenario) Government Primary Schools to service the demands generated by the Western and North-Western Growth Area.
24. Further consultation with the Department of Education will be required once formal planning processes commence in both growth areas to confirm provision strategies.
25. The location and configuration of proposed Government school sites should be delivered in accordance with the Victorian Government School Site Selection Criteria – Toolbox (October 2021).

Government Secondary

26. This assessment indicates a potential combined need for 2 Government Secondary Schools (under both a low and high development scenario) across the two growth areas.
27. Further consultation with the Department of Education will be required once formal planning processes commence in both growth areas to confirm provision strategies.
28. The location and configuration of proposed Government school sites should be delivered in accordance with the Victorian Government School Site Selection Criteria – Toolbox (October 2021).

Government Specialist Schools

29. Given the absence of formal facility provision benchmarks for Government Specialist Schools it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with DoE is recommended once formal planning processes commence across both growth areas to confirm its provision strategy.

Non-Government Schools

30. This assessment considers there will be a likely need to set aside land for potentially as many as three non-Government school sites (two primary schools and one secondary school).
31. However, early engagement with the Diocese of Ballarat Catholic Education Limited (DOBCCEL) and other local independent schools is recommended once formal planning processes commence across both growth areas to confirm provision needs.

University and TAFE

32. Given the absence of formal provision benchmarks for higher education facilities it is too early to estimate future needs generated by the Western and North-Western Growth Areas.
33. However, Early engagement with the Department of Education, Federation University and Australian Catholic University is recommended to confirm provision needs.

9.5 Law Courts, Police & Emergency Services

Police

34. Given the absence of formal facility provision benchmarks for police stations it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with Victoria Police is recommended once formal planning processes commence across both growth areas.

Fire Services

35. Given the absence of formal facility provision benchmarks for fire stations it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with Fire Rescue Victoria is recommended once formal planning processes commence across both growth areas.

Ambulance Services

36. Given the absence of formal facility provision benchmarks for ambulance stations it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with the Department of Health is recommended once formal planning processes commence across both growth areas.

State Emergency Services

37. Given the absence of formal facility provision benchmarks for VicSES facilities it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with Emergency Services Infrastructure Authority is recommended once formal planning processes commence across both growth areas.
38. There is a need to identify a new location for the existing Ballarat VICSES facility currently operating from leased premises owned by Ballarat City Council which it will not renew. The Ballarat West PSP, along with the future growth areas, provides an opportunity to identify a new site location for VICSES.
39. Council and the Department of Justice and Community Safety (DJCS) should undertake a coordinated and collaborative planning exercise to identify a suitable site within one of the growth areas.

Law Courts

40. Given the absence of formal facility provision benchmarks for law courts it is too early to estimate future needs generated by the Western and North-Western Growth Areas.
-

However, early engagement with Court Services Victoria is recommended once formal planning processes commence across both growth areas.

9.6 Health

Acute / Sub-Acute Health Services

41. Given the absence of formal provision benchmarks for acute/sub-acute health facilities it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with the Department of Health and Ballarat Health Service.

Community Health Services

42. Given the absence of formal provision benchmarks for community health facilities it is too early to estimate future needs generated by the Western and North-Western Growth Areas. However, early engagement with the Department of Health and Ballarat Community Health.

9.7 Aged Care & Other Services for Older Persons

Aged Care Places

43. Residential aged care provision will be delivered by private and or / not for profit service providers. However, it is recommended that Council determine preferred locations for further residential aged care provision across both growth areas with an aspirational target of accommodating 5 to 10 facilities depending on the development scenario. However, the provision of these services is not typically shown in a PSP.

9.8 Consistency with Statutory Policies and Other Strategic Documents

44. The recommendations outlined above a broadly in accordance with the statutory and strategic documentation reviewed by this assessment, and in particular the requirements and directions outlined in the Ballarat Planning Scheme and other City of Ballarat policies, strategies and plans.

9.9 Further Process Recommendations

45. Further discussion and engagement with Ballarat City Council and other external agencies is recommended to confirm support for the conclusions and recommendations outlined by this assessment.

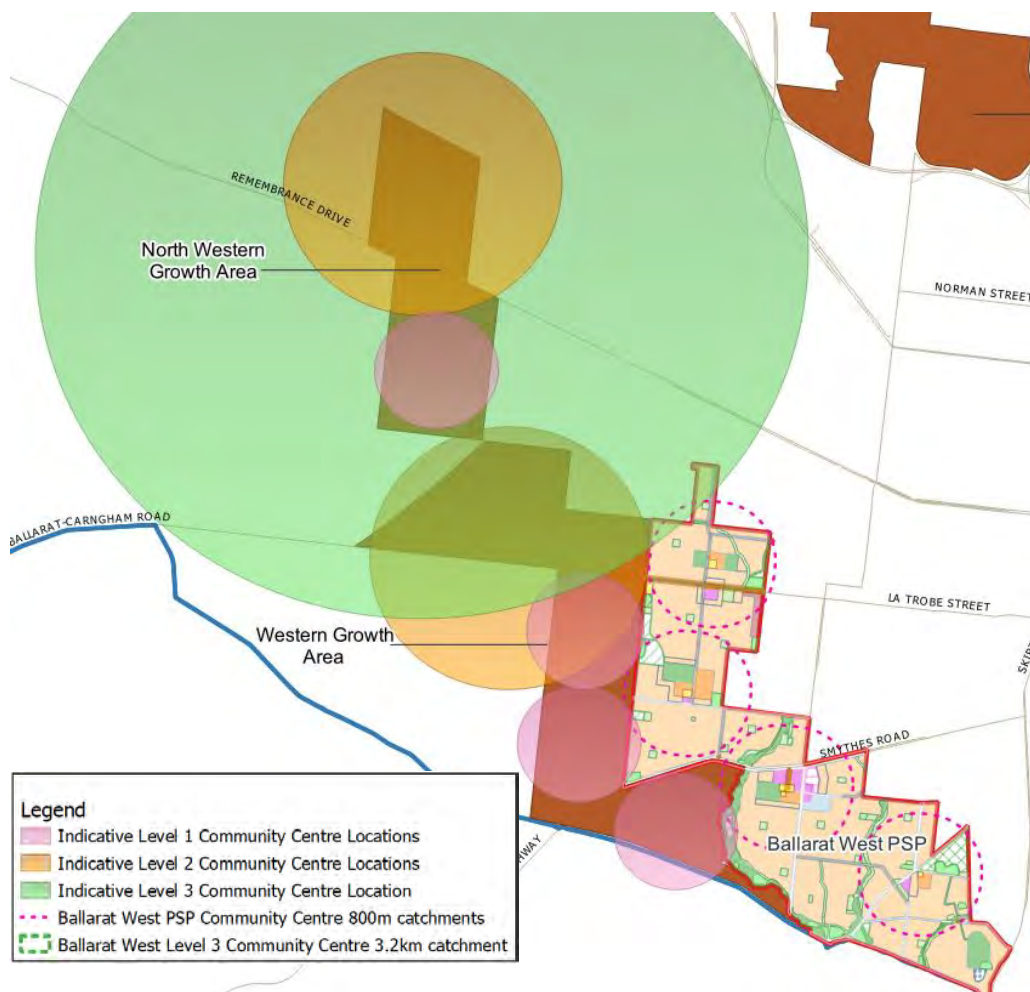
10 Indicative Community Infrastructure Hub Locations & DCP Cost Implications

10.1 Indicative Community Infrastructure Hub Locations

This section brings together the estimates of community infrastructure demand and supply requirements and the location of existing and planned community infrastructure to provide indicative community infrastructure hub locations for both the Western and North-Western Growth Areas.

Figure 4 below shows the indicative locations for all proposed Level 1, Level 2 and Level 3 Community Centres.

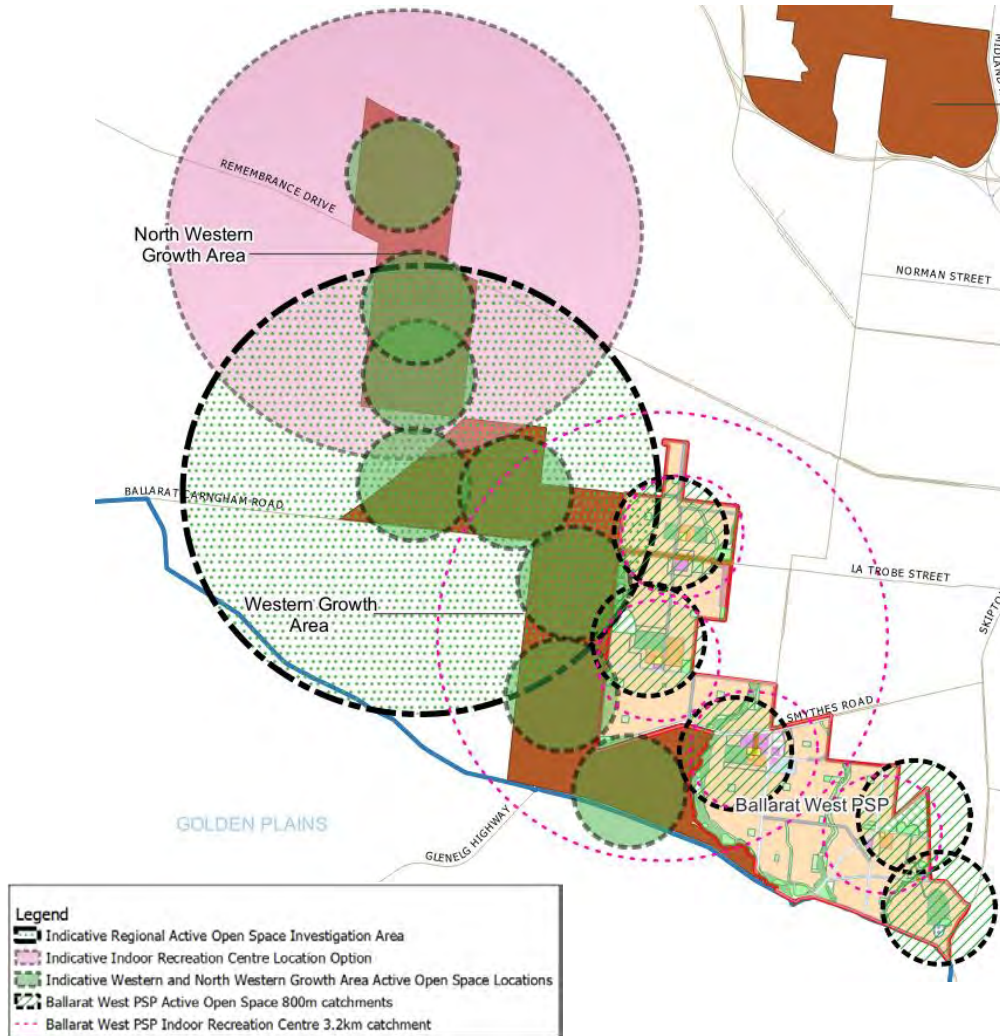
Figure 3 - Indicative Community Centre Facility Locations and Catchment Areas



Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Figure 5 below shows the indicative locations for all proposed local and regional active open spaces and indoor recreation centres.

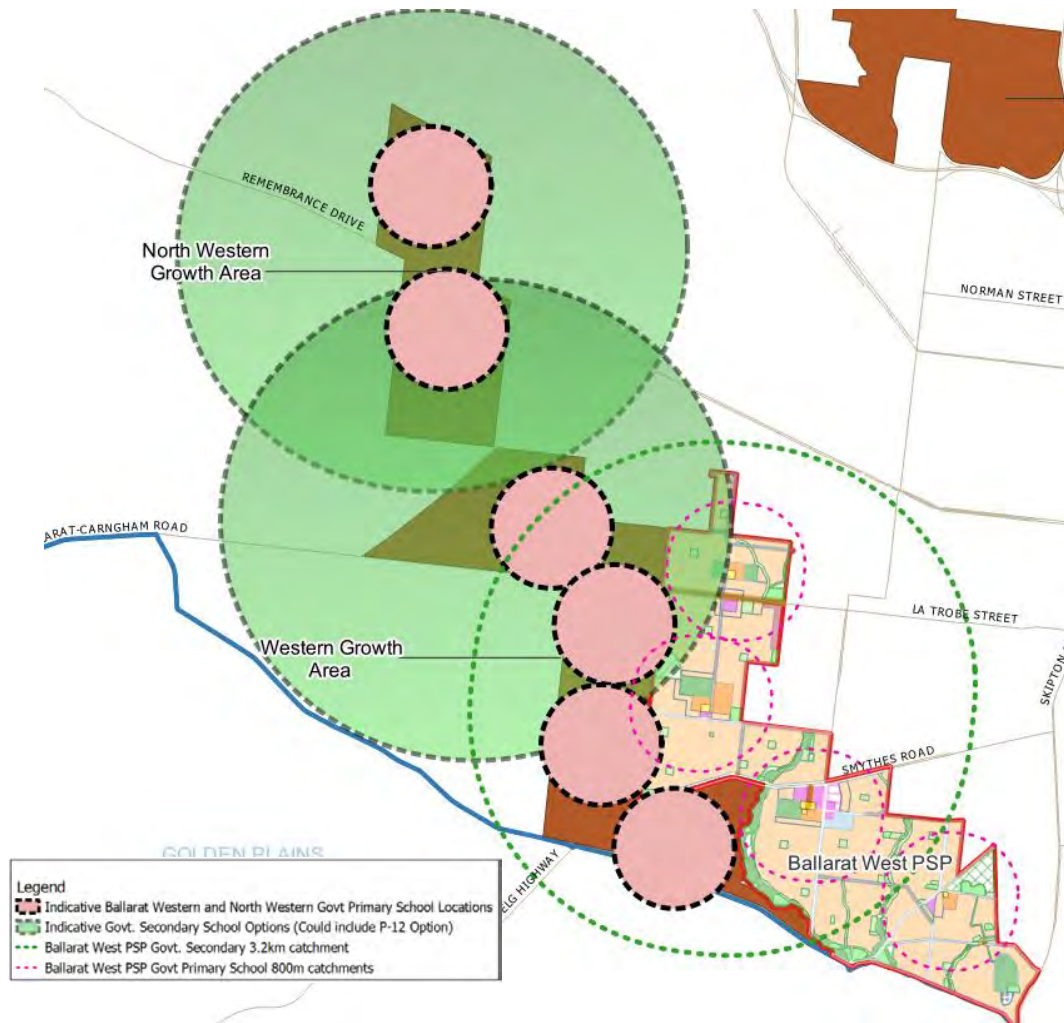
Figure 4 - Indicative Active Open Space and Indoor Recreation Facility Locations and Catchment Areas



Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Figure 6 below shows the indicative locations for all proposed Government Primary and Secondary Schools.

Figure 5 - Indicative Government Education Facility Locations and Catchment Areas



10.2 Indicative DCP Cost Implications

10.2.1 Low Development Scenario DCP Cost Estimates

Table 4 below shows the indicative DCP community infrastructure project cost estimates for the Ballarat Western and North-Western Growth Areas (excluding land acquisition costs) using a low development scenario. These projects are based on the recommendations contained in Section 9 of this report and limited to those projects which can be funded by the Development Infrastructure Levy (DIL) component of the DCP. Potential projects that may be funded via the Community Infrastructure Levy (CIL) component only are also shown in Table 4, but not costed at this early stage of planning. The current cost to deliver all of these core community infrastructure projects across both growth areas is estimated to be \$165,726,771. When combined with the cost of constructing a regional active open space (30 hectares and 3 sports pavilions) and an indoor recreation stadium (6 courts), the total cost increases to approximately \$239 million.

Table 4 – Indicative DCP Community Infrastructure Project Cost Estimates for the Ballarat Western and North-Western Growth Areas (excluding land acquisition costs): Low Development Scenario

Item	Indicative Quantity Required in Western Growth Area	Indicative Quantity Required in North-Western Growth Area	Cost Estimate Per Item	Total Cost Estimate (excluding land acquisition costs)
Level 1 Multipurpose community centre	2 (0.8 hectares each)	1 (0.8 hectares)	\$7,855,281	\$23,565,843
Level 2 Multipurpose community centre	2 (1.2 hectares each)	1 (1.2 hectares)	\$9,249,319	\$27,747,957
Level 3 Multipurpose community centre	0	1 (1.5 hectares)	\$12,297,044	\$12,297,044
Active open space (8 to 10 hectares)	5 (54 hectares in total)	3 (30 hectares in total)	\$10,541,568	\$84,332,544
Sports Pavilion serving 2 playing areas	3	2	\$1,779,971	\$8,899,855
Sports pavilion serving 3 playing areas	2	1	\$2,961,176	\$8,883,528
Total Development Infrastructure Levy Cost Estimate (excluding land acquisition cost)				\$165,726,771
Regional Active Open Space	Approximately \$41 million to construct ¹⁰			
Indoor Recreation Centre	Likely to only form Part of the Community Infrastructure Levy Component of the DCP (approximately \$32 million ¹¹)			

Source: Costing estimates based on the Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing, Prepared for VPA by Cardno (1 July 2022). Estimates are for the 2022/2023 Financial Year (1 July 2022)

¹⁰ Based on costings identified by the *Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing* (prepared for VPA by Cardno) for: 1) the construction of an 8 to 10 hectare active open space reserve multiplied by 3 to account for a 30 hectare reserve, and 2) the construction of a sports pavilion serving 3 playing areas multiplied by 3.

¹¹ Based on cost (\$31 million) to develop Cobblebank Indoor Stadium (6 indoor courts) in the City of Melton which was completed in 2021.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

10.2.1 High Development Scenario DCP Cost Estimates

Table 5 below shows the indicative DCP community infrastructure project cost estimates for the Ballarat Western and North-Western Growth Areas (excluding land acquisition costs) using a high development scenario. The current cost to deliver all of these core community infrastructure projects across both growth areas is estimated to be \$173,582,052. When combined with the cost of constructing a regional active open space (30 hectares and 3 sports pavilions) and an indoor recreation stadium (8 courts), the total cost increases to approximately \$257 million.

Table 5 – Indicative DCP Community Infrastructure Project Cost Estimates for the Ballarat Western and North-Western Growth Areas (excluding land acquisition costs): High Development Scenario

Item	Indicative Quantity Required in Western Growth Area	Indicative Quantity Required in North-Western Growth Area	Cost Estimate Per Item	Total Cost Estimate (excluding land acquisition costs)
Level 1 Multipurpose community centre	3 (0.8 hectares each)	1 (0.8 hectares)	\$7,855,281	\$31,421,124
Level 2 Multipurpose community centre	2 (1.2 hectares each)	1 (1.2 hectares)	\$9,249,319	\$27,747,957
Level 3 Multipurpose community centre	0	1 (1.5 hectares)	\$12,297,044	\$12,297,044
Active open space (8 to 10 hectares)	5 (54 hectares in total)	3 (30 hectares in total)	\$10,541,568	\$84,332,544
Sports Pavilion serving 2 playing areas	3	2	\$1,779,971	\$8,899,855
Sports pavilion serving 3 playing areas	2	1	\$2,961,176	\$8,883,528
Total Development Infrastructure Levy Cost Estimate (excluding land acquisition cost)				\$173,582,052
Regional Active Open Space	Approximately \$41 million to construct ¹²			
Indoor Recreation Centre	Likely to only form Part of the Community Infrastructure Levy Component of the DCP (approximately \$42 million to construct ¹³)			

Source: Costing estimates based on the Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing, Prepared for VPA by Cardno (1 July 2022). Estimates are for the 2022/2023 Financial Year (1 July 2022)

¹² Based on costings identified by the Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing (prepared for VPA by Cardno) for: 1) the construction of an 8 to 10 hectare active open space reserve multiplied by 3 to account for a 30 hectare reserve, and 2) the construction of a sports pavilion serving 3 playing areas multiplied by 3.

¹³ Based on cost (\$31 million) to develop Cobblebank Indoor Stadium (6 indoor courts) in the City of Melton which was completed in 2021.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Appendices

Appendix 1 – Review of Relevant Polices, Guidelines & Strategic Documents

1.1 Precinct Structure Planning Guidelines

The Precinct Structure Planning Guidelines: New Communities in Victoria (the Guidelines) are a Victorian Government initiative to ensure the Victorian Planning Authority (VPA) and other planning authorities prepare plans for places that enable best practice, liveable new communities for Victoria.

The purpose of the Guidelines is to provide the framework for preparing PSPs that guarantees quality outcomes while also being flexible, responsive and supportive of innovation by setting aspirational goals for our future communities. The approach provides a transitional model enabling 20-minute neighbourhoods to evolve over time and achieve the objectives as the area matures. The Guidelines are based on planning for 20-minute neighbourhoods, a principle in Plan Melbourne 2017-2050 (Plan Melbourne) that advocates for living locally to ensure accessible, safe and attractive local communities.

The Guidelines are structured in the following four parts:

- PART 1 - PURPOSE AND PLANNING CONTEXT. Provides the context for preparing a PSP, including how the Guidelines ensure a future where Victoria is socially and economically strong, environmentally resilient and engaged with the opportunities of a rapidly changing world. It outlines the United Nations Sustainable Development Goals (UN SDGs) and relevant Plan Melbourne policy and explains the 20-minute neighbourhood integrating framework and where PSPs fit in the planning hierarchy.
- PART 2 - PSP PATHWAYS AND PROCESSES (PSP 2.0). Outlines the process for co-designing a PSP with key stakeholders using the PSP 2.0 approach to develop a shared vision for the precinct and resolve key planning challenges early. It also outlines the innovation pathway, which provides new opportunities to deliver over and above expected outcomes.
- PART 3 - CONSTRUCTING A PSP. Provides specific guidance on the General Principles and Performance Targets to be adopted when preparing a PSP. The principles and targets reflect the aspirations of policies such as Plan Melbourne and UN SDGs. They also reflect broader updates to State Government policies including the Department of Transport's Movement and Place Framework and Resilient Melbourne's Living Melbourne – Our Metropolitan Urban Forest. Part 3 also provides guidance on how to demonstrate a PSP has achieved its principles and targets, and where the innovation pathway should be considered.
- PART 4 - PRACTITIONER'S TOOLBOX. Provides guidance on the more detailed aspects of planning for Victoria's new communities. The Practitioner's Toolbox is available online and kept up to date with the latest tools and practices, including updates and changes to relevant government planning policies and guidance notes.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

The Guidelines have a hierarchy of elements to explain what needs to be considered and delivered in a PSP. Elements are grounded in state policy and strategy or key future directions for greenfield precincts as determined by the VPA through the preparation process.

There are a number of sections within the PSP Guidelines that specifically relevant to the preparation of a Community Infrastructure Assessment. The most relevant elements are located in Part 3 (Constructing a PSP) and include:

- **Offer High-Quality Public Realm**
 - Offer high-quality public realm and open space
 - The public realm and open space network are crucial to creating the identity of a neighbourhood, and can have a significant impact on liveability, social cohesiveness, sense of place, the community's health and wellbeing, and the urban heat island effect.

- **Services and Destinations**
 - Provide services and destinations that support local living
 - Encouraging communities to 'live locally' means ensuring facilities and services are located close to housing and that the services meet the community's daily needs.

- **Infrastructure and Coordination**
 - Smarter infrastructure investment, and an integrated approach to land-use planning, is essential to unlocking development and ensuring housing affordability PSPs identify infrastructure needs and coordinate their integration with appropriate future land uses in order to provide for future communities.
 - The Guidelines provide direction around the distribution of community facilities, open space and transport required to support compact, walkable 20-minute neighbourhoods. Coordinated and timely delivery of this infrastructure is critical to enable development in greenfield areas and therefore affordability of land. The logical and orderly development of precincts also ensures that new communities have the things they need to thrive.

Table 6 on the following page provides a summary of the key community infrastructure assessment principles, the application of these principles to the PSP process and key PSP targets.

In addition to the PSP Guidelines the VPA, Department of Education and Training and Catholic Education Melbourne has prepared a number of additional resources to assist with the community infrastructure planning process in PSP locations. These include:

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

- Victorian Planning Authority – Guidance Note – PSP2.0 (November 2021);
- Victorian Planning Authority – Community Infrastructure Planning in New Communities Guidance Note (November 2021);
- Victorian Planning Authority – Infrastructure Contributions Plan Guidelines (March 2021);
- Department of Education & Training - Victorian Government School Site Selection Criteria – Toolbox (October 2021);
- Victorian Planning Authority – PSP Note – Non-Government Schools; and
- Melbourne Archdiocese Catholic Schools - Catholic Schools Site Selection Criteria Guidelines (2021).

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Table 6 – Key Elements of the PSP Guidelines Relevant to the Community Infrastructure Assessment Process

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
Offer High-Quality Public Realm		
F 10. Local recreational spaces and facilities		
Networks of open space and facilities that optimise the use of available land and provide equitable access to sport and recreation, leisure, environmental benefits, cultural benefits and visual amenity.		
<p>F 10.1 The open space network should include local parks that:</p> <ul style="list-style-type: none"> • have a variety of sizes and proportions, generally ranging from 0.1 to 3 hectares • are located to enable access by local residents without having to cross significant barriers such as arterial roads, railways or waterways • provide a diversity of amenity experiences – both internal to the park and external interfaces that will provide an amenity context for development. <p>Relevant VPP: Clause 56.05-2</p>	<ul style="list-style-type: none"> • A Public Realm & Water Plan should be developed. The plan may demonstrate a diverse range of open space typologies that respond to place (for example, linear open space, waterway corridors, biodiversity areas and the productive use of encumbered land). The plan should show park sizes, preferred interfaces and walkable catchments (adjusted for significant barriers). 	<p>T11 The open space network should seek to meet the following minimum targets:</p> <ul style="list-style-type: none"> • Within residential areas (including activity centres): <ul style="list-style-type: none"> - 10% of net developable area for local parks and sports field reserves - 3-5% of net developable area set aside for local parks - 5-7% of net developable area set aside for sports field reserves. • Within dedicated employment and/or economic activity areas, 2% of the net developable area for local parks. <p>Relevant VPP: Clause 19.02-6S, 53.01</p> <p>T12 Open space and sports reserves should be located to meet the following distribution targets:</p> <ul style="list-style-type: none"> • A sports reserve or open space larger than 1 hectare within an 800m safe walkable distance of each dwelling • A local park within a 400m safe walkable distance of each dwelling. <p>Relevant VPP: Clause 56.05-2</p> <p>Note: Includes sports reserves and public land that is encumbered by other uses but is capable of being utilised for open space purposes.</p>
<p>F 10.2 Proposed sporting reserves should be located, designed and configured to be:</p> <ul style="list-style-type: none"> • targeted to forecast community needs, including design, landscaping and functionality accessible • appropriately meeting their purpose, having regard to shared use opportunities • able to take advantage of opportunities for alternative water supply (including co-location with stormwater harvesting and treatment facilities) • distinctive and responsive to local character and surrounding land use. 	<ul style="list-style-type: none"> • A community needs analysis should be undertaken to inform the plan at preparation stage. • A Public Realm & Water Plan should show sporting reserve size, purpose and walkable catchments. • Typography should be considered when determining the appropriate location of sport reserves. 	

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
<p>F 10.3 A network of diverse open space should be provided across the precinct that connects (via open space or major pedestrian/cycle links) to metropolitan or regional open space networks.</p>	<ul style="list-style-type: none"> A Public Realm & Water Plan should show linkages and connections, any barriers to connectivity, and measures to overcome barriers. 	
<p>F 10.4 The location and scale of open space should respond to and optimise integration with the existing topography, waterway features, landscape features, biodiversity conservation areas and cultural heritage values.</p>	<ul style="list-style-type: none"> A Public Realm & Water Plan should detail the features the open space network is responding to. A PSP may include any relevant cross section/s of existing or proposed features. For example, waterway, conservation area, Water Sensitive Urban Design (WSUD) element with the surrounding urban form to clearly show expected development interface outcomes. 	
<p>F 10.5 The public realm network should be located, configured and designed to enhance and optimise the role of encumbered or restricted public land (for example, waterways, conservation, utility easements, schools) for multifunctional spaces and cater for a broad range of local users and visitors.</p> <p>Where possible, the provision of open space should be integrated with and/or link with waterways and Water Sensitive Urban Design (WSUD) elements. The public realm network should account for provision of multifunctional water management assets.</p> <p>Relevant VPP: Clause 56.05-2, 19.03-3S</p>	<ul style="list-style-type: none"> The community needs analysis should identify possible functions of each space. This could also include the potential role and function of school sports fields, waterways and/or floodways in contributing to the network. Place-specific guidance should express expectations with regard to landscaping outcomes in open spaces and the public realm. 	
Services And Destinations		
<p>F 14. Local schools and community Infrastructure</p> <p>Education and community infrastructure and facilities that are located to equitably and efficiently maximise their accessibility and shared use.</p>		
<p>F 14.1 Education and community facilities (i.e. primary, secondary and specialist schools, kindergartens, community centres, health facilities and sport reserves) should:</p> <ul style="list-style-type: none"> be co-located within community hubs have good visual and physical links to a local centre be located on connector streets, linked by walking and cycling paths be located in proximity to high-quality public transport where possible be located away from potential hazards. <p>Relevant VPP: Clause 56.03-3</p>	<ul style="list-style-type: none"> A Community Infrastructure Plan should show the preferred location of education and community facilities and identify their locational advantages. The assessment should ensure that the context of surrounding or planned development is considered to inform the role and location of education and community facilities. Where a specialist school is required, it should wherever possible, be located adjacent to an existing or proposed government school—preferably a secondary school. Planning to co-locate kindergartens with all new government primary schools (including within co-located community facilities) should be undertaken in consultation with Department 	<p>T18 The location of dwellings should achieve the following accessibility targets in relation to education and community facilities:</p> <ul style="list-style-type: none"> 70% of dwellings located within 800m of a government primary school 100% of dwellings located within 3,200m of a government secondary school 80% of dwellings located within 800m of a community facility 80% of dwellings located within 800m of a health facility. <p>Note: A health facility may include areas where a general practitioner would be capable of operating (for example, commercial or mixed use zone).</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
	<p>of Education and Training (DET) to determine appropriate land take and design requirements.</p> <p>Note: PSPs are only capable of accommodating the provision of infrastructure. Timing of delivery is subject to the discretion of the relevant service provider.</p>	
<p>F 14.2 High intensity facilities such as libraries, childcare centres, justice/emergency services and community centres should be located within close proximity of an activity centre or have good visual and physical links to an activity centre and active transport routes.</p>	<ul style="list-style-type: none"> • Consultation with agencies and service providers should explore spatial and locational needs of these facilities, as well as likely delivery models. • A community infrastructure needs assessment should be prepared to inform plan preparation, identifying potential local synergies available in the PSP area. 	
<p>F 14.3 Upgrades to existing infrastructure and/or the provision of new infrastructure should align with council and/or agency service plans and provide guidance to reflect the most cost-efficient approach to addressing service needs. This includes making use of any spare capacity of existing facilities within the catchment area and pursuing integrated service planning and delivery opportunities.</p>	<ul style="list-style-type: none"> • A community infrastructure needs assessment should be undertaken to inform plan preparation, identifying spare capacity within the catchment and exploring integrated delivery opportunities. • Consultation with community infrastructure service providers should be undertaken to explore integrated delivery opportunities. 	
<p>F 14.4 Where feasible, education and community infrastructure should provide space for not-for-profit organisations.</p> <p>Opportunities should also be explored in town centres for space that not-for-profits may be able to rent</p>	<ul style="list-style-type: none"> • Consultation with not-for-profit organisations and DET, Council and other community land use managers, as well as developers of town centres, should be undertaken early to identify and co-design opportunities for shared facilities. 	
<p>F 14.5 The location of emergency services should be within easy access to the arterial road network to maximise coverage and reduce response times.</p>	<ul style="list-style-type: none"> • A community infrastructure needs assessment should be undertaken to inform plan preparation, identifying the location of existing or proposed emergency service facilities. • A Community Infrastructure Plan should identify the preferred location of emergency services if located within the precinct. 	
<p>F 15. Lifelong learning opportunities</p> <p>Education and community infrastructure and facilities that cater for the many social needs of the community and individuals at any stage of their lives.</p>		

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
<p>F 15.1 The amount of land allocated for education and community facilities, and their role and function, should be determined in consultation with service providers and should respond to the local context, the broader strategic context, and the forecast service needs of the new or changing community.</p> <p>Relevant VPP: Clause 56.03-3</p>	<ul style="list-style-type: none"> • A community infrastructure needs assessment should identify likely community needs. The assessment should ensure that the context of surrounding or planned development is considered to inform the role and location of education and community facilities. • Consultation with community infrastructure service providers should be undertaken to explore opportunities to respond to changing needs in an innovative way. 	<p>Refer to T18 Targets</p>
<p>F 15.2 The location and design of education and community facilities should cost-effectively maximise functional use, flexibility, safety, amenity and operational efficiency (e.g. shared use of facilities with active open space, alternative funding models, adaptable design models, community access to school grounds, etc.)</p>	<ul style="list-style-type: none"> • A Community Infrastructure Plan should show any proposed agreement for shared use. • A Precinct Infrastructure Plan should identify timing, delivery responsibility, potential funding sources and commitments to shared delivery and use of facilities. 	
<p>F 15.3 Opportunities for non-government schools and tertiary education facilities should be identified through engagement with the non-government school and tertiary education sectors.</p>	<ul style="list-style-type: none"> • Consultation with non-government education providers should be undertaken early in the PSP process. • A Community Infrastructure Plan should identify any nongovernment education facilities (where known). 	
<p>F 15.4 Future opportunities for higher order health and education (e.g. tertiary education) should be considered during the PSP process and land areas or 'areas of strategic interest' should be nominated where known.</p>	<ul style="list-style-type: none"> • Consultation with higher order health and education providers should be undertaken early in the PSP process to explore any opportunities for these sites to be nominated and for partnerships to be forged. • A Community Infrastructure Plan should identify any facilities (where known) and identify any catalyst impacts of these facilities. 	
<p>Infrastructure Coordination</p>		
<p>F 17. Staging and location of development</p> <p>Directing the staging and location of development within a PSP to:</p> <ul style="list-style-type: none"> • use available capacity in existing infrastructure • support the orderly and economic extension or augmentation of existing infrastructure • match the timely provision of new infrastructure. <p>This will include directing the location and timing of development and identifying trigger points for the provision of required infrastructure.</p>		
<p>F 17.1 The structure and design of a PSP should accommodate the coordinated delivery of key infrastructure (basic and essential infrastructure and other infrastructure) and appropriate staging of development to provide for:</p> <ul style="list-style-type: none"> • integration and shared-use opportunities 	<ul style="list-style-type: none"> • Encourage active engagement with government departments, service providers and utility agencies to input their forward plans, identify and define essential infrastructure and to explore strategic partnerships for planning, funding and delivery. 	<p>T20 Identify all basic and essential infrastructure with spatial requirements on the future place-based structure plan (e.g. open space, schools, community centres, integrated water management, etc.)</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
<ul style="list-style-type: none"> timely delivery, taking into consideration likely sequencing of development, land ownership constraints and funding sources efficient delivery, taking into consideration likely sequencing of development development that will not be isolated from basic and essential infrastructure and services ensuring that development does not take place unless it can be serviced in a timely manner ensuring that development within a PSP can be staged to match the attainment of infrastructure triggers and the provision of infrastructure and services opportunities for alternative delivery models that achieve sustainability or other community benefits. 	<ul style="list-style-type: none"> A Precinct Infrastructure Plan should identify all infrastructure needed to service the new neighbourhoods, indicative timing, delivery responsibility, other potential funding sources and any agreed commitments to partnerships or alternative delivery models. The indicative locations of essential infrastructure should consider the local requirements of service providers relevant to the PSP. 	
<p>F 17.2 The staging of development within PSPs should consider:</p> <ul style="list-style-type: none"> proximity to existing or proposed development fronts or serviced land proximity to significant public transport infrastructure or public transport services proximity to existing or committed community infrastructure such as schools proximity to new or existing arterial or connector road infrastructure existing uses (for example, extractive uses) which may transition over a longer period of time its role in facilitating delivery of this infrastructure. 	<ul style="list-style-type: none"> Active engagement with government departments, service providers, utility providers, landowners, developers and local government to explore the potential staging of development that aligns with potential planning, funding and delivery of infrastructure. Spatial arrangement of land uses within a PSP and the provision of infrastructure within a Precinct Infrastructure Plan are aligned to encourage appropriate staging of development. Direction is provided on the location and timing of development fronts within a PSP and the trigger points for required infrastructure, where relevant, in order to ensure development matches the timely provision of infrastructure. An indicative staging plan should be prepared where appropriate. 	
<p>F 17.3 Land should be set aside and reserved to allow for all public land uses, including schools, community centres, health, emergency and justice facilities, road widening and grade separation of rail from all transport corridors (includes roads, pedestrian and bicycle paths) where a delivery agency has agreed to the commitment.</p>	<ul style="list-style-type: none"> Land required in the future should be identified in a Place Infrastructure Plan. 	
<p>F 17.4 Structure and design of a PSP should seek to maximise opportunities for development to utilise existing infrastructure or to capitalise on planned infrastructure commitments.</p>	<ul style="list-style-type: none"> An infrastructure and servicing assessment should be prepared to inform plan preparation and should identify existing capacity of infrastructure. Consultation should be undertaken with agencies and servicing authorities to identify opportunities to leverage planned infrastructure commitments. 	
<p>F 18. Innovative and sustainable infrastructure delivery</p>		

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
<p>Actively pursuing innovative and sustainable models for infrastructure delivery, and long-term strategic infrastructure opportunities that align with the UN SDGs and the 20-minute neighbourhood framework.</p>		
<p>F 18.1 Alternative and innovative infrastructure and service delivery approaches should be explored early in the PSP place-shaping and visioning stages to ensure new and innovative initiatives are embedded in the design and structure of a PSP. Implications for urban form, housing, jobs and other features of the 20-minute neighbourhood should be considered and addressed through the PSP.</p>	<ul style="list-style-type: none"> The PSP vision statement should identify any proposed infrastructure or service delivery innovations, as well as actions to support the vision. 	<p>Refer to Performance Target T18</p>
<p>F 18.2 Potential mechanisms to incentivise the early delivery of key infrastructure should be explored, particularly where fragmented land parcels and/or other site constraints exist that prohibit the logical delivery of infrastructure to support new job growth.</p>	<ul style="list-style-type: none"> Active engagement with key implementing stakeholders will identify opportunities and commitment to bring forward infrastructure. All commitments should be identified in the Precinct Infrastructure Plan. A staged approach to drainage outfall should be considered to align with incremental development of the precinct. 	

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

1.2 City of Ballarat & Non Council Agency Strategic Documents

A number of City of Ballarat and other non-Council agency strategies, plans and policies were identified and reviewed for potential relevance to the review.

1.2.1 City of Ballarat Strategic Documents

The key Council policies, strategies and plans reviewed are listed below and summarised in the Table following this list.

- Community Vision 2021-2031
- Council Plan 2021-2025
- City of Ballarat Health and Wellbeing Plan 2021-2031
- City of Ballarat Asset Plan 2022-2032
- Municipal Early Years Plan 2022-26
- Youth Strategy 2022-2026
- Ageing Well Strategy 2022-2026
- Active Ballarat Strategy
- Active Women and Girls Strategy 2018
- Ballarat Aquatic Strategy 2014
- Ballarat Skate and Youth Facilities Framework (2019)
- Lawn Bowls Facilities Framework (2015)
- Ballarat Open Space Strategy (2008)
- Playspace Planning Framework (2014)
- Ballarat Libraries and Learning Strategy 2022-2027
- Arts and Cultural Infrastructure Report (2021)
- Ballarat Creative City Strategy (2019)
- Ballarat Creative Precinct Master Plan (2019)
- Ballarat Event Strategy 2018-28
- Ballarat Heritage Plan 2017-30
- Social Policy Framework
- Intercultural Plan 2022-2026

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Table 7 - Ballarat City Council Strategic Documents Potentially Relevant to the Assessment

Strategy Type and Name
Corporate Strategies
<p>Community Vision 2021-2031</p> <p>The Community Vision 2021-2031 was informed by a large-scale community engagement process in February and March 2021. A Community Panel, representative of the Ballarat community, further developed community input received during this first stage of engagement via a deliberative engagement process in April and May. The Panel developed the vision statement, principles for decision making and the key themes for action presented in the Vision.</p>
<p>Council Plan 2021-2025</p> <p>The City of Ballarat Council Plan 2021-2025 was adopted by Council at the August 25 Council Meeting. The plan outlines how City of Ballarat will achieve Council's and the community's vision of Ballarat.</p> <p>The plan has six goals:</p> <ul style="list-style-type: none"> • An environmentally sustainable future • A healthy, connected and inclusive community • A city that fosters sustainable growth • A city that conserves and enhances our natural and built assets • A strong and innovative economy and city • A council that provides leadership and advocates for its community
<p>City of Ballarat Health and Wellbeing Plan 2021-2031</p> <p>The City of Ballarat Health and Wellbeing Plan 2021-2031 sets the health priorities for the Ballarat community, outlines strategies to prevent or reduce public health issues and supports the community to achieve optimum health and wellbeing.</p> <p>The Health and Wellbeing Plan 2021-2031 has six priority areas:</p> <ul style="list-style-type: none"> • Tackling climate and its impact on health • Preventing all forms of violence • Increasing healthy eating • Increasing active living • Improving mental wellbeing • Reducing harm from smoking, gambling, alcohol and other drugs
<p>City of Ballarat Asset Plan 2022-2032</p> <p>The Asset Plan 2022-2032 provides clear direction about how the City of Ballarat proposes to manage the portfolio of public assets it controls over the next 10 years and beyond to ensure responsible and sustainable stewardship</p>
Education, Early Years, Youth and Older Persons
<p>Municipal Early Years Plan 2022-26</p> <p>The Municipal Early Years Plan lays out the Ballarat community's vision and priorities for its children, and for being a child friendly city for every child that lives, learns, is cared for and plays in the municipality. The Plan has six key goals:</p> <ul style="list-style-type: none"> • Valued, loved and safe • Having material basics • Being healthy • Children are learning • Children are participating • Positive sense of culture and identity
<p>Youth Strategy 2022-2026</p> <p>The City of Ballarat Youth Strategy 2022 –2026 lays the foundation for our young people to access the programs and services they need to build a brighter future for our city. The visions, voices and creativity of young people will be fostered to grow through a range of exciting programs for young people aged 12 –25.</p>
Older Persons
<p>Ageing Well Strategy 2022-2026</p> <p>This strategy has been developed to guide City of Ballarat to respond to the current, changing and emerging needs of residents aged 55 years and over and to identify its future focus and priorities for the community. Priorities include:</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Strategy Type and Name
<ul style="list-style-type: none"> Improving the accessibility and safety of our spaces, places, and streetscapes. Access to a range of reliable and affordable transport and affordable housing options. The availability of services to maintain independence at home and in the community. Strengthening the regard and respect for people as they age and their contribution and value in community, social, political and economic life.
Open Space & Recreation
<p>Active Ballarat Strategy</p> <p>One of the key objectives of the Active Ballarat Strategy is that it aligns with the State government’s plan – Active Victoria – which aims to strengthen the sport and recreation sector and participation across the state. This has been at the forefront of our thinking throughout the development of this strategy.</p> <p>The overall objectives of this strategy are to:</p> <ul style="list-style-type: none"> Establish strategic directions for the planning, provision, development and management of a diverse range of sport and recreation facilities, services and infrastructure; Provide recommendations and strategic outcomes that address short term (1-2 years), medium term (3-4 years) and future term (5-10 years) community needs; and Identify critical policy direction for the City of Ballarat recreation processes and procedures.
<p>Active Women and Girls Strategy 2018</p> <p>This strategic document represents the overarching strategy to guide future initiatives aimed at increasing female participation in sport and physical activity within the municipality. The strategy has a four-year timeframe and is supported by a strategy action plan that identifies priority initiatives, and aligns with Council Plan, key recreation documents and capital programs and budgets.</p> <p>This strategy will identify four key focus areas that will guide Council over the next four years on projects to be delivered. The outcomes of any projects or initiatives will be communicated based on how they address four key pillars. They are:</p> <ul style="list-style-type: none"> Participation; Culture and Environment; Infrastructure; and Media Action.
<p>Ballarat Aquatic Strategy 2014</p> <p>The City of Ballarat Aquatic Plan presents practical projects to be delivered across the municipality over the next five to ten years. These projects are designed to increase participation in aquatic activities by all people, regardless of gender, age or physical capabilities.</p> <p>One of the recommendations contained in this report states: “Given the high growth expected in Ballarat’s west, specific planning must also be undertaken for aquatic play spaces and additional aquatic facilities in this part of the city.”</p>
<p>Ballarat Skate and Youth Facilities Framework (2019)</p> <p>The aim of this report is to ensure that the City of Ballarat has a clear strategic plan to appropriately provide accessible, inclusive and relevant skate, scooter and BMX spaces and broader activity spaces for tweens (aged 8 to 12) and teens in line with current practice for the next ten years.</p>
<p>Lawn Bowls Facilities Framework (2015)</p> <p>The Lawn Bowls Facilities Framework assists the City of Ballarat deliver its stated health and wellbeing domains outlined in the Council Plan, notably in the areas of sustainable built and natural environments, where a key objective is improved access to and utilisation of leisure and recreational facilities.</p> <p>Council will support local bowls clubs and work with other relevant stakeholders, particularly the Ballarat District Bowls Division (BDBD), Bowls Victoria and Bowls Australia, to support the long-term growth and sustainability of bowls in the region.</p>
<p>Ballarat Open Space Strategy (2008)</p> <p>The Ballarat Open Space Strategy:</p> <ul style="list-style-type: none"> Provides a clear and concise policy framework for the management, use and development of the municipality’s open space assets; Determines the appropriate provision of open space to cater to Ballarat’s existing and projected population; Provides environmental management outcomes and solutions for financing the development of open space; Provides a sustainable public landscape and planting vision aimed at responding to the impact of climate change.
<p>Playspace Planning Framework (2014)</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Strategy Type and Name
<p>This strategy provides guidance for the provision of integrated play opportunities for people of all ages, interests and abilities throughout the municipality. It is based on ten geographic precincts that comprise the City of Ballarat and form the basis for planning and development of play spaces for all ages. Additionally, the strategy is not intended to cover all forms of physical activity (like sport and organised competition), but focuses on the informal playful and casual activities.</p>
<p>Libraries, Arts & Culture</p>
<p>Ballarat Libraries and Learning Strategy 2022-2027</p> <p>Key priorities of the Strategy are:</p> <p>Reach out</p> <ol style="list-style-type: none"> 1. Engage with the Ballarat community to increase library use and service impact. 2. Target library services to priority community cohorts with a focus on literacy, lifelong learning, digital inclusion and wellbeing. <p>Branch out</p> <ol style="list-style-type: none"> 3. Increase the size, quality and accessibility of the branch library network. 4. Explore use of alternative models that increase community access to library services. <p>Stand out</p> <ol style="list-style-type: none"> 5. Exemplify a strategic approach to delivering purposeful and mutually beneficial service partnerships. 6. Demonstrate regional and industry leadership in provision of community-focused public library services. <p>The Strategy identifies that “planning will also be undertaken for a future library to serve the Ballarat West growth area located in the Delacombe Town Centre.” (Page 17)</p>
<p>Ballarat Arts and Cultural Infrastructure Report (2021)</p> <p>This Arts and Cultural Infrastructure Report provides an analysis of the current supply and function of private and public cultural facilities in the City of Ballarat, and the anticipated sector trends that will drive infrastructure needs into the future.</p> <p>This Report has identified six strategic priorities to guide the City of Ballarat’s investment in:</p> <ul style="list-style-type: none"> • New cultural infrastructure, upgrades or redevelopment of existing arts and cultural assets • Opportunities for the inclusion of cultural use and programming in planned and future infrastructure projects • Initiatives that support the provision and or operation of cultural infrastructure including the inclusion of provision standards for arts and cultural infrastructure. <p>These six strategic priorities include:</p> <ol style="list-style-type: none"> 1. A holistic, collaborative approach to new and ongoing capital and operational investment in arts and cultural infrastructure 2. The incorporation of cultural use into the design of fit for purpose community infrastructure planning 3. Prioritised investment in arts and cultural infrastructure that supports and improves the productivity, entrepreneurship and sustainability of the sector 4. Arts and cultural infrastructure is visible and accessible to the community and visitors 5. Arts and cultural infrastructure is affordable and supports collaboration, career development and pathways 6. World class arts and cultural infrastructure to be fit for purpose to preserve cultural collections and assets, provide education and learning opportunities, and optimise tourism and visitation.
<p>Ballarat Creative City Strategy (2019)</p> <p>Creative City Strategy presents a proposed long-term vision for the City, to guide policy and investment for the cultural and creative industries. The strategy is built on comprehensive research and extensive engagement with community and expert stakeholders. Collectively, and with community support, the strategy and masterplan aim to position Ballarat as one of Australia’s leading creative cities. The Strategy identifies the following seven strategic goals:</p> <p>Goal 1: Ballarat is a creative city with entire community participation Goal 2: Ballarat is a city in which artists and creatives can sustain professional careers and prosper Goal 3: Ballarat has a strong domestic audience and consumer market for local creative product Goal 4: Ballarat’s cultural economy and market is continually growing Goal 5: Ballarat is a city with strong representation of a variety of creative industries Goal 6: Ballarat is a city where strong creative capabilities are used throughout industry and the community Goal 7: Ballarat has a high quality creative precinct, which is vibrant, playful and tells the unique Ballarat story</p>
<p>Ballarat Creative Precinct Master Plan (2019)</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Strategy Type and Name
<p>The Precinct Master Plan will provide a framework for the development of the central business district until 2040. Its aim is to help coordinate investment in the Creative Precinct to support Ballarat as a creative city, through creating a vibrant, diverse and participatory place to live, work, study, create and visit.</p>
<p>Ballarat Event Strategy 2018-28</p> <p>This Events Strategy (Strategy) provides a roadmap for the development of Ballarat’s event program over the next eight years. It will help ensure the outcomes of the events program are fully understood, optimised and in line with broader City of Ballarat strategies and priorities. The Strategy is designed to be a practical guide to assist the direction of current events, initiation and acquisition of new events, and provide a rationale for ceasing investment in others – to that end, it is a strategic framework for event development.</p>
<p>Ballarat Heritage Plan 2017-30</p> <p>Our People, Culture & Place: A plan to sustain Ballarat’s heritage 2017 – 2030 is a whole-of-city action plan that details locally and collaboratively developed projects and programs under three key priority areas:</p> <ol style="list-style-type: none"> 1. Regeneration 2. Celebrating and inspiring with Ballarat’s stories 3. Managing change and safeguarding heritage.
Other
<p>Social Policy Framework</p> <p>Social policy relates to people's wellbeing, particularly the welfare of those who experience disadvantage. It relates to how people work, live, and spend time, and helps determine the best ways to meet human needs such as housing, employment, education, recreation, leisure, health, safety, and the care of children. The City of Ballarat Social Policy Framework highlights the principles, considerations, roles, and responsibilities for policy development in social and wellbeing areas. Council’s position statements accompany the Social Policy Framework, and consolidate our social policies, key messages, roles and responsibilities on several social issues. These include:</p> <ul style="list-style-type: none"> • Access to Food • Affordable Housing • Alcohol and other Drugs • Mental Health and Wellbeing • Preventing Gambling Harm • Preventing Family Violence and • Promoting Active Living
<p>Intercultural Plan 2022-2026</p> <p>Ballarat’s Intercultural City Strategic Plan promotes social inclusion and wellbeing within its multicultural and Indigenous communities, highlighting the positive contributions migrants and Indigenous Australians have made to our community.</p>

1.2.2 Non-Council Strategic Documents

The following important non-Council social infrastructure strategies are summarised in this section:

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

- Victorian State Government, Best Start, Best Life Policy (June 2022);
- Transforming lives and enhancing communities: Federation University Strategic Plan 2018 – 2022;
- Health 2040: Advancing health, access and care;
- Statewide Design, Service and Infrastructure Plan for Victoria’s Health System: 2017–2037;
- Ballarat Health Services Strategic Plan 2017 – 2022;
- Victoria Police Blue Paper: A Vision for Victoria Police In 2025;
- Ambulance Victoria Strategic Plan 2017-2022;
- Court Services Victoria Strategic Asset Plan:2016-2031;
- Fire Rescue Victoria Strategic Plan 2022-2032; and
- Victorian State Emergency Services (VICSES) Service Delivery Strategy 2025.

Table 8 - Non-Council Strategies and Plans

Document Name
<p>Victorian State Government, Best Start, Best Life Policy (June 2022)</p> <p>The Andrews Labor Government will expand the Best Start, Best Life program with three major new initiatives:</p> <ul style="list-style-type: none"> • Making kinder free across the state • Delivering a new year of universal Pre-Prep for 4-year-olds • Establishing 50 government operated childcare centres <p>This means from 2023, any family with a three or four-year-old will pay nothing for kinder – a saving of up to \$2,500 per child every year.</p> <p>Three-Year-Old Kinder is already rolling out across the state, expanding universal access to 15 hours of government funded kinder every week – and from next year, it will be free.</p> <p>Four-Year-Old Kinder will also be free, providing much-needed relief for family budgets and giving more women a choice to return to the workforce.</p> <p>Over the next decade, Four-Year-Old Kinder will transition to Pre-Prep – increasing to a universal 30-hour a week program of play-based learning for every four-year-old child in Victoria. Pre-Prep will be delivered through kinders and long day care centres, creating a high-quality, universal program to give four-year-old kids the opportunity to socialise and learn through play.</p>
<p>Transforming lives and enhancing communities: Federation University Strategic Plan 2018 - 2022</p> <p>FedUni is regional Victoria’s largest education institution, with campuses in Ballarat, Berwick, Brisbane, Gippsland and the Wimmera providing easy access to study, and approximately 1,300 staff committed to teaching excellence and student support.</p> <p>The Berwick Campus became part of FedUni in 2017. The campus is located about 40km south east of the Melbourne CBD. It is only a five minute walk from the Berwick Station on the metropolitan Pakenham train line, and adjacent to the Princes Freeway. The multi-level complex of modern architecturally-designed buildings is surrounded by spacious grounds with landscaped gardens and internal courtyards.</p> <p>Purpose: To transform lives and enhance communities.</p> <p>Priorities</p> <ul style="list-style-type: none"> • Lifelong Learning – Provide future-focused, high-quality lifelong learning opportunities for students from all backgrounds. • Global Citizens - Empower students with the necessary knowledge, skills and aptitude for further study, to participate in workplaces and to be effective global citizens. • Partnerships - Use our network of campuses and partnerships to deliver our courses and programs. • Research to Impact – Conduct research with measurable impact on the communities in which we are located and wider society. • Sustainability – Ensure long-term financial sustainability. <p>Outcomes</p> <p>By 2022 FedUni will:</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Document Name
<p>1. Become a popular student destination</p> <ul style="list-style-type: none"> Reach 20,000 higher education and 8,000 TAFE student enrolments. Attract significant numbers of international students. Engage students from a diverse range of backgrounds. Be highly regarded for our range of offerings. <p>2. Offer a high-quality student experience</p> <ul style="list-style-type: none"> Improve student retention rates and success results. Achieve 5 Star rating by the Good Universities Guide for high-quality teaching. Meet students' needs using the latest pedagogy and technology. Create connected alumni who provide industry links and channel future employees. <p>3. Make a positive impact</p> <ul style="list-style-type: none"> Be highly rated by employers for the quality of our graduates. Be known for research that delivers societal impact and be ranked by Times Higher Education (THE), Shanghai Academic Ranking of World Universities (Shanghai) and QS World University Rankings (QS). Lead the sector in best practice community and industry engagement. <p>4. Become a university workplace of choice</p> <ul style="list-style-type: none"> Demonstrate high levels of employee satisfaction. Be in the top quartile of Australian universities for the numbers of female staff in senior leadership roles. Be an asset to regional communities and contribute to capacity building. Be a preferred employer and higher education destination for Indigenous staff and students. Build an efficient organisation
<p>Health 2040: Advancing health, access and care</p> <p>The organisation's vision is for all Victorians to have:</p> <ul style="list-style-type: none"> better health – skills and support to be healthy and well better access – fair, timely and easier access to care better care – world-class healthcare every time. <p>Better health</p> <ul style="list-style-type: none"> A system geared to prevention as much as treatment Everyone understands their own health and risks Illness is detected and managed early Healthy neighbourhoods and communities encourage healthy lifestyles <p>Better access</p> <ul style="list-style-type: none"> Care is always there when people need it More access to care in the home and community People are connected to the full range of care and support they need There is fair access to care <p>Better care</p> <ul style="list-style-type: none"> Target zero avoidable harm Healthcare that focuses on outcomes People are active partners in care Care fits together around people's needs
<p>Statewide Design, Service and Infrastructure Plan for Victoria's Health System: 2017–2037</p> <p>This Plan focuses on five priority areas over the coming 20 years:</p> <ol style="list-style-type: none"> building a proactive system that promotes health and anticipates demand creating a safety and quality-led system integrating care across the health and social service system strengthening regional and rural health services investing in the future—the next generation of healthcare
<p>Ballarat Health Services Strategic Plan 2017 – 2022</p> <p>The BHS 2017 – 22 Strategic Plan:</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Document Name
<ul style="list-style-type: none"> Identifies important service directions, priorities and actions for the next five years. Identifies a new set of organisational Values, and a new Vision. Provides a foundation for the development of a more detailed Service Plan. Has been developed through extensive consultation with patients, staff, and stakeholders.
<p>Victoria Police Blue Paper: A Vision for Victoria Police In 2025</p> <p>Based on an understanding of the role of Victoria Police, the principles of policing, and the external and internal challenges facing Victoria Police, A Vision for Victoria Police in 2025 lays out three proposed strategic directions to enhance public safety, and increase value for money for the Victorian community through its investment in Victoria Police:</p> <p>1. Better matching of resources to demand by rethinking the traditional operating model</p> <p>The Paper makes the following observations on this direction:</p> <p><i>The traditional police service delivery model needs to shift from one based on an historical geographic footprint, to one that is mobile, technologically-advanced, and more responsive to changing demand. The type and location of police operations should be determined by what is required to provide the best possible service to the community. For example, larger, consolidated ‘supersites’ should replace many of the smaller and less operationally-effective traditional police stations. The supersite – or sites - in each Division should be the central ‘hub’ that supports a variety of other Victoria Police service points for local communities, such as ‘shopfronts’, mobile police stations, and self-service kiosks for non-urgent issues. In rural Victoria, multiple hubs might be required. Supersites should be multi-disciplinary centres where Victoria Police is co-located with other public services”.</i></p> <p>2. Improving capability through workforce reform and technology</p> <p>The Paper makes the following observations on this direction:</p> <p><i>“Victoria Police officers need to be far better supported by modern technology. They need to have the information and systems to do their work in a more ‘virtual’ environment, and to be freed from time-consuming paperwork. Technology should also support a strong culture of information security.</i></p> <p><i>Frontline officers should not need to return to their supersite during their shift: the proportion of an officer’s time spent in the community (not in a police complex) should increase from 54 per cent to around 80 per cent. Each supersite should be designed to accommodate an IT system which allocates tasks and coordinates police operations. The system would integrate audio and video feeds from mobile and fixed sensor platforms, advanced analytics, and advice from partner agencies. It would also have capacity for a custody suite, operated by a private provider.</i></p> <p><i>Victorians should be able to report crime and suspicious activity through online self-service portals, and provide pictures and video to assist in offender identification. There should also be a dedicated non-emergency telephone line, where the public can talk directly to a staff member who can take their report and provide access to crime prevention information. Individuals should be able to track the progress of their reports via a secure online system. The system would, via social media, provide the community with real time alerts and requests for assistance to solve a crime or problem.”</i></p> <p>3. Collaborating more closely through partnerships</p> <p>The Paper makes the following observations on this direction:</p> <p><i>“Different types of partnerships with the community are necessary:</i></p> <ul style="list-style-type: none"> <i>An effective model of local policing in collaboration with residents and business owners will remain of vital importance, for maintaining and building community trust and confidence in Victoria Police.</i> <i>Local policing partnerships should use practical and wide-reaching methods for public participation to shape local priorities (such as community forums and social media platforms). A more personal approach, through greater face-to-face interaction with identified individual police officers – recognisable ‘faces’ – is vital.</i> <i>Victoria Police must increase the trust that communities of identity (relating to gender, ethnicity, religion, sexuality, age, capacity or otherwise) have in its ability to serve them as well and treat them as fairly as anybody else.</i> <i>Victoria Police needs to engage with businesses in a different way for mutual benefit, based on enduring structures and processes.</i> <i>Police and private security firms need to work together to deter crime and maintain public order most effectively, but police should retain an involvement in the regulation of the industry and could become involved in the training of its members”.</i>
<p>Ambulance Victoria Strategic Plan 2017-2022</p> <p>This Strategic Plan outlines how Ambulance Victoria will continue its recent operational reforms, to provide Victorians with a world-class emergency ambulance service over the next five years.</p> <p>The Plan focuses on achieving four key outcomes and associated priorities:</p>

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Document Name
<p>Outcome 1 - An exceptional patient experience</p> <ul style="list-style-type: none"> • Providing safe, high quality, timely and expert patient care every time • Helping people to make informed decisions about their emergency health care • Connecting people with the care they need • Using research and evidence to continuously learn and improve our services <p>Outcome 2 - Partnerships that make a difference</p> <ul style="list-style-type: none"> • Working with communities to deliver local emergency health care solutions • Collaborating with our partners to improve health outcomes • Planning for and responding to major events and emergencies • Sharing knowledge, experience and data <p>Outcome 3 - A great place to work and volunteer</p> <ul style="list-style-type: none"> • Keeping our people safe, and physically and psychologically well • Providing an inclusive and flexible workplace • Developing a culture of continual learning and development • Embedding an ethical, just and respectful culture <p>Outcome 4 - A high performing organisation</p> <ul style="list-style-type: none"> • Embracing innovative ideas, systems and technology • Being accountable for our actions and outcomes • Improving our integrated service model • Operating in a financially and environmentally sustainable way
<p>Court Services Victoria Strategic Asset Plan:2016-2031</p> <p>The purpose of this Plan is to deliver safe, secure and sustainable court and tribunal assets via excellent and expert asset management.</p> <p>Court Services Victoria (CSV) aims to enable provision of accessible justice for all Victorians through a portfolio of buildings that are safe, secure and sustainable to meet the service needs of the jurisdictions, court and tribunal users and community, now and into the future.</p> <p>The key priority focus areas are:</p> <ul style="list-style-type: none"> • Enabling specialist court infrastructure including family violence response • Ensuring safe, flexible, future proofed and fit-for-purpose environments • Delivering Melbourne CBD Legal Precinct (the Precinct) development requirements • Delivering Melbourne growth corridor development priorities • Implementing the Court Services Delineation Model across metropolitan and regional Victoria • Identifying a set of principles that will determine proper priorities and allocation of resources for new capital works and maintenance of the existing asset base both within and between the CBD, metropolitan Melbourne, and regional Victoria. <p>The strategy responds to the defined service needs of all jurisdictions, incorporating the following components over a 15 year period:</p> <ul style="list-style-type: none"> • Investment in ten new court and tribunal facilities • Expansion of five existing court and tribunal facilities • Upgrade and lifecycle management across the court portfolio <ul style="list-style-type: none"> - Accommodating the new Court Services Delineation Model - Replacing/upgrading critical infrastructure - Increase in recurrent maintenance funding • Divestment of up to thirteen properties • Release of up to ten leased properties.
<p>Fire Rescue Victoria Strategic Plan 2022-2032</p> <p>The FRV Strategic Plan is built on the following five pillars of focus over the next 10 years:</p> <ol style="list-style-type: none"> 1. Partnering effectively for safer communities; 2. Creating a culture that connects and supports our people; 3. Modernising our organisation to provide better outcomes; 4. Helping Victorian communities build resilience through education and preparation; and 5. Delivering excellence across our fire and rescue services.

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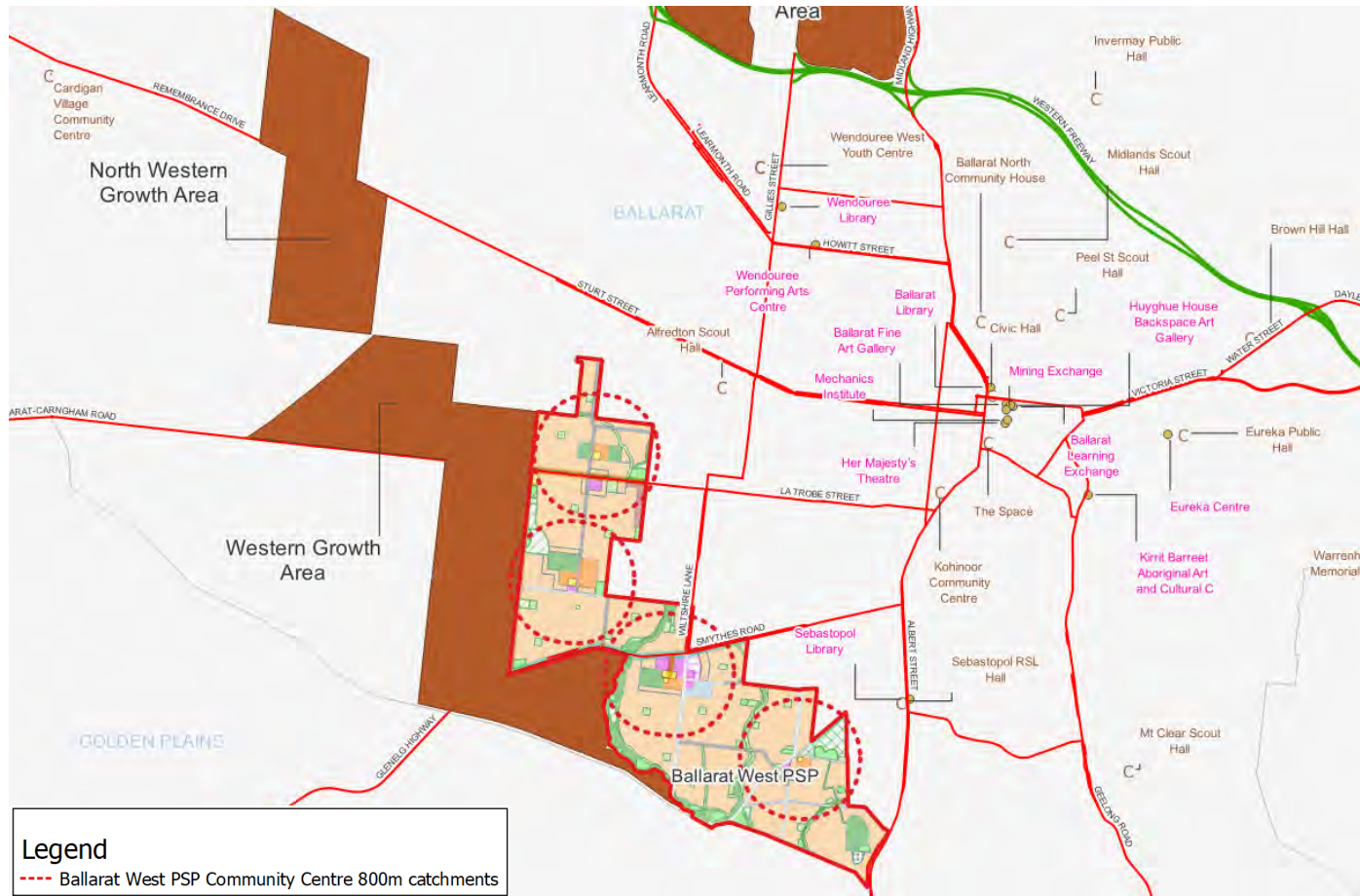
Document Name
The Strategic Plan states that FRV periodically reviews the strategic location of fire stations to look at ways to improve response to the community (page 27).
Victorian State Emergency Services (VICSES) Service Delivery Strategy 2025 VICSES is a volunteer-based organisation, providing emergency assistance to minimise the impact of emergencies and strengthen the community's capacity to plan, respond and recover, when emergencies occur. It operates under the Victoria State Emergency Act (2005) and the coordinating agency for emergency management, Emergency Management Victoria (EMV). VICSES aims to partner with communities, government, other agencies and business to provide timely and effective emergency management services, building community preparedness, disaster resilience and contributing to risk prevention.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

[Appendix 2 – Community Infrastructure Audit Maps](#)

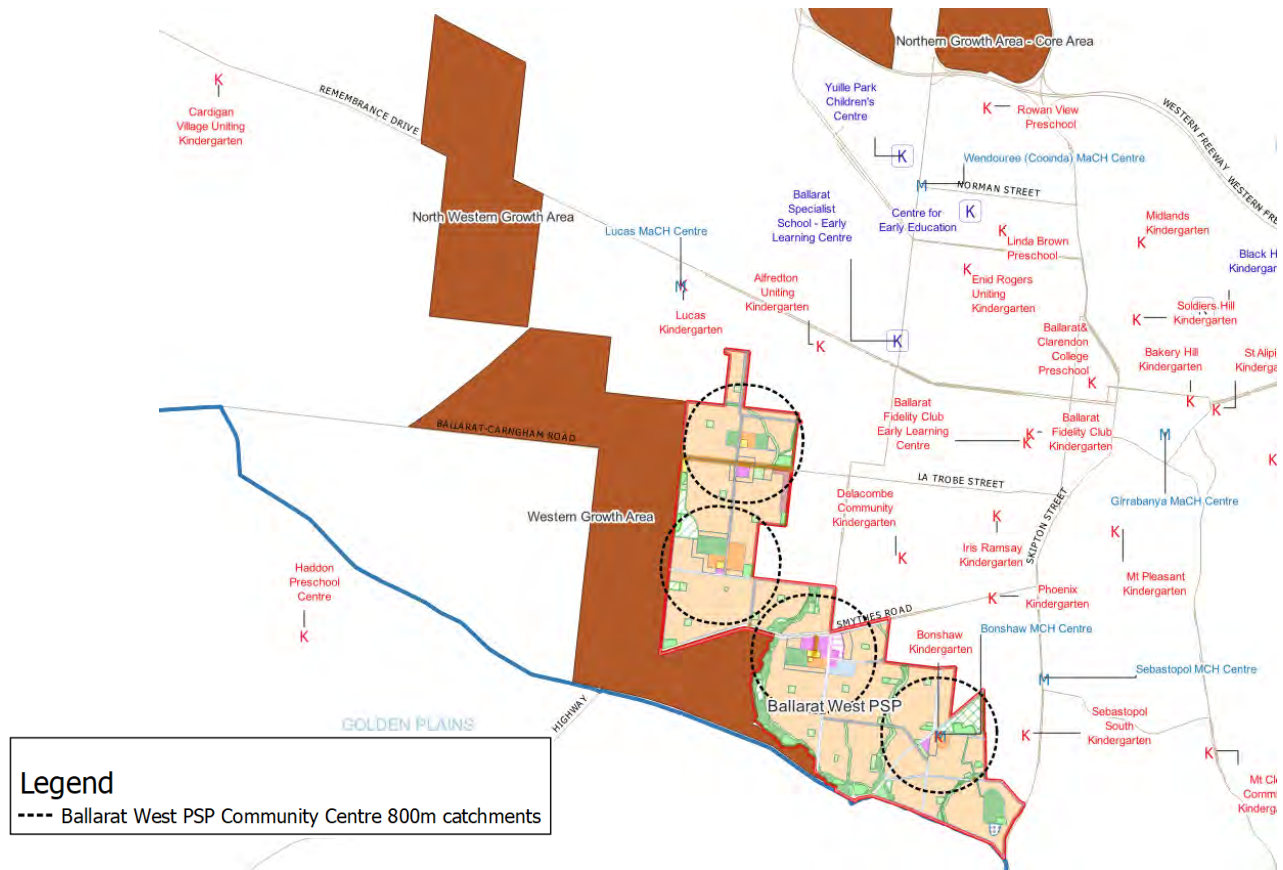
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Figure 6 - Libraries, Community Centres, Cultural Facilities and Halls



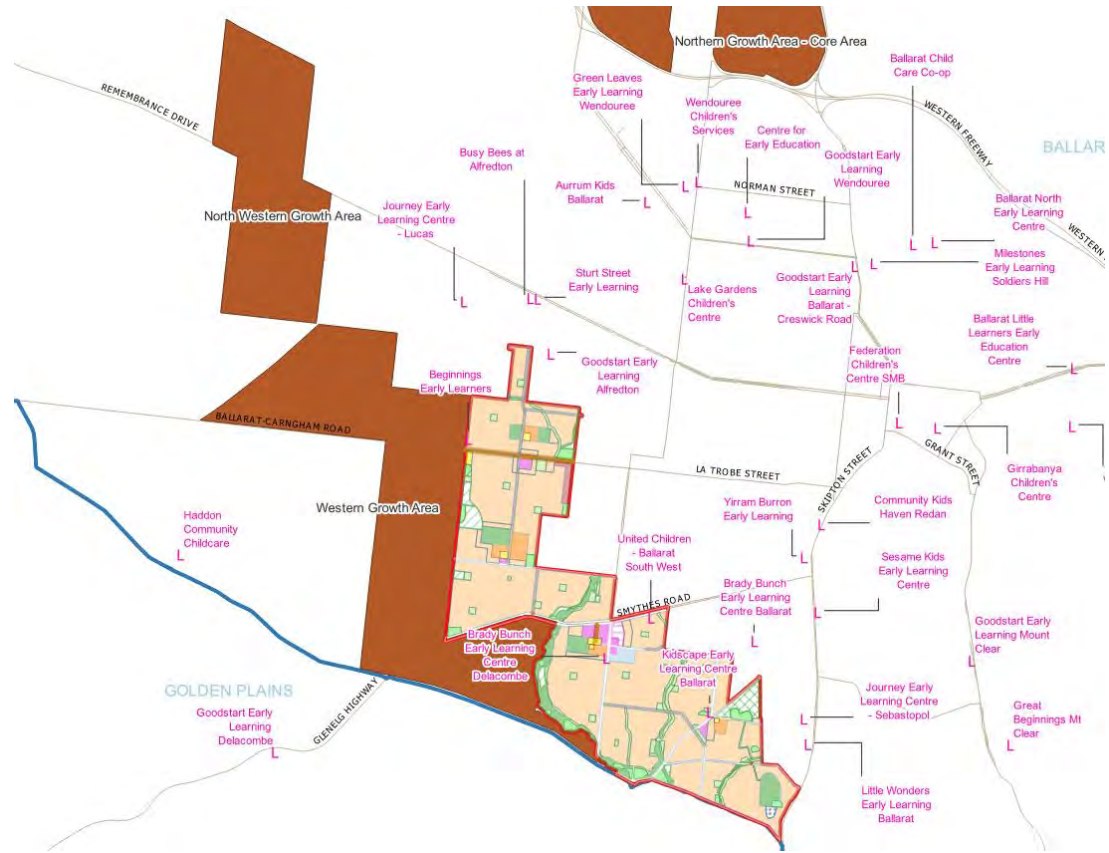
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Figure 7 - Early Years Facilities: Sessional Kindergarten (K) and Maternal & Child Health (M)



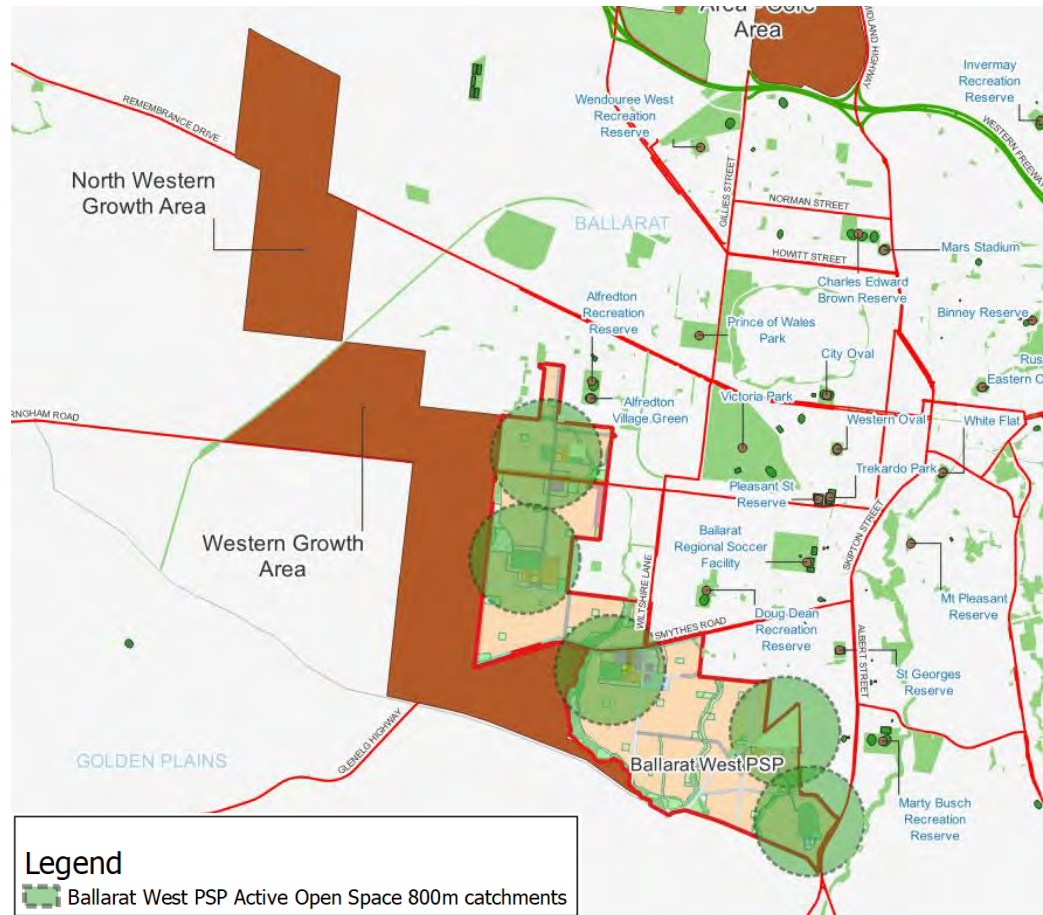
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Figure 8- Early Years Facilities: Long Day Child Care (L)



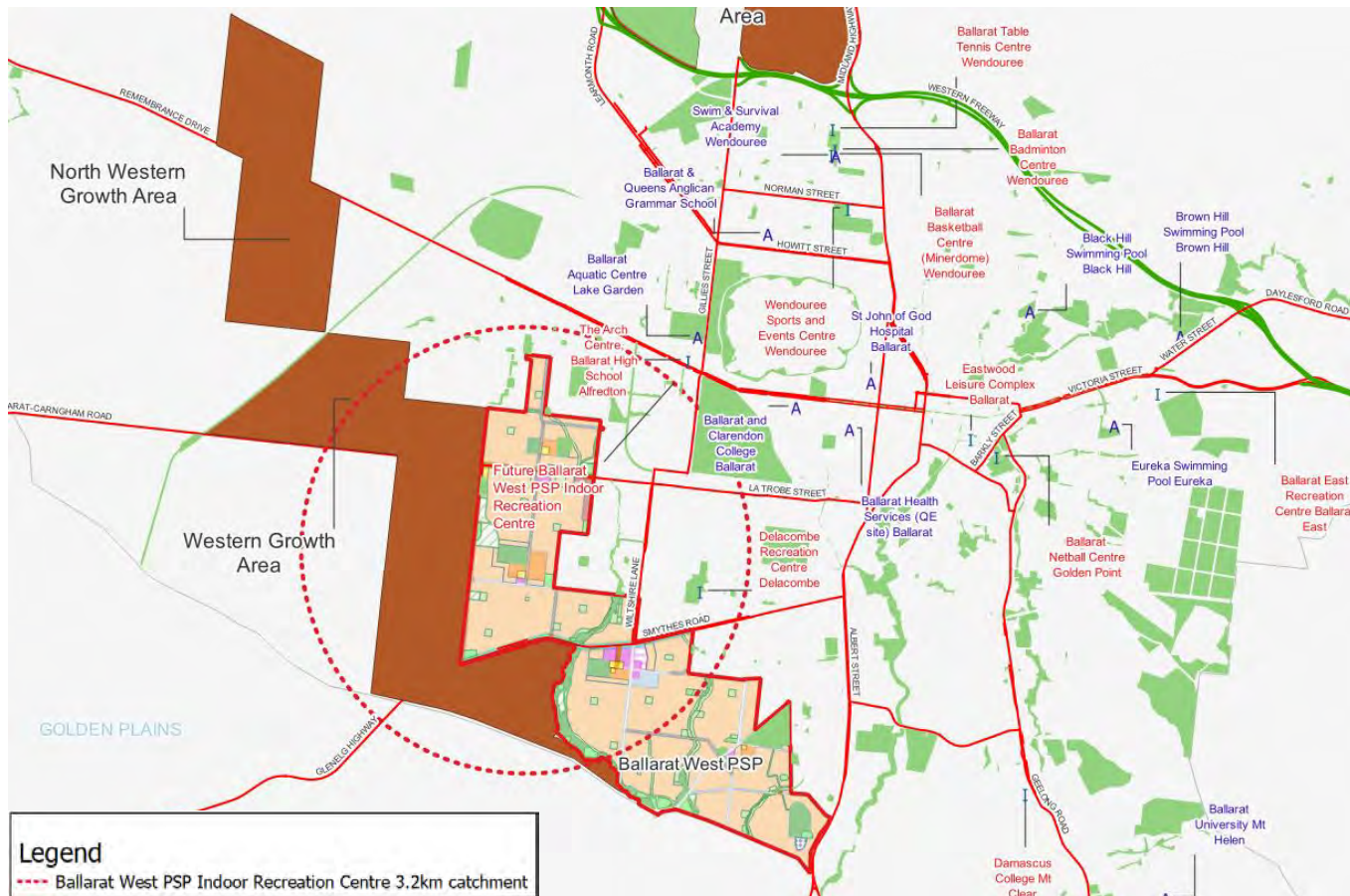
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Figure 9 – Outdoor Passive and Active Open Space Facilities



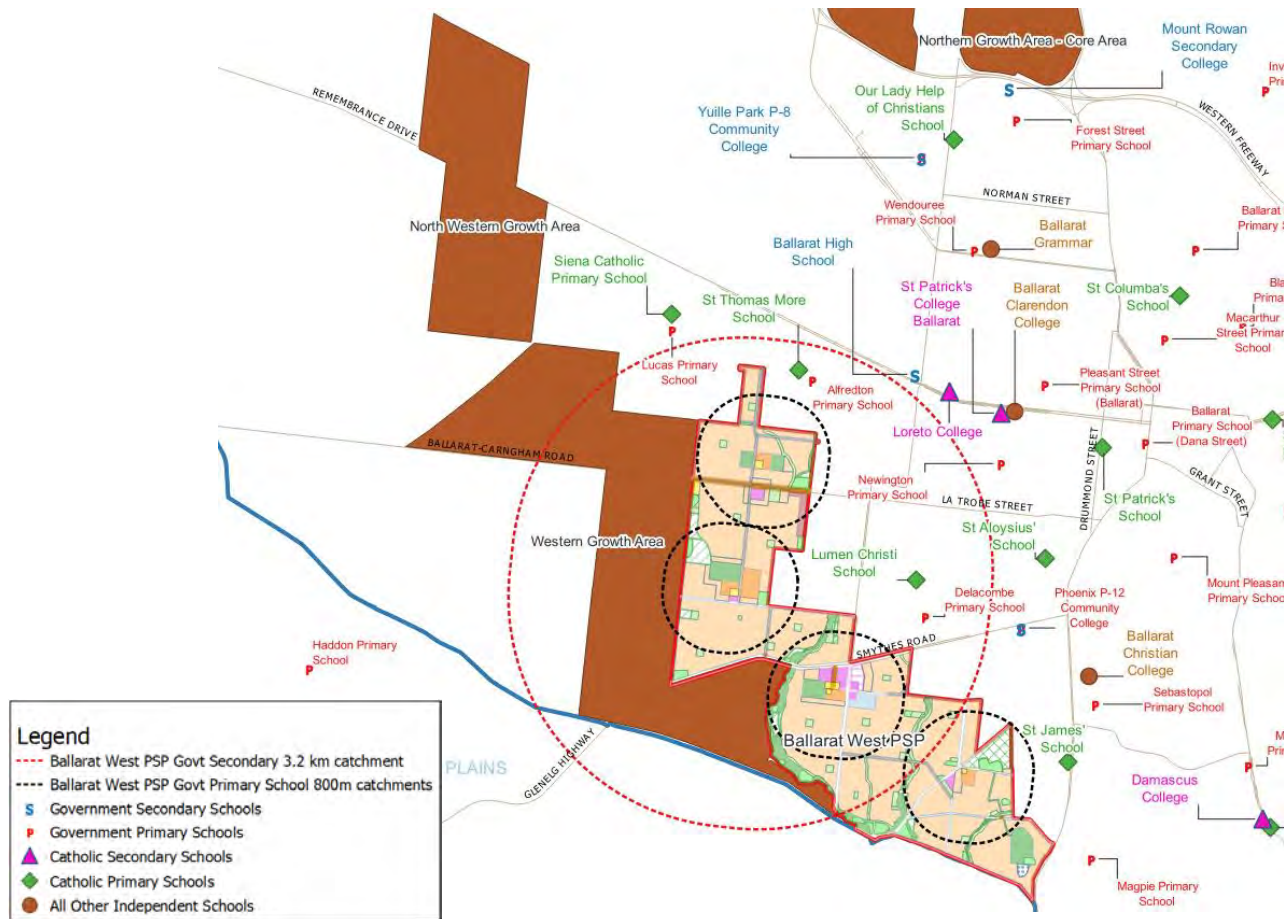
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Figure 10 – Indoor Recreation Facilities



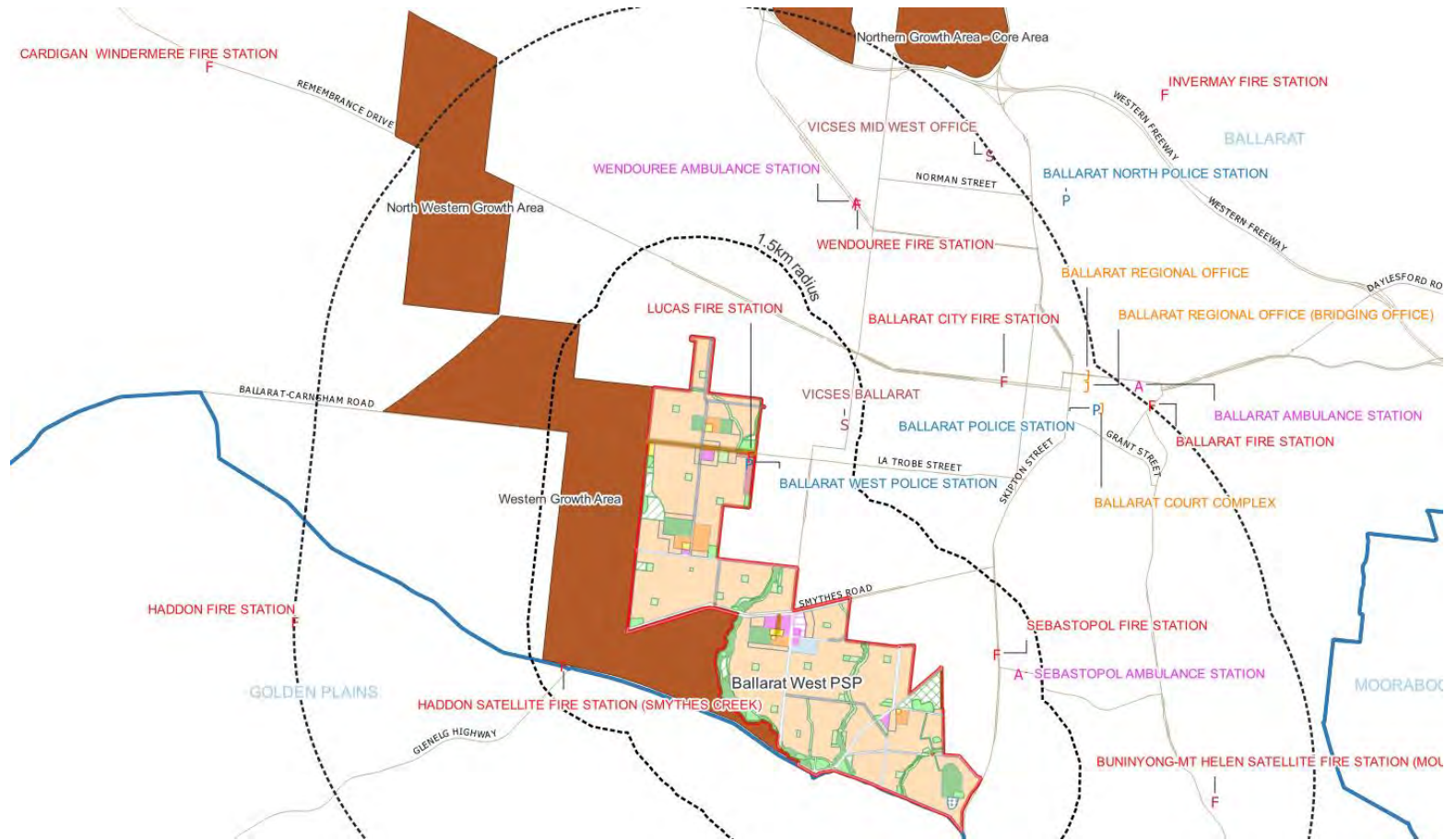
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Figure 11 - Education Facilities



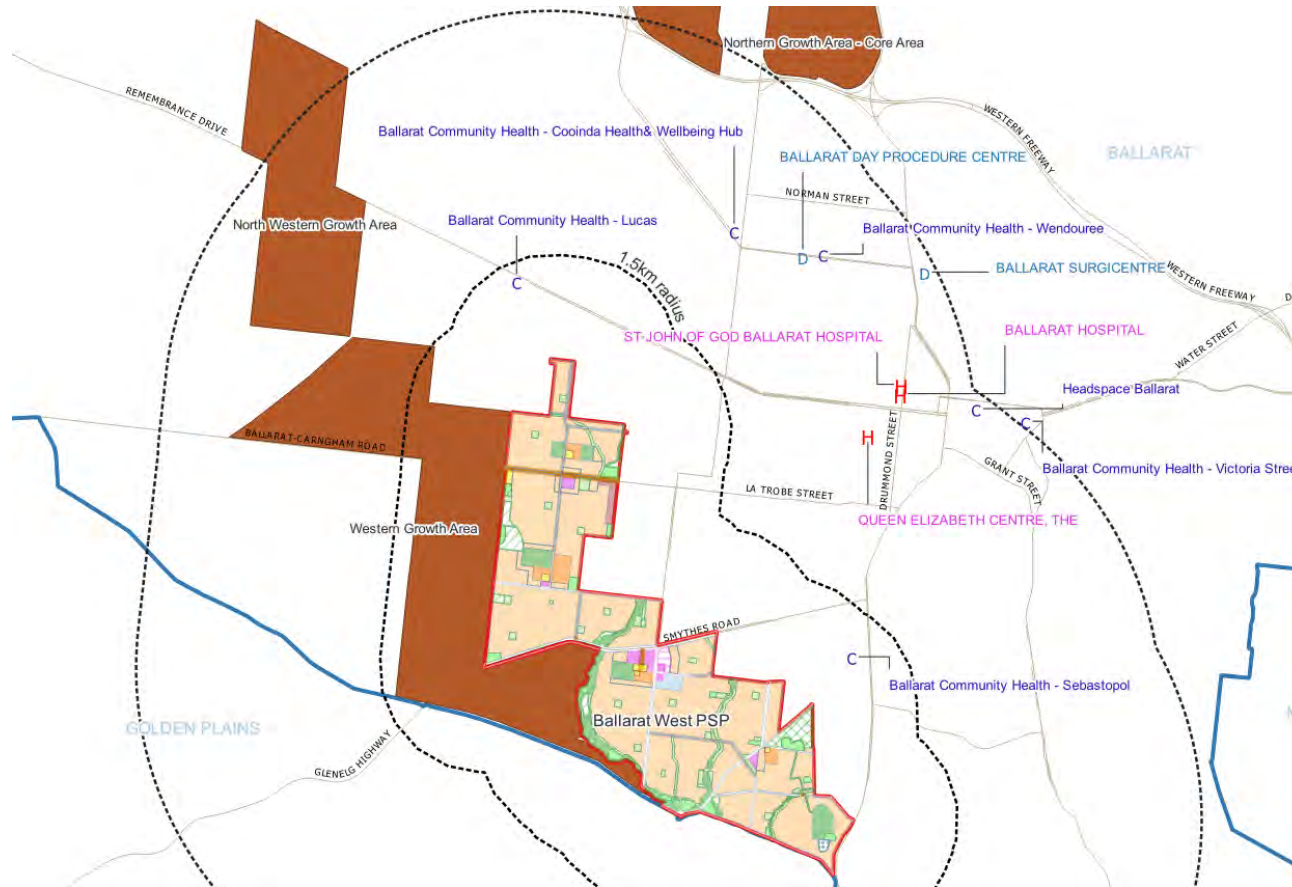
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Figure 12 - Law Courts, Police and Emergency Services



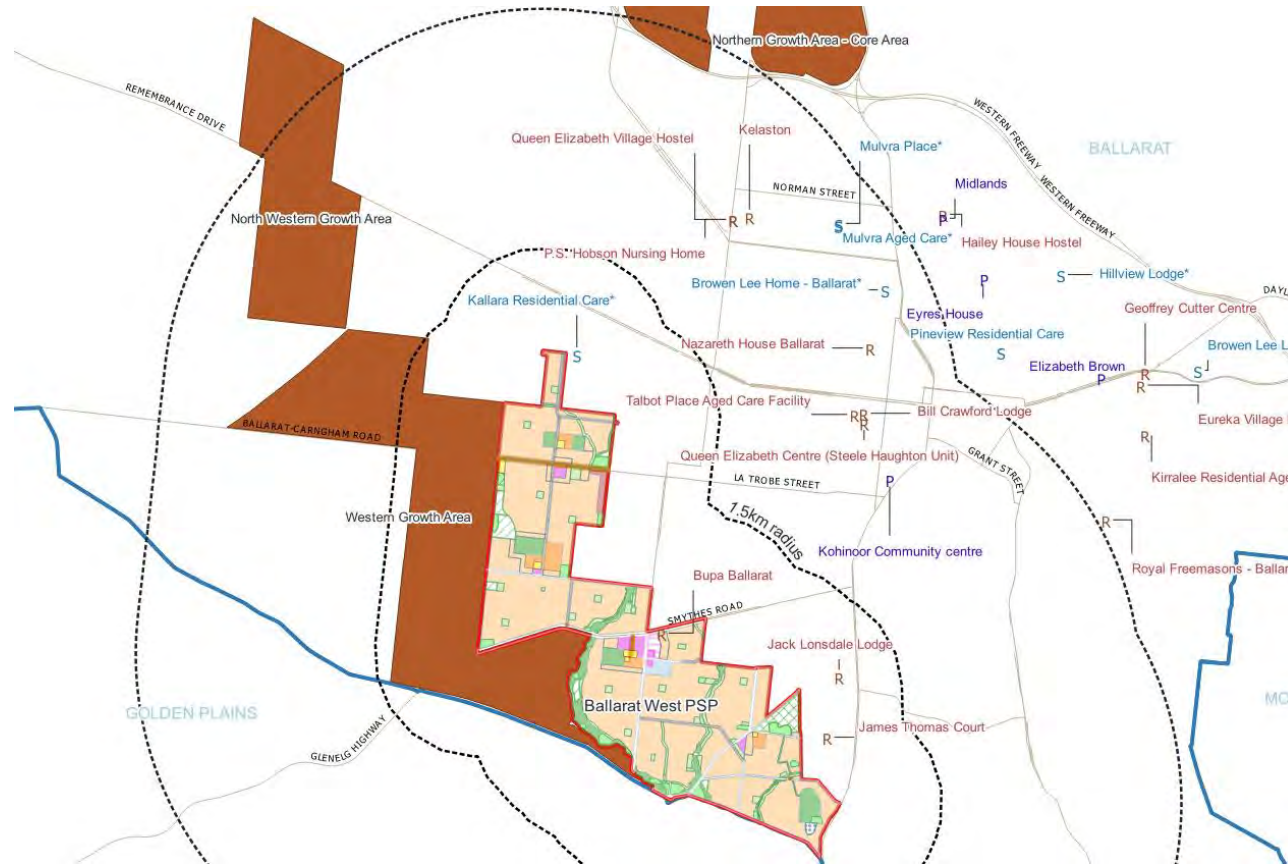
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Figure 13 - Acute and Community Health Services



Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Figure 14 - Residential Aged Care (R), Supported Residential Services (S) and Planned Activity Group Venues (P)



Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Appendix 3 – Ballarat Western and North-Western Growth Areas Community Infrastructure Demand & Supply Estimates

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Public Open Space									
Total public open space contribution (local passive + local active)	10.0%	Percentage of net developable area to be provided as unencumbered public open space	Victorian Planning Authority, Precinct Planning Guidelines (2021)	86.0	86.0	48.0	48.0	134.0	134.0
Local passive open space	4.0%	Percentage of net developable area to be provided as unencumbered public open space	Victorian Planning Authority, Precinct Planning Guidelines (2021)	34.4	34.4	19.2	19.2	53.6	53.6
Local active open space	6.0%	Percentage of net developable area to be provided as unencumbered public open space	Victorian Planning Authority, Precinct Planning Guidelines (2021)	51.6	51.6	28.8	28.8	80.4	80.4
Organised Sport Facility & Participation Estimates									
Indoor and outdoor recreation facilities									
Indoor recreation centres / courts	10,000	Total population per court	Typical standard used by some Melbourne Growth Area Councils (note: individual LGAs vary on their views about the “desired” benchmark and some have no documented working benchmark).	3.5	4.6	1.9	2.6	5.4	7.2

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Council aquatic leisure centre visits per annum	5.1	Number of visits per person per annum	Victorian Department of Jobs, Precincts & Regions, Know Your Council: 2018-2019 Dataset (All Victorian LGA average)	178,009	237,350	99,338	132,451	277,347	369,801
Council aquatic / leisure centres	116,000	Approximate total population per facility	ASR Research benchmark for Melbourne growth areas	0.3	0.4	0.2	0.2	0.5	0.6
Organised Sport Participation									
Participation in organisation/venue based activity: Adults (people aged 15 and over)									
		% of people aged 15 years and over participating in organised physical activity or sport at least once per year	Australian Sports Commission, AusPlay Survey (AusPlay): January 2019 - December 2019 Victoria Data (Table 11)	8,614	11,486	4,807	6,409	13,421	17,895
Fitness/Gym	32.2%	As above	As above	2,595	3,460	1,448	1,931	4,043	5,391
Swimming	9.7%	As above	As above	1,070	1,427	597	796	1,667	2,223
Golf	4.0%	As above	As above	1,043	1,391	582	776	1,626	2,167
Pilates	3.9%	As above	As above	1,097	1,462	612	816	1,709	2,279
Basketball	4.1%	As above	As above	829	1,106	463	617	1,292	1,723
Tennis	3.1%	As above	As above	883	1,177	493	657	1,375	1,834
Football/soccer	3.3%	As above	As above	1,124	1,498	627	836	1,751	2,334
Yoga	4.2%	As above	As above						

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Netball	3.2%	As above	As above	856	1,141	478	637	1,334	1,778
Australian football	3.4%	As above	As above	910	1,213	508	677	1,417	1,890
Athletics, track and field (includes jogging and running)	3.9%	As above	As above	1,043	1,391	582	776	1,626	2,167
Walking (Recreational)	2.9%	As above	As above	776	1,034	433	577	1,209	1,612
Cycling	1.4%	As above	As above	375	499	209	279	584	778
Bowls	1.4%	As above	As above	375	499	209	279	584	778
Cricket	2.2%	As above	As above	589	785	328	438	917	1,223
Organised participation by activity - top 10 activities (children aged 0 to 14)									
		% of children aged 0-14 participating in organised physical activity or sport at least once per year	Australian Sports Commission, AusPlay Survey (AusPlay): January 2019 - December 2019 Victoria Data (Table 10)	1,958	2,611	1,093	1,457	3,051	4,069
Swimming	35.5%	As above	As above	927	1,236	517	690	1,444	1,925
Australian football	16.8%	As above	As above	756	1,008	422	562	1,178	1,570
Basketball	13.7%	As above	As above	353	471	197	263	550	733
Cricket	6.4%	As above	As above	563	750	314	419	877	1,169
Dancing (recreational)	10.2%	As above	As above	320	427	179	238	499	665
Netball	5.8%	As above	As above						

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Football/soccer	10.1%	As above	As above	557	743	311	415	868	1,158
Tennis	6.4%	As above	As above	353	471	197	263	550	733
Gymnastics	11.8%	As above	As above	651	868	363	484	1,014	1,352
Karate	5.2%	As above	As above	287	383	160	213	447	596
Early Years Services									
Kindergartens									
% of 4 year olds participating in 4 year old Kindergarten	100.0%	% of all eligible children participating in 4 Year Old Subsidised Kindergarten	State Government Objective	538	717	300	400	838	1117
Total number of enrolments in 4 year old sessional Kindergarten	75.5%	% of participating children (see above) enrolled at a 4 year old sessional Kindergarten service	Victorian Child and Adolescent Monitoring System (VCAMS), Department of Education & Training Based on indicator 31.4 Number of four year old kindergarten enrolments in a long day care or integrated children's services setting for Ballarat: 24.5% (2015 data).	406	541	227	302	632	843
Total number of enrolments in 3 year old sessional Kindergarten	75.5%	% of participating children (see above) enrolled at a 3 year old sessional Kindergarten service	ASR Research assumption	399	532	223	297	622	829
Total 3 & 4 year old enrolments attending sessional kindergarten				805	1073	449	599	1254	1672

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Number of sessional kindergarten rooms required under current kindergarten policy environment (15 hours per week for both three and four year old kindergarten)	66		ASR constructed calculation	12	16	7	9	19	25
Number of sessional kindergarten rooms required under current kindergarten policy environment (15 hours per week of three year old kindergarten and 30 hours of four year old kindergarten)	66 enrolments for three year old kindergarten & 33 enrolments for four year old kindergarten.		ASR constructed calculation	18	24	10	14	29	38
Maternal & Child Health									
Number of MCH Full-Time Nurses	120	1 FT nurse per 120 children 0 years	ASR Research estimate	4.1	5.4	2.3	3.0	6.3	8.4
Number of MCH consulting units	1	Number of MCH consulting units required per FT nurse	Based on above	4.1	5.4	2.3	3.0	6.3	8.4
Playgroup									
Number of 2 hr playgroup sessions per week	245	Total number of children aged 0-3 years required to generate demand	ASR Research constructed measure using Playgroup Victoria	8.3	11.0	4.6	6.2	12.9	17.2

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
		for a 2 hour playgroup session per week							
Occasional Child Care									
Number of occasional child care places	124	Total number of children aged 0-6 years per licensed LDC place	Department of Education & Training, Register of Approved Children's Services in Victoria (City of Ballarat data, 86 places and 3 services) October 2022	318.3	424.4	178	237	496	661
Number of occasional child care centres	30	Total number of facilities required based on number of licensed places generated (see above)	ASR Research constructed measure based on a typical sized occasional child care facility.	10.6	14.1	5.9	7.9	16.5	22.0
Long Day Child Care Centres								0	0
Number of Long Day Child Care places	3.3	Total number of children aged 0-6 years per licensed LDC place	Australian Children's Education and Care Quality Authority (ACECQA) National Register Data (City of Ballarat data, 3251 places and 33 services), October 2022	1,109	1,479	619	825	1,728	2,304
Number of Long Day Child Care centres	120	Total number of facilities required based on number of licensed places generated (see above)	ASR Research constructed measure based on a typical large sized long day child care facility.	9	12	5	7	14	19
Community Centres, Meeting spaces, Neighbourhood Houses & Libraries									

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Level 1 community centre	20,000	Population per Level 1 facility for a catchment of 60,000 people	VPA / ASR Research Growth Area Community Centre Planning Guideline	1.7	2.3	1.0	1.3	2.7	3.6
Level 2 community centre	20,000	Population per Level 2 facility for a catchment of 60,000 people	VPA / ASR Research Growth Area Community Centre Planning Guideline	1.7	2.3	1.0	1.3	2.7	3.6
Level 3 community centre	60,000	Population per Level 3 facility for a catchment of 60,000 people	VPA / ASR Research Growth Area Community Centre Planning Guideline	0.6	0.8	0.3	0.4	0.9	1.2
Neighbourhood Houses								0	0
Number of Neighbourhood House users per week	2.9%	Percentage of population using a Neighbourhood House in a given week	Neighbourhood Houses Victoria, Neighbourhood Houses Survey 2019	1,010	1,347	564	752	1,574	2,099
Number of Neighbourhood Houses	28,000	Approximate total population per facility in the City of Ballarat (2021)	2021 statistic based on 4 existing Neighbourhood House services and a municipal population of 113,500 (2021 estimate)	1.2	1.7	0.7	0.9	1.9	2.6
Libraries								0	0
Number of library loans annum	5.4	Total loans per person	Public Libraries Victoria Network, 2018-19 PLVN Annual Statistical Survey (2019), Central Highlands Libraries	188,111	250,820	104,976	139,968	293,087	390,788

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Number of library visits per annum	4.4	Total visits per person	Public Libraries Victoria Network, 2018-19 PLVN Annual Statistical Survey (2019), Central Highlands Libraries	153,276	204,372	85,536	114,048	238,812	318,420
Number of library facilities	38,000	Population per Library facility	2021 statistic based on 3 branch libraries within the City of Ballarat (excluding mobile library locations) and a municipal population of 113,500 (2021 estimate)	0.9	1.2	0.5	0.7	1.4	1.9
Education Enrolment & Facility Estimates									
Primary Schools									
Govt Primary Enrolment	55%	% of 5-11 year old population	Australian Bureau of Statistics, 2021 Census of Population and Housing, based on data for Ballarat LGA	2,134	2,846	1,191	1,588	3,325	4,434
Catholic Primary Enrolment	27%	% of 5-11 year old population	As above	1,050	1,400	586	781	1,636	2,181
Non Govt Primary Enrolment	12%	% of 5-11 year old population	As above	453	604	253	337	705	941
Total Primary Enrolment	94%	% of 5-11 year old population	As above	3,644	4,858	2,033	2,711	5,677	7,569
Govt Primary School	3,000	Total number of dwellings per facility	Department of Education & Training	4.3	5.7	2.4	3.2	6.7	8.9
Secondary Schools									
Govt Secondary Enrolment	40%	% of 12-17 year old population	Australian Bureau of Statistics, 2021 Census of Population and Housing, based on data for Ballarat LGA	1,271	1,694	709	945	1,980	2,640
Catholic Secondary Enrolment	28%	% of 12-17 year old population	As above	879	1,172	490	654	1,369	1,826

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Non Gov Secondary Enrolment	20%	% of 12-17 year old population	As above	619	826	346	461	965	1,287
Total Secondary Enrolment	88%	% of 12-17 year old population	As above	2,771	3,695	1,546	2,062	4,317	5,757
Govt Secondary School	10,000	Total number of dwellings per facility	Department of Education & Training	1.3	1.7	0.7	1.0	2.0	2.7
TAFE								0	0
TAFE Full-Time Enrolment (15 to 24)	2.5%	% of 15-24 year old population	Australian Bureau of Statistics, 2021 Census of Population and Housing, based on data for Ballarat LGA	115	153	64	86	179	239
TAFE Full-Time Enrolment (25+)	0.5%	% 25 + year old population	As above	109	146	61	81	170	227
TAFE Part-Time Enrolment (15 to 24)	4.4%	% of 15-24 year old population	As above	201	268	112	149	313	417
TAFE Part-Time Enrolment (25+)	1.4%	% 25 + year old population	As above	309	412	172	230	481	642
Total TAFE Enrolments				734	979	410	546	1144	1525
Universities								0	0
University Full-Time Enrolment (15 to 24)	15.2%	% of 15-24 year old population	Australian Bureau of Statistics, 2021 Census of Population and Housing, based on data for Ballarat LGA	687	916	383	511	1,070	1,427
University Full-Time Enrolment (25+)	1.3%	% 25 + year old population	As above	286	382	160	213	446	595
University Part-Time Enrolment (25 to 24)	2.1%	% of 15-24 year old population	As above	97	129	54	72	150	201

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
University Part-Time Enrolment (25+)	1.8%	% 25 + year old population	As above	406	542	227	302	633	844
Total University Enrolments				1,476	1,968	824	1,098	2,300	3,067
Primary & Acute Health Services									
Number of public and private hospital beds	3.55	Number of public and private beds per 1,000 people	Australian Institute of Health & Welfare, Hospital resources 2017–18: Australian hospital statistics	124	165	69	92	193	257
Number of public hospital beds	2.34	Number of public beds per 1,000 people	Australian Institute of Health & Welfare, Hospital resources 2017–18: Australian hospital statistics	82	109	45	61	127	169
Community health clients	3%	Proportion of population that is a registered community health client	Victorian Auditor-General’s report, Community Health Program (June 2018)	1,000	1,333	558	744	1,558	2,077
Allied health service sites	0.8	Number of allied health service sites per 1,000 people (City of Ballarat)	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	28	37	16	21	43	58
General practices	0.30	Number of general practice clinics per 1,000 people (City of Ballarat)	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	10	14	6	8	16	22

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Dental services	0.30	Number of dental service sites per 1,000 people (City of Ballarat)	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	10	14	6	8	16	22
Pharmacies	0.20	Number of pharmacies per 1,000 people (City of Ballarat)	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	7	9	4	5	11	14
Projected hospital admissions	476.2	Hospital inpatient separations per 1,000 people (City of Ballarat). Note: projected to increase by 3.2% per annum until 2026/27.	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	16,589	22,119	9,257	12,343	25,846	34,462
Emergency presentations	375	Emergency department presentations per 1,000 people (City of Ballarat). Note: projected to increase by 3% per annum until 2026/27	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	13,063	17,418	7,290	9,720	20,353	27,138
Drug & alcohol clients	5.5	Number of registered Alcohol & Drug Treatment clients	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	192	255	107	143	299	398

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Mental health clients	18.5	per 1,000 people (City of Ballarat) Number of registered mental health clients per 1,000 people (City of Ballarat)	Department of Health and Human Services, City of Ballarat Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	644	859	360	480	1,004	1,339
Aged Care & HACC									
Aged Care									
Number of aged care places (residential and home care)	123	Number of aged care places per 1000 people aged 70 years +	Australian Government Planning Ratio 2019	389	518	217	289	606	808
Short Term Restorative Care Programme	2	Number of STRC places per 1000 people aged 70 years +	Australian Government Planning Ratio by 2019	6	8	4	5	10	13
Arts & Cultural Activities									
Type of arts / cultural activity participated in (people aged 15 and over)									
Performing in a drama, comedy, musical or variety act	6.2%	% of 15+ population	Australian Bureau of Statistics, Participation in Selected Cultural Activities, Australia, 2017–18 (Catalogue Number 4921.0)	1,659	2,212	926	1,234	2,584	3,446

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Singing or playing a musical instrument	4.3%	participating in activity As above	As above	1,150	1,534	642	856	1,792	2,390
Dancing	4.8%	As above	As above	1,284	1,712	717	955	2,001	2,668
Writing	2.8%	As above	As above	749	999	418	557	1,167	1,556
Visual art activities	1.9%	As above	As above	508	678	284	378	792	1,056
Craft activities	1.8%	As above	As above	482	642	269	358	750	1,000
Designing websites, computer games or interactive software	2.8%	As above	As above	749	999	418	557	1,167	1,556
Fashion, interior or graphic design	5.7%	As above	As above	1,525	2,033	851	1,135	2,376	3,168
Type of arts / cultural activity participated in (children aged 0 to 14)				5,083	6,777	2,836	3,782	7,919	10,559
Drama activities	8%	% of 0-14 population participating in activity	Australian Bureau of Statistics, Participation in Selected Cultural Activities, Australia, 2017–18 (Catalogue Number 4921.0)	436	581	243	324	679	905
Singing or playing a musical instrument	23%	As above	As above	1,269	1,692	708	944	1,977	2,636
Dancing	17%	As above	As above	916	1,221	511	681	1,427	1,903
Art and craft activities	39%	As above	As above	2,141	2,854	1,195	1,593	3,335	4,447
Creative writing	23%	As above	As above	1,241	1,655	693	924	1,934	2,579

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Ballarat Western Growth Area		Ballarat North Western Growth Area		Total Western & North Western Growth Areas	
				Low Scenario	High Scenario	Low Scenario	High Scenario	Low Scenario	High Scenario
Creating digital content	17%	As above	As above	910	1,214	508	677	1,418	1,891
Screen based activities	90%	As above	As above	4,982	6,642	2,780	3,707	7,762	10,349
Reading for pleasure	79%	As above	As above	4,331	5,774	2,417	3,222	6,748	8,997

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Appendix 4 – Community Infrastructure Specifications

This Appendix shows indicative community infrastructure specifications for the main DCP items typically identified in a PSP. These specifications include active open space reserves, sporting pavilions and community centres.

Table 9 - Typical PSP Active Open Space Specifications by Size¹⁴

Component	Unit	5 to 6 Hectares	8 to 10 Hectares
Combination of two ovals & three soccer fields	No	1 Ovals 1 soccer	2 Ovals
Car park	Spaces	120	175
Netball / basketball court	No	2	2
Tennis Courts	No	2	
Cricket pitch and practice nets	No	1 / 1	2 / 1
Goals	No	2 sets	4 sets
Internal access road	m2	1350	1980
Landscaping	m2	30430	55435
Lighting – training & site	No	8	14
Signage	No	15	24
Site boundary fencing	m	1000	1300
Driveway crossing access from street	No	1	1
Utility service connections	Item	1	1
Interchange shelters	No	5	8
Turf surface and irrigation system	m2	21340	55440
Score Board	No	2	2

Source: Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing, Prepared for VPA by Cardno (2018)

¹⁴ Note: These are indicative VPA specifications which Council may seek to amend them at the formal PSP stage to align with Council and / or peaking sporting association facility guidelines.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Table 10 - Typical PSP Sport Pavilion Specifications by Number of Playing Fields¹⁵

Description / Facility	Unit	Two playing areas	Three playing areas
Four changes rooms with toilets and showers	m2	120	
Six change rooms with toilets and showers	m2		240
Two umpire change rooms with toilets	m2	40	
Three umpire change rooms with toilets	m2		60
Storage	m2	80	120
Office / first aid room	m2	20	30
Canteen and kitchen	m2	20	40
Public Toilets	m2	40	60
Multipurpose community room / social room (A small (50-80m2) community meeting space, entry foyer and circulation space)	m2	100	
Multipurpose community room / social room (A small (100-125m2) community meeting space, entry foyer and circulation space)	m2		150
Total Building floor space	m2	420	700
Covered spectator area	m2	80	120

Source: Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing, Prepared for VPA by Cardno (2018)

¹⁵ Note: These are indicative VPA specifications which Council may seek to amend them at the formal PSP stage to align with Council and / or peaking sporting association facility guidelines.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Table 11 – Typical PSP Community Centre Configurations x Hierarchy Type¹⁶

Description / Facility	Unit	Level 1	Level 2	Level 3
Kindergarten Facility Two kindergarten rooms to accommodate 99 licensed places, including children's toilets and amenities, storage space, office, staff room and staff toilets and amenities display and circulation space	m2	750	750	
Extra 33-place kindergarten room / multipurpose meeting space	m2	150	150	
Maternal and child health consulting facility (two consulting rooms plus waiting space / program room)	m2	100	100	
Multipurpose community spaces (A combination of small (50-80m2) and medium (100-125m2) community meeting spaces, plus public toilets and amenities, office, staff room and staff toilets and amenities, reception and circulation space)	m2	200	500	
Multipurpose and specialist community spaces (A combination of small (50-80m2), medium (100-125m2) and large (180m2+) community meeting spaces and classrooms plus public toilets and amenities, reception and circulation space)	m2			450
Library	m2			1500
Specialist community space (adult reception / neighbourhood house, arts and cultural facility, youth facility, planned activity group space etc)	m2			250
Total building floor space	m2	1200	1500	2500
Small commercial kitchen	No	1		
Medium commercial kitchen	No		1	
Large commercial kitchen	No			1
Kindergarten outdoor play spaces	m2	700	700	
Car parking spaces	Spaces	60	75	125
Playground	m2	800	800	800
Landscaping	m2	500	500	500

Source: Review of Benchmark Infrastructure Costings: Benchmark Infrastructure Costing, Prepared for VPA by Cardno (2018)

¹⁶ Note: These are indicative VPA specifications which Council may seek to amend them at the formal PSP stage to align with Council facility guidelines and State regulatory requirements.

Ballarat Western and North-Western Growth Areas Framework Plan Community Infrastructure Assessment: Draft Report

Growth Areas Framework Plan

Retail assessment

PREPARED FOR City of Ballarat

February 2024

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Table of contents

Executive summary.....	2
Introduction & context	3
Section 1: City of Ballarat.....	5
1.1 Policy & strategy context.....	5
1.2 Population & households.....	7
1.3 Socio-demographics.....	8
1.4 Employment	10
1.5 Retail expenditure	11
1.6 Population projections	14
1.7 Activity centres	14
Section 2: Western/North Western Growth Areas.....	16
2.1 Catchments dwelling/population projections.....	16
2.2 Supermarket and activity centre requirements	17
2.3 Recommended centres, locations and hierarchy.....	19
2.4 Staging considerations	21
2.5 Potential employment.....	22
2.6 Summary of recommendations.....	23

Executive summary

- The City of Ballarat is preparing a Growth Area Framework Plan for the future Western and North Western Growth Areas. As part of this process, an assessment of activity centre needs is required.
- E-Commerce has seen significant growth in recent years. For retailers that have both a physical store and online presence, customer satisfaction and experience has given rise to the need for combining existing stores with warehouses to fulfil orders, and helps to increase network efficiency and provides an opportunity to bring customers back in store. While e-commerce has and will continue to grow it is likely to have a smaller impact on regional centres such as Ballarat where physical stores are more deeply integrated into the community and have more focus on fresh food, produce, and convenience.
- According to the Australia Bureau of Statistics, the City of Ballarat population was 93,501 in 2011, 101,686 in 2016, 113,504 in 2021, and is estimated at 116,145 in 2022. The population is projected to grow to between 142,624 (forecast.id) and 144,783 (VIF) by 2036.
- The City of Ballarat population is generally characterised by younger, Australian born families.
- 55% of workers are employed full-time and 38% part-time.
- The largest age cohort for full-time workers is 25 – 29 years. For part-time workers, 15-19 and 20-24 are the largest cohorts.
- 87% of workers declared as employees, 6% as owner – incorporated and 5% as owner – not incorporated.
- Total retail expenditure per person, estimated at \$15,682 per annum, is 1.0% above the non-metropolitan Victoria average. Within this, spend on food and non-food are 0.2% and 2.2% above the respective non-metropolitan Victoria averages.
- Key findings in relation to the need for activity centres are summarised below:

City of Ballarat growth areas - summary of findings					
Metric		Western Growth Area		North Western Growth Area	
		15 dwelling/ha	20 dwelling/ha	15 dwelling/ha	20 dwelling/ha
Supermarket floorspace	sq.m	12,541 – 14,979	16,721- 19,973	6,998 – 8,359	9,331 - 11,146
Total floorspace*	sq.m	21,256 – 25,388	28,341 – 33,853	11,861 – 14,168	15,815 – 18,892
Potential employment	FTE	849 – 1,036	1,031 – 1,258	424 – 518	637 – 777
Activity centres	(no.)	1 x Local Convenience Centre 2 x Neighbourhood Activity Centre		1 x Neighbourhood Activity Centre	
Staging priority**		Central sector, between Ballarat Carngham Rd and Glenelg Hwy		Southern sector, south of Remembrance Dr	

*excl. external/other commercial
**residential/activity centre

Introduction & context

The City of Ballarat is preparing a Growth Area Framework Plan for the future Western and North Western Growth Areas. As part of this process, an assessment of activity centre needs is required.

This report presents an independent assessment of the Western and North Western Growth Areas, has been prepared in accordance with instructions received from the City of Ballarat, and is presented as follows:

- **Section 1** provides regional context regarding the City of Ballarat, including key policies and strategies relevant to this assessment, activity centre landscape and the current and projected profile of residents.
- **Section 2** provides a detailed analysis of the Western and North Western Growth Areas, with concluding recommendations.

The following context, provided by the City of Ballarat, guides this assessment:

- DELWP Planning Practice Note 90 requires that Local Authorities plan to accommodate projected population growth over at least a 15-year period and provide clear direction on locations where growth should occur.
- On 23 February 2022, Council resolved to prepare a Growth Area Framework Plan for the Western and North-western Growth Areas to guide the future urban development of these areas.
- The purpose of preparing a Growth Area Framework Plan is to identify high level infrastructure requirements, and to determine a logical sequence for future Precinct Structure Plan preparation in both the Western and North Western Growth Areas.
- Clause 11.02-15 of the Ballarat Planning Scheme requires that planning authorities ensure sufficient land is available to meet forecast demand and population growth over a 15-year period, including locations of growth.
- Clause 11.02-2S relating to Structure Planning requires planning authorities to prioritise creating communities that are sustainable, high quality and safe, with local and regional public transport. They are also responsible for preparation of structure plans/precinct structure plans.

Online retailing context

E-Commerce has seen significant growth in recent years, with data from Australia Post estimating 7.5 million Australian households shopped online in 2023, representing growth of 4.3% over 2022. Notably, Victoria saw no change in year-on-year online shopping and Western Australia saw the largest growth (+8.0%). The most popular segments for online shopping included women's fashion, marketplaces & online discount stores and athleisure. Despite the rise of online retailing, bricks and mortar stores still remain important for consumers, facilitating order fulfilment, including click & collect, delivery, price matching and product research.

As consumers become more socially aware, Australia Post research estimates that 40% of consumers will spend more on sustainable products in 2024-25. This places focus on sustainable products and materials, carbon neutral delivery options and develop communication and marketing strategies to show customers they are socially responsible and taking steps to reduce carbon and waste.

Introduction & context

The Australian Retailers Association believes that 1 in every 3 dollars spent on retail shopping in 2032 will be online. For retailers that have both a physical store and online presence, customer satisfaction and experience has given rise to the need for combining existing stores with warehouses to fulfil orders, and helps to increase network efficiency and provides an opportunity to bring customers back in store.

It is important to note that while e-commerce has and will continue to grow, it is likely to have a smaller impact on regional centres such as Ballarat where physical stores are more deeply integrated into the community and have more focus on fresh food, produce, and convenience.

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Section 1: City of Ballarat

The City of Ballarat is located 115 km west of the Melbourne Central Business District, connected via the M8 freeway (refer Map 1.1). Ballarat is a major regional centre, with key industry sectors including healthcare and social assistance, construction and retail trade. The population of Ballarat is projected to reach 170,000 people by 2040/41. This increase represents an increase of 50%, or an additional 57,000 people, and is expected to drive demand for an additional 29,000 dwellings.

1.1 Policy & strategy context

Key policies and strategies impacting the City of Ballarat and the Western/North Western Growth Areas as summarised below:

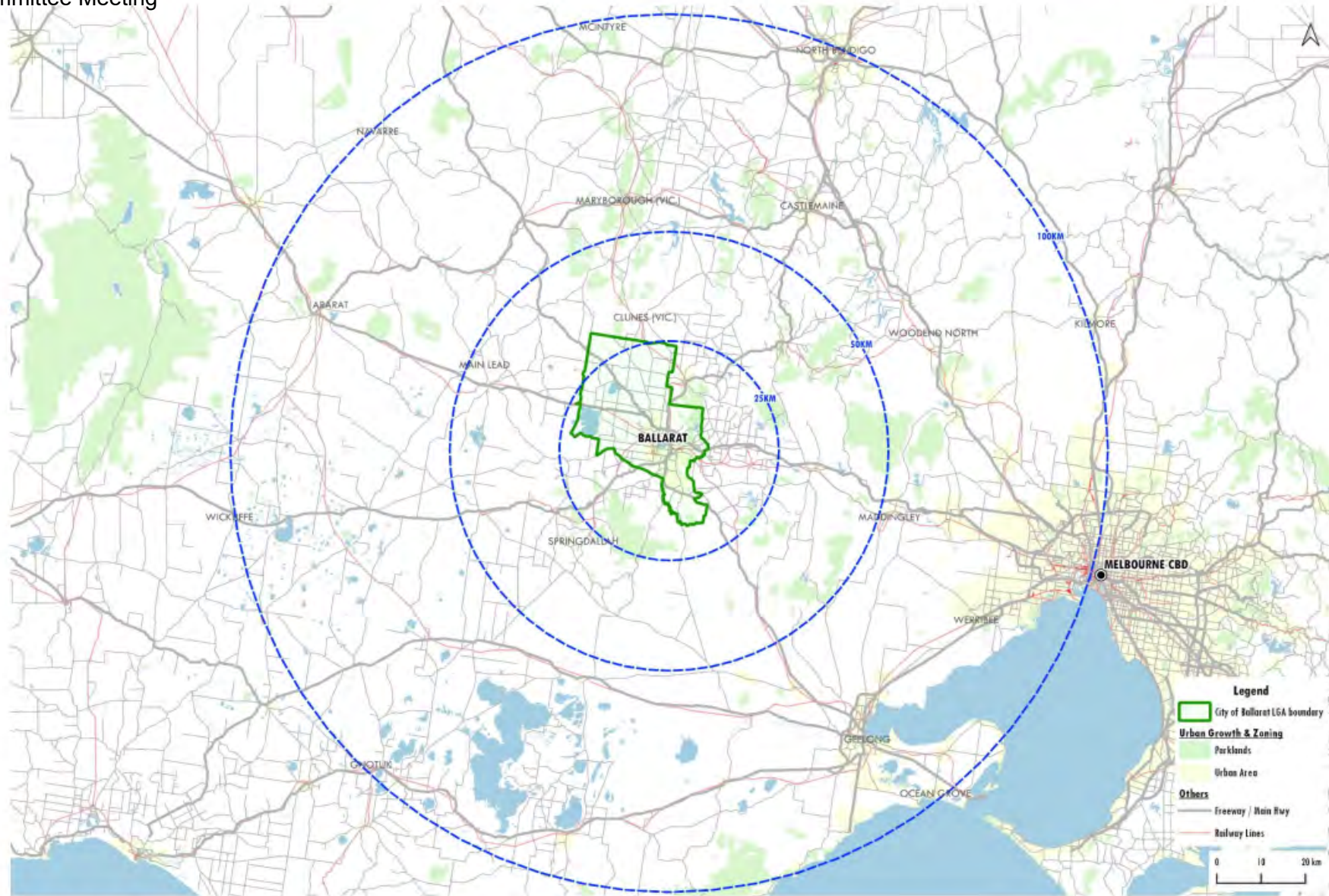
Ballarat Strategy 2040 – This is a long-term strategic planning document which identifies the 10-minute City as a key platform to guide growth and change. Key strategies that are relevant to this include encouraging a compact city form and developing a network of complete local neighbourhoods characterised by safe and convenient access to goods and services. The strategy also supports the implementation of the Ballarat Activity Centre Strategy and prioritises housing development within walking distance of local activity centres.

Ballarat Activity Centre Strategy 2012 – lays out the strategic guidelines for development centres across Ballarat and is a key document that's has been incorporated into other municipal strategic polies such as the Ballarat Strategy 2040. The activity centre Strategy sets out the vision and principles for future activity centre planning, including allowing flexibility for centres to change over time to accommodate the changing needs of the community, reinforcing the defined hierarchy in Ballarat, and consolidating retail and commercial activities in existing and planned centres.

Draft Ballarat Employment Lands Strategy – This is a comprehensive audit of both existing and future supply capacity of employment land within Ballarat. It identifies a total of 370 hectares , equivalent to between 21 and 41 years of supply depending on the methodologies used to assess demand. The strategy also identifies a further 437 hectares of proposed industrial land and 39 hectares of land to be used for activity centre development.

Precinct Structure Plan Guidelines – Referred to as PSP 2.0, these guidelines provide the overarching principles for greenfield developments across Victoria and specifically references the concept of 20-minute neighbourhoods along with other guidelines which are relevant to Activity Centre and employment land planning, including encouraging 30 dwellings per net development within a 400 metre radius, a minimum job density of one job per dwelling with a wider growth corridor, and a target 80% to 90% of dwellings to be within 800 metres of an activity centre.

Ballarat Long Term Growth Options Investigations – These are a series of documents designed to guide future growth opportunities across Ballarat. The Northern growth area has been identified as a preferred location for the future of long-term growth in Ballarat. The growth area has been identified as to have good access to major activity centres, strong access to Neighbourhood Centre's and access to the Ballarat CBD within a 20-minute drive.



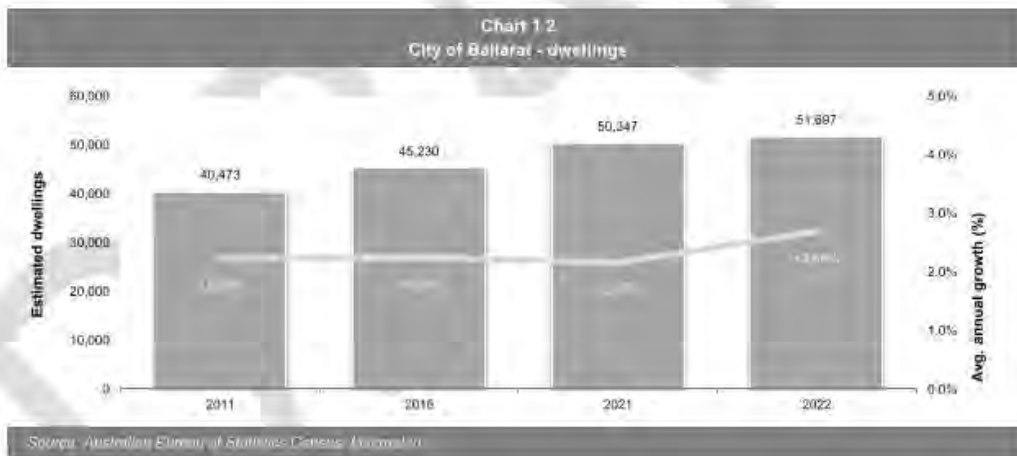
**Map 1.1: City of Ballarat
Regional context**

macroplan

1.2 Population & households

For the City of Ballarat, Chart 1.1 estimates the resident population growth profile to 2022, while Chart 1.2 estimates the number of dwellings.

According to the Australia Bureau of Statistics, the City of Ballarat population was 93,501 in 2011, 101,686 in 2016, 113,504 in 2021, and is estimated at 116,145 in 2022 (Australian Bureau of Statistics Estimated Resident Population). This represents average annual growth of 2.22% to 2021, and 2.33% to 2022.



Section 1: City of Ballarat

1.3 Socio-demographics

Table 1.2 illustrates the socio-demographic profile of the City of Ballarat, compared with benchmarks for non-metropolitan Victoria and Australia, based on data from the 2021 ABS Census of Population and Housing. Key results include the following:

- Per capita and per household income levels of residents are 4.8% and 4.7% above the non-metropolitan Victoria averages respectively.
- The average age of residents, at 39.1 years, is below the non-metropolitan Victoria average (43.6 years).
- Home ownership levels are lower than the non-metropolitan Victoria.
- The population is 88.1% Australian born, above the non-metropolitan Victoria average (86.8%).
- Traditional families (i.e. couples with dependent children) are the most prevalent household type (36.0%).

The City of Ballarat population is generally characterised by younger, Australian born families.

Section 1: City of Ballarat

Table 1.1 City of Ballarat - socio-demographic profile, 2021			
Census item	City of Ballarat	Non-metro. VIC	Australia avg.
Per capita income	\$39,397	\$37,609	\$43,826
<i>Var. from Rest of Vic.</i>	4.8%		
Avg. household income	\$93,042	\$88,881	\$111,341
<i>Var. from Rest of Vic.</i>	4.7%		
Avg. household size	2.4	2.4	2.5
<u>Age distribution (% of population)</u>			
Aged 0-14	18.8%	17.6%	18.3%
Aged 15-19	6.1%	5.6%	5.7%
Aged 20-29	13.4%	10.9%	13.2%
Aged 30-39	12.9%	11.8%	14.5%
Aged 40-49	12.2%	11.7%	12.9%
Aged 50-59	12.0%	13.1%	12.4%
Aged 60+	24.5%	29.2%	22.8%
Average age	39.1	43.6	38.8
<u>Housing status (% of households)</u>			
Owner (total)	<u>64.7%</u>	<u>72.2%</u>	<u>65.1%</u>
• Owner (outright)	32.2%	39.1%	30.6%
• Owner (with mortgage)	32.5%	33.1%	34.5%
Renter	31.2%	23.4%	30.3%
<u>Birthplace (% of population)</u>			
Australian born	88.1%	86.8%	70.8%
Overseas born	<u>11.9%</u>	<u>13.2%</u>	<u>29.2%</u>
<u>Family type (% of population)</u>			
Couple w dep't child.	36.0%	34.6%	38.6%
Couple w non-dep't child.	15.6%	17.3%	19.3%
Couple without child.	21.6%	24.3%	20.8%
One parent w dep't child.	8.1%	6.6%	6.0%
One parent w non-dep't	5.4%	4.8%	5.0%
Lone person	12.3%	11.7%	9.4%

Source: ABS Census of Population & Housing 2021; Macroplan

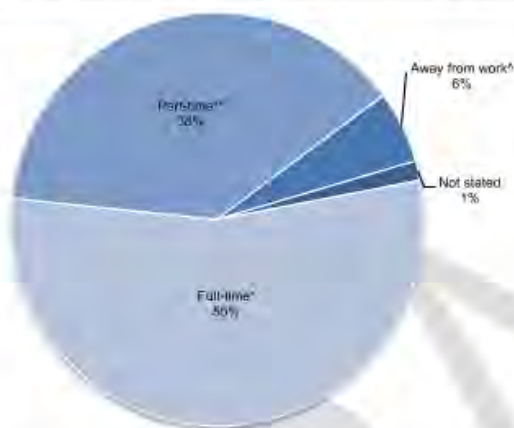
Section 1 | City of Ballarat

1.4 Employment

Charts 1.3 – 1.6 summarise the employment profile of workers within the City of Ballarat at the 2021 Census, summarised as follows:

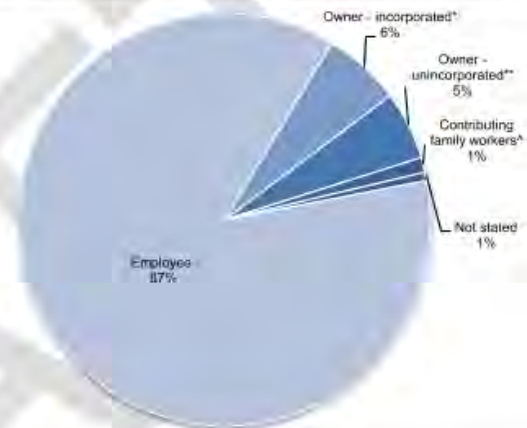
- 55% of workers are employed full-time and 38% part-time.
- The largest age cohort for full-time workers is 25 – 29 years, followed by those aged 45-49. For part-time workers, 15-19 and 20-24 are the largest cohorts.
- 87% of workers declared as employees, 6% as owner – incorporated and 5% as owner – not incorporated.

Chart 1.3
City of Ballarat - employed persons (place of work), 2021



Source: ABS Census of Population & Housing 2021, Macroplan
*worked 35 hours or more during the week prior to Census night
**worked less than 35 hours during the week prior to Census night
*unemployed persons who did not work in the week prior to Census night

Chart 1.4
City of Ballarat - employed persons (place of work), 2021



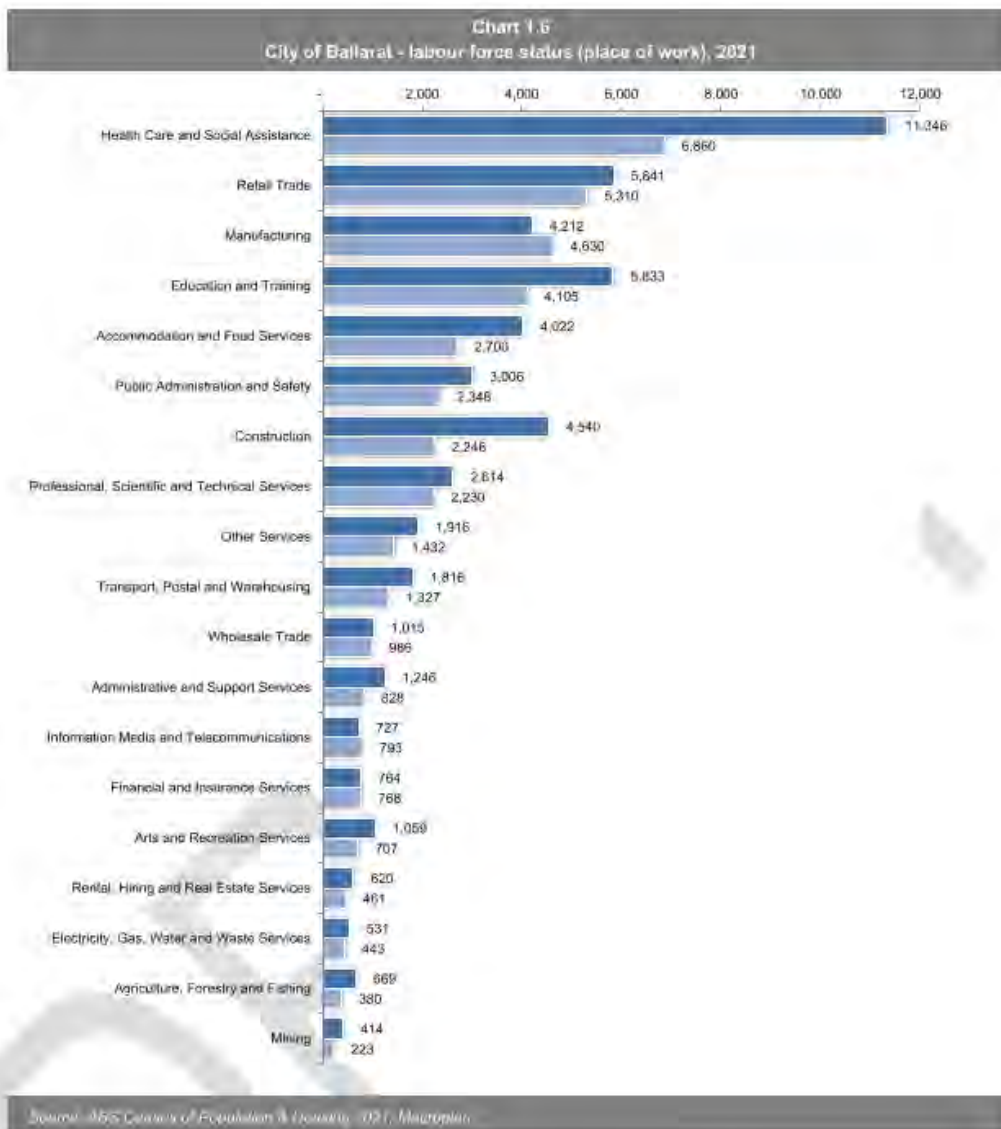
Source: ABS Census of Population & Housing 2021, Macroplan
*Owner manager of incorporated enterprise with/without employees
**Owner manager of unincorporated enterprise with/without employees
*contributing family worker is defined as a person who works without pay, in an economic enterprise operated by a relative.

Chart 1.5
City of Ballarat - employed persons (place of work), 2021



Source: Australian Bureau of Statistics Census, Macroplan

Section 1: City of Ballarat



1.5 Retail expenditure

Macroplan estimates retail expenditure capacity based on information sourced from Market Data Systems (MDS), which utilises a detailed micro simulation model of household expenditure behaviour for all residents of Australia. The model considers information from a wide variety of sources including the regular ABS Household Expenditure Surveys, national accounts data, Census data and other information. We consider MarketInfo data to be an accurate measure of available retail expenditure and it is widely relied on in the retail industry.

Total retail expenditure is detailed in several categories, as follows:

- **Take-home food and groceries** – goods typically sold in fresh food retailers.
- **Packaged liquor** – packaged beer, wine, and spirits such as those purchased at bottle-shops and liquor outlets.

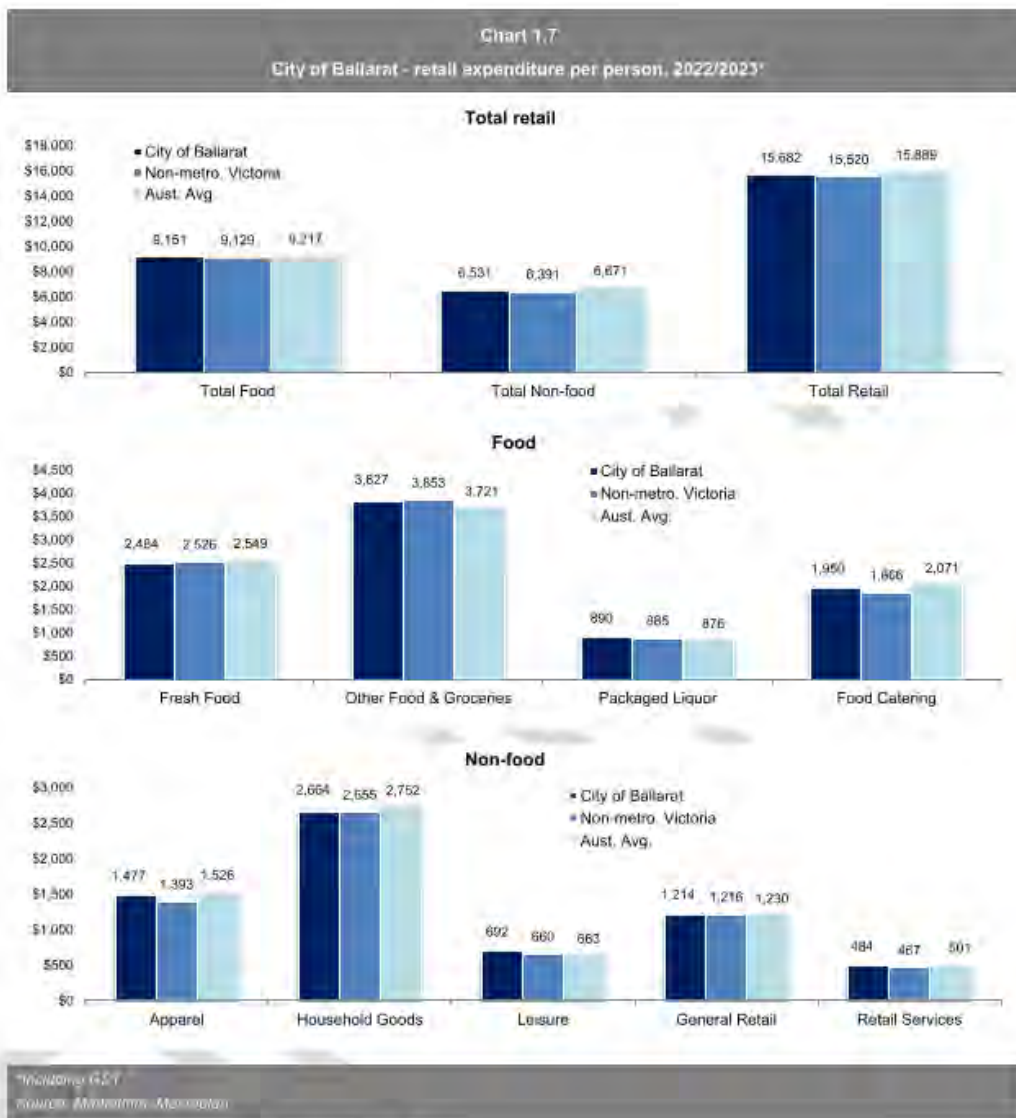
Section 1: City of Ballarat

- **Food catering** – cafes, take-away outlets, and restaurants, including liquor consumed on such premises.
- **Apparel** – clothing, footwear, fashion, and accessories.
- **Household goods** – giftware, electrical, computers, furniture, homewares, and hardware goods.
- **Leisure** – sporting goods, music, DVDs, games, books, newsagents, and film processing/photography.
- **General retail** – pharmaceutical goods, cosmetics, toys, florists, and mobile phones.
- **Retail services** – key cutting, shoe repairs, hair, and beauty.

Chart 1.7 details the estimated retail spending levels of the City of Ballarat on a per capita basis for the year 2022/23 and compares these estimates with the average for non-metropolitan Victoria and Australia. Spending estimates are presented inclusive of GST. The following points are noted:

- Total retail expenditure per person, estimated at \$15,682 per annum, is 1.0% above the non-metropolitan Victoria average. Within this, spend on food and non-food are 0.2% and 2.2% above the respective non-metropolitan Victoria averages.
- Within the food category, spend per capita on food catering is 4.6% above the non-metropolitan Victoria average, followed by packaged liquor (+0.5%), while spend on fresh food is 1.7% below benchmark.
- Within the non-food retail categories (i.e. generally considered discretionary retail), spend on apparel, leisure and retail services are 6.0%, 4.8% and 3.6% above benchmark respectively.

Section 1: City of Ballarat



Section 1: City of Ballarat

1.6 Population projections

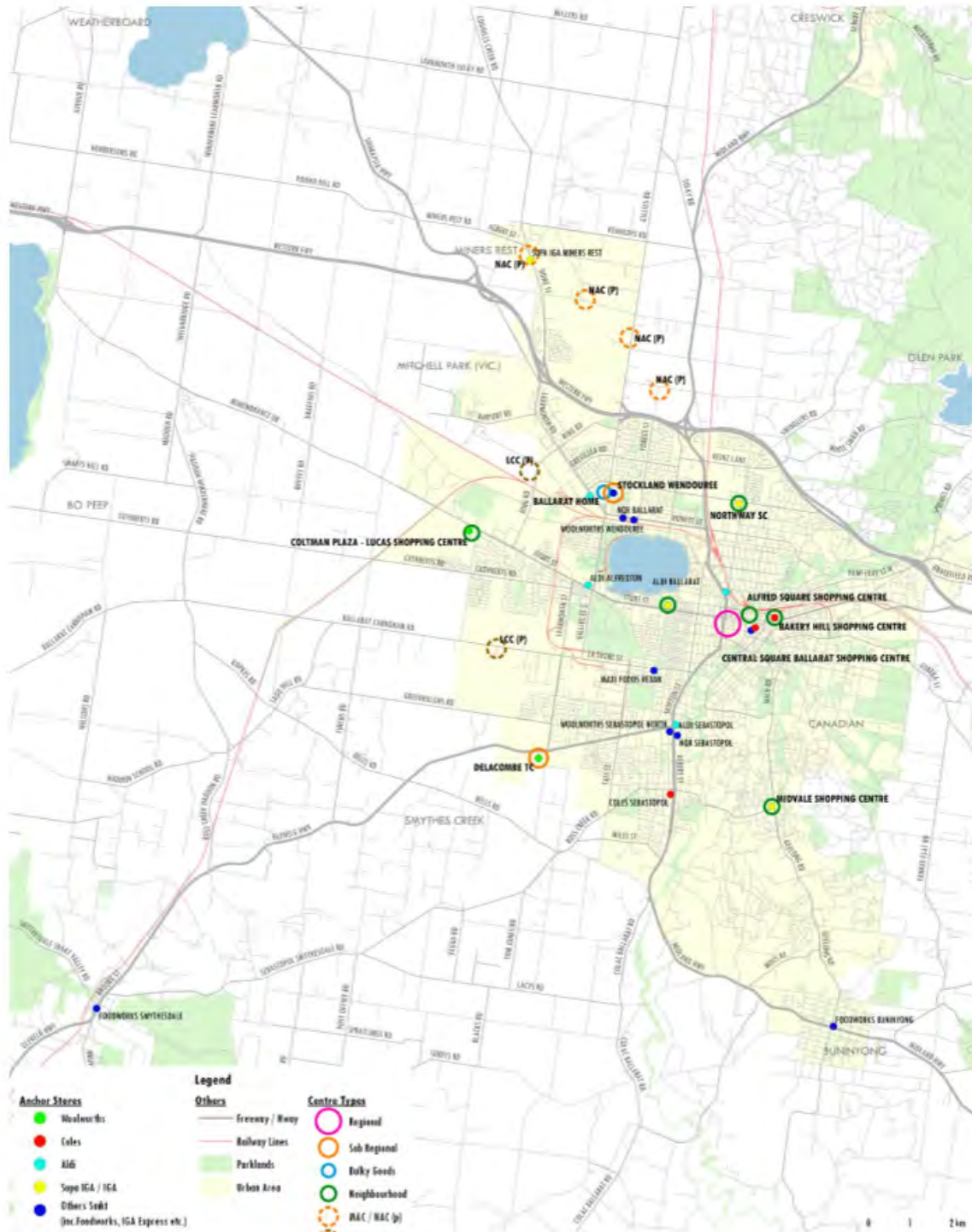
Chart 1.8 outlines the projected population levels for the City of Ballarat, as estimated by Victoria In Future (VIF) and forecast.id. The population of the City of Ballarat is projected to grow to between 142,624 (forecast.id) and 144,783 (VIF) by 2036, equating to 59,485 - 68,568 dwellings, an increase of 12,236 – 16,871 from 2022.



1.7 Activity centres

The appropriate locations and hierarchy of future activity centres within the Western and North Western Growth Areas must consider alternative centres within the wider City of Ballarat. Map 1.2 provides the locations of current and future activity centres and supermarkets within the region.

Section 1: City of Ballarat

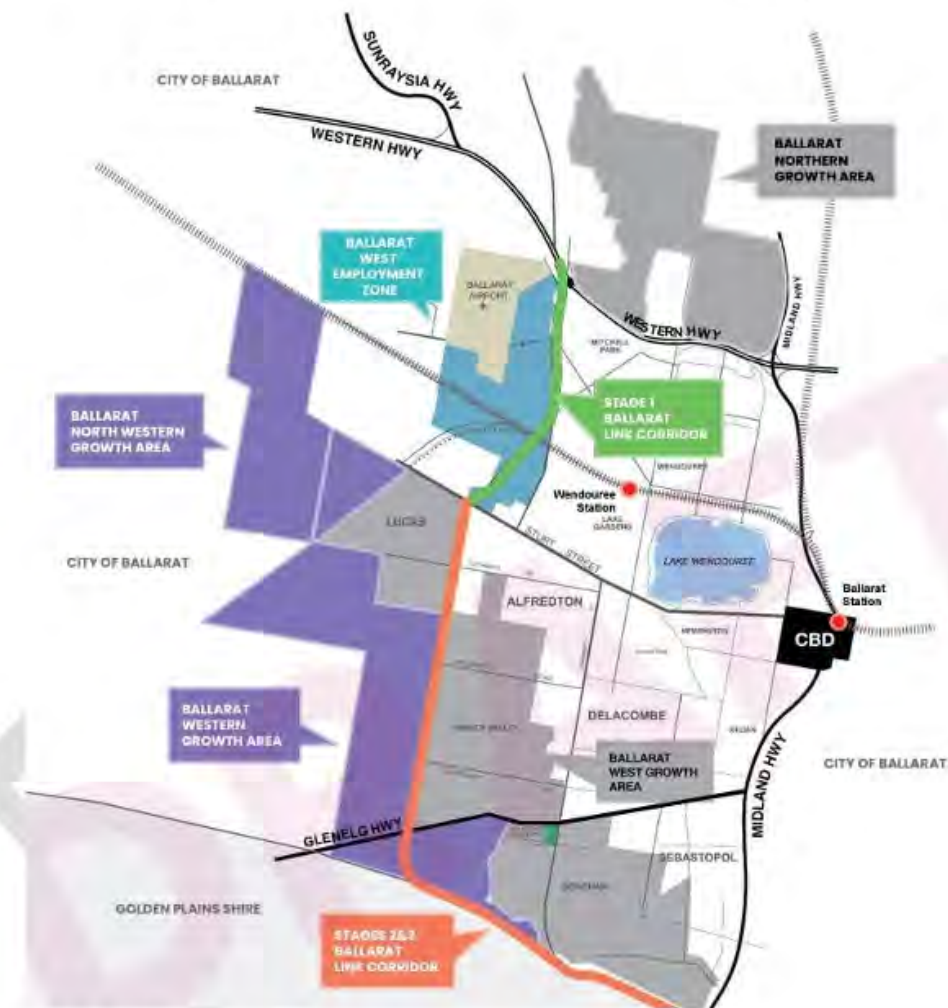


Map 1.2: City of Ballarat Activity centres

Section 2: Western/North Western Growth Areas

2.1 Catchments dwelling/population projections

Two catchments have been defined by the City of Ballarat (refer Map 2.1) along with dwelling and population estimations under a high and low scenario, outlined in Table 2.1.



**Map 2.1: City of Ballarat
Western & North Western Growth Areas**

Section 3: Western & North Western Growth Areas

Table 2-1 City of Ballarat growth areas - assumptions		
	Western	North Western
NDHA (ha)	896 ha	500 ha
Non residential (ha)	36 ha	20 ha
Residential NDHA (ha)	860 ha	480 ha
Average overall household size	2.7	2.7
@ 15 dwellings per ha		
Dwelling yield	12,902	7,200
Population	34,835	19,440
@ 20 dwellings per ha		
Dwelling yield	17,203	9,600
Population	46,448	25,920

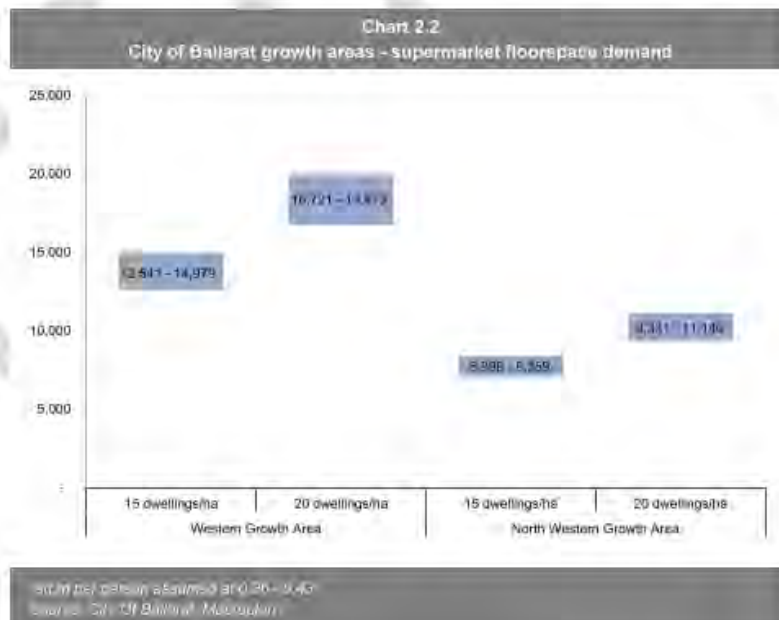
Source: City of Ballarat

2.2 Supermarket and activity centre requirements

The total supermarket floorspace required to support the above resident populations is tested against typical provision in non-metropolitan Australia, estimated between 0.36 and 0.43 sq.m per person.

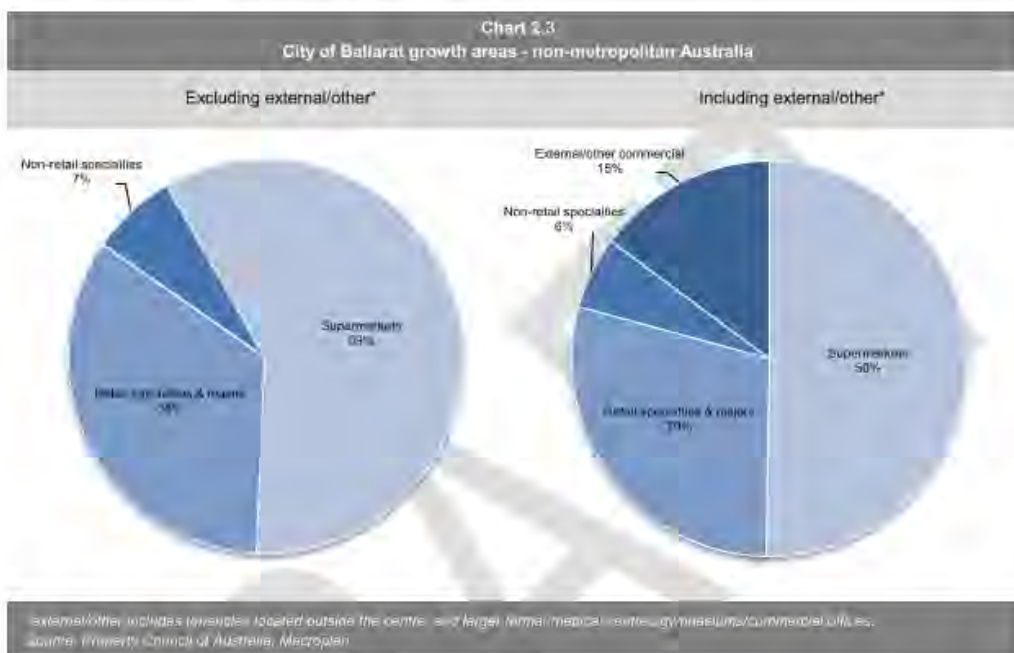
Using these assumptions, Chart 2.2 estimates:

- Under the 15 dwellings per hectare scenario the supermarket floorspace required is estimated at 12,541 – 14,979 sq.m for the Western Growth Area and 6,998 – 8,359 sq.m for the North Western Growth Area.
- Under the 20 dwellings per hectare scenario the supermarket floorspace required is estimated at 16,721-19,973 sq.m for the Western Growth Area and 9,331 - 11,146 sq.m for the North Western Growth Area.



Section 3: Western & North Western Growth Areas

Chart 2.3 summarises the estimated composition of potential activity centres within the Western and North Western Growth Areas, based on typical neighbourhood and sub-regional centres and sourced from the Macroplan comprehensive database of Australian shopping centres which incorporates the Property Council of Australia database and additional research. We expect that future neighbourhood centre floorspace located (excluding external/other commercial) within the growth areas will consist of approximately 59% supermarket floorspace, 34% retail specialties & majors, and 7% non-retail specialties.



With regard to the analysis in Charts 2.2 and 2.3, Table 2.2 provides the estimated total centre (excluding external/other) floorspace requirements for the Western and North Western Growth areas. Using these assumptions, the following conclusions are drawn:

- Under the 15 dwellings per hectare scenario the total floorspace required is estimated at 21,256 – 25,388 sq.m for the Western Growth Area and 11,861 – 14,168 sq.m for the North Western Growth Area.
- Under the 20 dwellings per hectare scenario the floorspace required is estimated at 28,341 – 33,853 sq.m for the Western Growth Area and 15,815 – 18,892 sq.m for the North Western Growth Area.

Table 2.2
City of Ballarat growth areas - estimated total centre floorspace*

	Centre shares**	15 dwellings/ha		20 dwellings/ha	
		Western	North Western	Western	North Western
Supermarkets	59%	12,541 - 14,979	6,998 - 8,359	16,721 - 19,973	9,331 - 11,146
Retail specialties & majors	34%	7,227 - 8,632	4,033 - 4,817	9,636 - 11,510	5,377 - 6,423
Non-retail specialties	7%	1,488 - 1,777	830 - 992	1,984 - 2,370	1,107 - 1,322
Total	100%	21,256 - 25,388	11,861 - 14,168	28,341 - 33,853	15,815 - 18,892

*range based on 0.16 - 0.47 sq.m per dwelling providing 11 supermarkets floorspace **2009-13, excluding external/other
Source: City of Ballarat, Macroplan

Section 3: Western & North Western Growth Areas

2.3 Recommended centres, locations and hierarchy

The number of and locations for activity centres within the growth areas that best satisfy the totals in Table 2.2 have particular regard to the following considerations, some of which are known/unknown at this stage:

- The total floorspace deemed supportable in Table 2.2.
- Current and future population concentrations within growth areas sub-regions, including delivery staging.
- Current and future road networks and public transport infrastructure, along with walkability for local residents.
- The proximity and attractiveness of competitive activity centres surrounding the Western and North Western Growth Areas.
- Significant physical barriers which are difficult to negotiate and can act as delineating boundaries to the trade area served by an individual shopping centre, or retail facility.

With regard to the above, Map 2.2 presents our view of the preferred allocation of the floorspace values in Table 2.2 across each of the growth areas. These are summarised as follows:

Western Growth Area

- Neighbourhood Convenience Centre (NAC 1) – Recommended for location along Ballarat Carngham Road, this centre is the largest within the growth area, servicing the Western Growth Area population north and south of Ballarat Carngham Road and the Ballarat West PSP area to the east which is expected to be serviced by a Local Convenience Centre only. Being the major Neighbourhood Centre within the Growth Area this centre would likely feature the highest concentration of external/other tenancies such as medical centre, commercial offices and/or service station.
- Neighbourhood Convenience Centre (NAC 2) – While Glenelg Highway is the higher order route through the growth area, the presence of Delacombe Town Centre to the northeast will capture some demand from the Western Growth Area proximate to the highway, necessitating a smaller provision for NAC 2. External/other tenancies could include fitness/wellness, a small scale medical provision or pad site service station.
- Local Convenience Centre 1 (LCC 1) – While the lower concentration of estimated population south of Glenelg Highway does not necessitate a Neighbourhood Centre, its' relative isolation from the rest of the growth area warrants consideration of a Local Convenience Centre for more immediate access to daily shopping, with NAC 1 and NAC 2 remaining a key destination for these residents. Being a local centre, a limited line or independent supermarket is best placed, along with a small provision of external/other tenancies, likely a fitness studio or similar.

North Western Growth Area

Neighbourhood Convenience Centre (NAC 1) – A single Neighbourhood Centre is estimated to be supportable within the North Western Growth Area, ideally located along Remembrance Drive as the main local thoroughfare and able to service the north and south sections of the Growth Area. External/other tenancies could include fitness/wellness, a small scale medical provision or pad site service station.

Section 3: Western & North Western Growth Areas

Table 2.3 City of Ballarat growth areas - recommended activity centres					
	Western Growth Area				North Western Growth Area NAC 1
	LCC 1	NAC 1	NAC 2	Total	
Land size (ha)	240	400	420	1,060	700
15 dwellings/ha					
Population	7,887	13,145	13,803	34,835	19,440
Supportable supermarket (sq.m)				12,541 - 14,979	6,998 - 8,359
<i>Implied sq.m/person</i>				0.36 - 0.43	0.36 - 0.43
Supermarket (sq.m)	2,000	8,000	4,000	14,000	7,000
<i>Implied sq.m/person</i>	0.25	0.61	0.29	0.40	0.36
Retail specialties & majors	1,153	4,610	2,305	8,068	4,034
Non-retail specialties	237	949	475	1,661	831
Total centre	3,390	13,559	6,780	23,729	11,864
20 dwellings/ha					
Population	10,517	17,528	18,404	46,448	25,920
Supportable supermarket (sq.m)				16,721 - 19,973	9,331 - 11,146
<i>Implied sq.m/person</i>				0.36 - 0.43	0.36 - 0.43
Supermarket (sq.m)	4,000	6,500	6,500	17,000	10,500
<i>Implied sq.m/person</i>	0.38	0.37	0.35	0.37	0.41
Retail specialties & majors	2,305	3,746	3,746	9,797	6,051
Non-retail specialties	475	771	771	2,017	1,246
Total centre	6,780	11,017	11,017	28,814	17,797

*assumes dwellings density constant

Section 3: Western & North Western Growth Areas



**Map 2.2: City of Ballarat
Recommended activity centres**

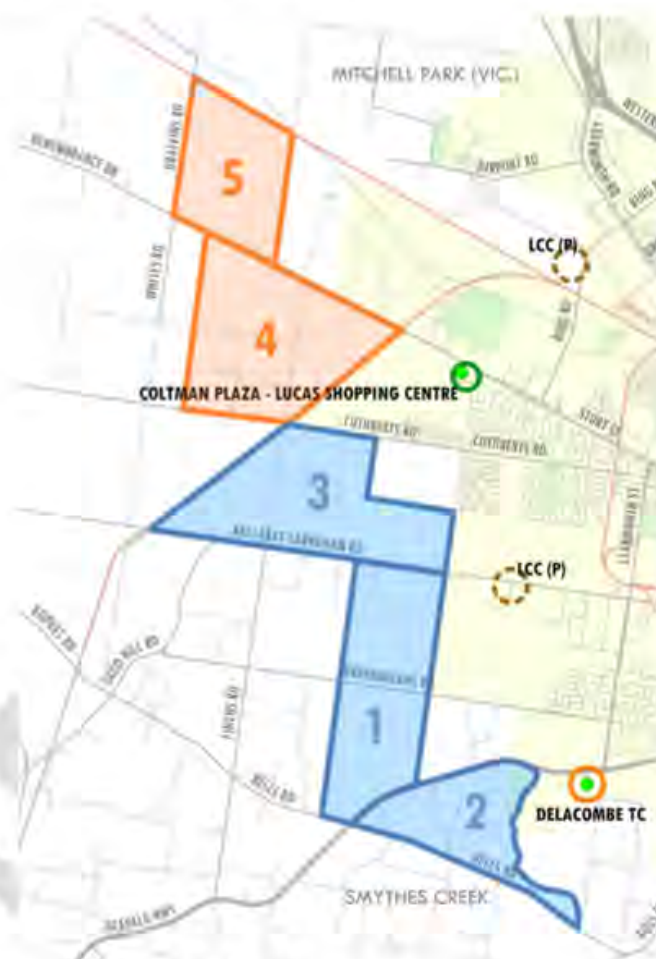
2.4 Staging considerations

The appropriate sequencing of activity centre development is primarily driven by the staging of residential development within the growth areas, along with timing of transport infrastructure development and proximity to existing residents and centres surrounding these growth areas. With regard to the information available at this stage, Map 2.3 shows a recommended staging order of development for the Growth Areas (both residential and Activity Centre), specifically:

Western Growth Area – Sector 1, located between Ballarat Carnham Road and Glenelg Highway, is recommended for early development. The area is central to the wider Growth Area and borders both main road thoroughfares, along with being best placed to capture demand from the Ballarat West PSP area to the east. If developed after sector 1, sectors 2 and 3 will benefit from the established activity centre/s, especially relevant for the moderately isolated sector 2.

Section 3: Western & North Western Growth Areas

North Western Growth Area – This area is more centralised than the Western Growth Area, with both sectors 4 and 5 located proximate to the proposed Neighbourhood Centre on Remembrance Drive. As a result, development staging is less critical, however sector 5 is further from the Western Growth Area and other residential development and as such, sector 4 is recommended for development first.



**Map 2.3: City of Ballarat
Recommended development staging**

2.5 Potential employment

Table 2.4 estimates potential employment generation within the activity centres outlined in Table 2.3, based on employment per sq.m seen in typical comparable centres and industry employment densities. It must be noted that the actual jobs created will be heavily dependent on specific tenancies in the centre and external/other commercial provision.

Table 2.4 estimates:

- Under the 15 dwellings per hectare scenario we estimate 849 – 1,036 jobs could be created across the activity centres in the Western Growth Area and 424 – 518 in the North Western Growth Area activity centre.

Section 3: Western & North Western Growth Areas

- Under the 20 dwellings per hectare scenario we estimate 1,031 – 1,258 jobs could be created across the activity centres in the Western Growth Area and 637 – 777 in the North Western Growth Area activity centre.

Table 2.4 City of Ballarat growth areas - potential employment						
	Job density (sq.m/FTE)*	Western Growth Area				North Western Growth Area
		LCC 1	NAC 1	NAC 2	Total	NAC 1
15 dwellings/ha						
Supermarkets	30 - 25	67 - 80	267 - 320	133 - 160	467 - 560	233 - 280
Retail specialties & majors	25 - 20	46 - 58	184 - 231	92 - 115	323 - 403	161 - 202
Non-retail specialties	28 - 23	8 - 10	34 - 41	17 - 21	<u>59 - 72</u>	<u>30 - 36</u>
Total					849 - 1,036	424 - 518
20 dwellings/ha						
Supermarkets	30 - 25	133 - 160	217 - 260	217 - 260	567 - 680	350 - 420
Retail specialties & majors	25 - 20	92 - 115	150 - 187	150 - 187	392 - 490	242 - 303
Non-retail specialties	28 - 23	17 - 21	28 - 34	28 - 34	<u>72 - 88</u>	<u>44 - 54</u>
Total					1,031 - 1,258	637 - 777

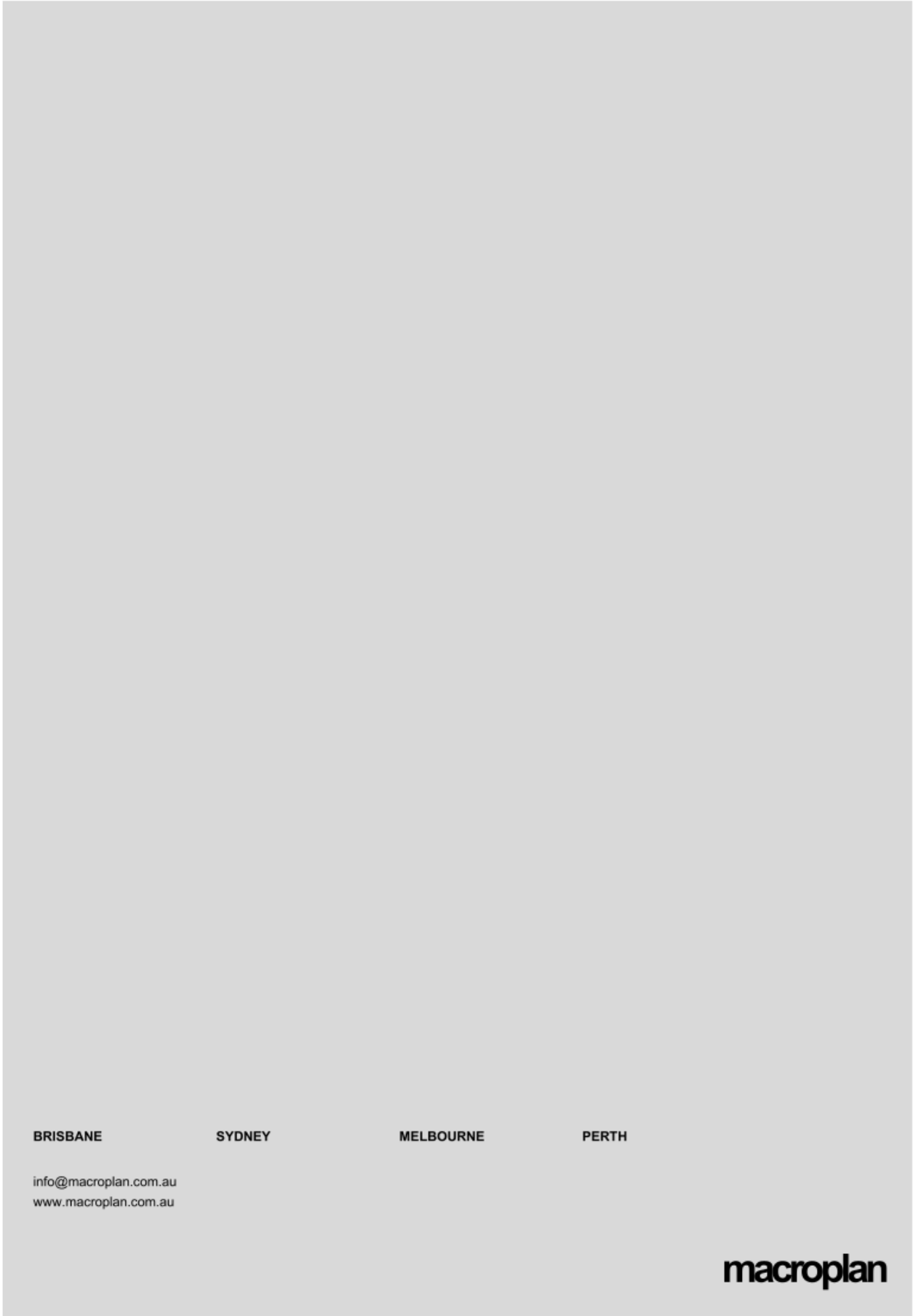
*Full-Time Equivalent
Source: Macroplan

2.6 Summary of recommendations

With regard to the above analysis, Table 2.5 summarises the key findings and recommendations.

Table 2.5 City of Ballarat growth areas - summary of findings					
	Metric	Western Growth Area		North Western Growth Area	
		15 dwelling/ha	20 dwelling/ha	15 dwelling/ha	20 dwelling/ha
Supermarket floorspace	sq.m	12,541 – 14,979	16,721- 19,973	6,998 – 8,359	9,331 - 11,146
Total floorspace*	sq.m	21,256 – 25,388	28,341 – 33,853	11,861 – 14,168	15,815 – 18,892
Potential employment	FTE	849 – 1,036	1,031 – 1,258	424 – 518	637 – 777
Activity centres	(no.)	1 x Local Convenience Centre 2 x Neighbourhood Activity Centre		1 x Neighbourhood Activity Centre	
Staging priority**		Central sector, between Ballarat Carngham Rd and Glenelg Hwy		Southern sector, south of Remembrance Dr	

*excl. external/other commercial
**residential/activity centre



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Engineering Services Strategy

- Ballarat Western & North-Western Growth Areas

City of Ballarat
April 2024

Table of Contents

1	EXECUTIVE SUMMARY	5
2	INTRODUCTION	10
3	COMMISSION	11
4	SITE DESCRIPTION	12
5	PROPOSAL	14
6	INVESTIGATION:	15
7	LIMITATIONS AND ASSUMPTIONS	16
8	SERVICING STRATEGY	17
8.1	WATER SUPPLY – Potable Water	17
8.1.1	Existing Services, North-Western Growth Area	17
8.1.2	Existing Services, Western Growth Area	18
8.1.3	Future Servicing Arrangements, North-Western Growth Area	23
8.1.4	Future Servicing Arrangements, Western Growth Area	25
8.1.5	Expected Funding Arrangements	27
8.1.6	Estimated Project Costs, North-Western Growth Area	28
8.1.7	Estimated Project Costs, Western Growth Area	28
8.1.8	Summary of Outcomes	29
8.2	SEWERAGE	30
8.2.1	Existing Services, North-Western Growth Area	30
8.2.2	Existing Services, Western Growth Area	31
8.2.3	Future Servicing Arrangements, North-Western Growth Area	35
8.2.4	Future Servicing Arrangements, Western Growth Area	37
8.2.5	Expected Funding Arrangements	42
8.2.6	Estimated Project Costs, North-Western Growth Area	43
8.2.7	Estimated Project Costs, Western Growth Area	43
8.2.8	Summary of Outcomes	44
8.3	ELECTRICITY	45
8.3.1	Existing Services, North-Western Growth Area	45
8.3.2	Existing Services, Western Growth Area	46
8.3.3	Future Servicing Arrangements	47
8.3.4	Expected Funding Arrangements	48
8.3.5	Summary of Outcomes	48
8.4	TELECOMMUNICATION SERVICES	49
8.4.1	Existing Services, North-Western Growth Area	49
8.4.2	Existing Services, Western Growth Area	50
8.4.3	Future Servicing Arrangements	51
8.4.4	Expected Funding Arrangements	51
8.4.5	Summary of Outcomes	51
8.5	GAS	53
8.5.1	Existing Servicing, North-Western Growth Area	53
8.5.2	Existing Servicing, Western Growth Area	54
8.5.3	Future Servicing Arrangements	58
8.5.4	Expected Funding Arrangements	58
8.5.5	Summary of Outcomes	58
8.6	STORMWATER MANAGEMENT	59
8.6.1	Existing Services	59
8.6.2	Future Servicing Arrangements	61
8.6.3	Expected Funding Arrangements	69
8.7	INTEGRATED WATER MANAGEMENT	69
8.7.1	Existing Services	69
8.7.2	Future Servicing Arrangements	69

8.7.3	Expected Funding Arrangements.....	73
8.8	TRAFFIC & TRANSPORT.....	73
8.8.1	Executive Summary.....	73
8.8.2	Expected Funding Arrangements.....	84
9	SEQUENCING.....	86
10	SERVICING INNOVATION & SUSTAINABILITY OPPORTUNITIES.....	89
10.1	Non-Drinking Water & Urban Cooling.....	89
10.2	Carbon Storage.....	89
10.3	Resource Management.....	89
11	FURTHER INVESTIGATION.....	91
12	APPENDIX A – STORMWATER MANAGEMENT STRATEGY.....	92
13	APPENDIX B – INTEGRATED WATER MANAGEMENT.....	93
14	APPENDIX C – STORMWATER MANAGEMENT INFRASTRUCTURE LIST.....	94
15	APPENDIX D – TRAFFIC & TRANSPORT REPORT.....	97
16	APPENDIX E – TRAFFIC & TRANSPORT INFRASTRUCTURE LIST.....	98

Figures

Figure 1:	Aerial Photograph (Taylors GIS).....	12
Figure 2:	Locality Plan & Proposed Precincts.....	13
Figure 3:	North-Western Growth Area north of Remembrance Drive.....	17
Figure 4:	North-Western Growth Area south of Remembrance Drive.....	18
Figure 5:	Western Growth Area north of Cuthberts Road.....	19
Figure 6:	Western Growth Area South of Ballarat-Carngham Road.....	19
Figure 7:	Western Growth Area South of Glenelg Highway.....	20
Figure 8:	Western end of Bells Road.....	21
Figure 9:	South-Eastern end of Bells Road.....	21
Figure 10:	South of Bells Road to West of Glenelg Highway.....	22
Figure 11:	East of Karingal Park Drive.....	22
Figure 12:	Potable water network extension under investigation – North-Western Growth Area.....	23
Figure 13:	Potable water network extension under investigation – Western Growth Area.....	26
Figure 14:	North-Western Growth Area, Remembrance Drive.....	30
Figure 15:	North-Western Growth Area adjacent to the Ballarat-Skipton Rail Trail reserve.....	31
Figure 16:	Western Growth Area rear of properties fronting Fawcett Road.....	32
Figure 17:	Western Growth Area East of Dyson Road.....	33
Figure 18:	Western Growth Area East of Kensington Creek.....	34
Figure 19:	Possible sewer network extensions under investigation – North-Western Growth Area.....	36
Figure 20:	Possible sewer network extensions under investigation – Western Growth Area, Precinct 1.....	39
Figure 21:	Proposed sewer network extension – Western Growth Area, Precinct 2.....	40
Figure 22:	Proposed sewer network extension – Western Growth Area, Precinct 3.....	41
Figure 23:	Existing Powercor Network.....	45
Figure 24:	Western Growth Area South of Cuthberts Road.....	46
Figure 25:	Western Growth Area North of Cuthberts Road.....	46
Figure 26:	NBN Network – North-Western Growth Area.....	49
Figure 27:	NBN Network – Western Growth Area.....	50
Figure 28:	High Pressure Reticulation Gas Main – Remembrance Drive.....	53
Figure 29:	High Pressure Reticulation Gas Main – Remembrance Drive & Lucas.....	54
Figure 30:	High Pressure Reticulation Gas Main – Cuthbert Road & Surrounding Developments.....	55
Figure 31:	High Pressure Reticulation Gas Main – Dyson Drive & Surrounding Developments.....	56
Figure 32:	High Pressure Reticulation Gas Main – Greenhalghs Road & Surrounding Developments.....	57
Figure 33:	High Pressure Reticulation Gas Main – Glenelg Highway & Surrounding Developments.....	57
Figure 34:	Topography - North-Western Growth Area.....	59
Figure 35:	Topography - Western Growth Area.....	60

Figure 36: Retarding basin locations and modelling results - North-Western Growth Area.....	62
Figure 37: Retarding basin locations and modelling results - North section of the Western Growth Area.....	63
Figure 38: Retarding basin locations and modelling results - South section of Western Growth Area.....	64
Figure 39: Waterway Corridors - North-Western Growth Area.....	65
Figure 40: Waterway Corridors - Northern section of Western Growth Area.....	66
Figure 41: Waterway Corridors - Southern section of the Western Growth Area.....	67
Figure 42: Suggested growth area changes to provide continuity.....	68
Figure 43: Proposed Public Transport Network.....	74
Figure 44: Proposed Active Transport Network.....	75
Figure 45: Future Traffic Network - Low Yield.....	78
Figure 46: Future Traffic Network - High Yield.....	79
Figure 47: Future Traffic Network - Low Yield (No Link Road).....	82
Figure 48: Future Traffic Network - High Yield (No Link Road).....	83
Figure 49: Locality Plan & Proposed Precincts.....	87

Tables

Table 1: Western and North-Western Growth Areas Major Services Summary.....	5
Table 2: Western and North-Western Growth Areas Drainage Infrastructure Summary.....	6
Table 3: Western and North-Western Growth Areas Road and Intersection Infrastructure Summary.....	7
Table 4: Indicative Lot Yield.....	14
Table 5: North-Western Growth Area, Estimated Peak Hour Water Demand, 15 dwellings per hectare.....	24
Table 6: North-Western Growth Area, Estimated Peak Hour Water Demand, 20 dwellings per hectare.....	24
Table 7: North-Western Growth Area, Central Highlands Water Pros and Cons, Water Supply.....	24
Table 8: Western Growth Area, Estimated Peak Hour Water Demand, 15 dwellings per hectare.....	26
Table 9: Western Growth Area, Estimated Peak Hour Water Demand, 20 dwellings per hectare.....	26
Table 10: Western Growth Area, Central Highlands Water Pros and Cons, Water Supply.....	27
Table 11: North-Western Growth Area, Estimated Water Main Project Costs.....	28
Table 12: Western Growth Area, Estimated Water Main Project Costs.....	28
Table 13: North-Western Growth Area, Estimated Sewer Design Flow, 15 dwellings per hectare.....	36
Table 14: North-Western Growth Area, Estimated Sewer Design Flow, 20 dwellings per hectare.....	37
Table 15: North-Western Growth Area, Central Highlands Water Pros and Cons, Sewer Reticulation.....	37
Table 16: Western Growth Area, Estimated Sewer Design Flow, 15 dwellings per hectare.....	41
Table 17: Western Growth Area, Estimated Sewer Design Flow, 20 dwellings per hectare.....	41
Table 18: Western Growth Area, Central Highlands Water Pros and Cons, Sewer Reticulation.....	42
Table 19: North-Western Growth Area, Estimated Sewer Main Project Costs.....	43
Table 20: Western Growth Area, Estimated Sewer Main Project Costs.....	43
Table 21: IWM Plan Summary.....	70
Table 22: Future Road Network – Estimated Traffic Volumes.....	77
Table 23: Future Road Network - Estimated Traffic Volumes (Without Link Road).....	81
Table 24: Road Upgrade Thresholds.....	84
Table 25: Estimated Infrastructure Project Costs Matrix.....	86
Table 26: Infrastructure Project Complexity.....	87
Table 27: Infrastructure Project Benefit to Wider Community.....	88
Table 28: Estimated Yield (20 dwellings / ha).....	88
Table 29: Estimated Cost per ha (20 dwellings / ha).....	88
Table 30: Final Precinct Sequencing (Weighted).....	88

1 EXECUTIVE SUMMARY

The purpose of this report is to present an Infrastructure Servicing Strategy for the Western and North-Western Growth Areas of Ballarat (Growth Areas). The Infrastructure Servicing Strategy will underpin the preparation of the Growth Area Framework Plan to guide the future urban development of these areas.

Taylor's has been engaged by the City of Ballarat to undertake an investigation into the location of existing services and determine their ability to service proposed development of the Growth Areas. Accordingly, this report identifies existing infrastructure and future infrastructure servicing requirements within the Growth Areas and any associated implications that need to be considered based on the information available at this time.

Utility Services

Taylor's investigation into the availability of services to the Growth Areas included a desktop and field survey. The desktop survey comprised obtaining existing service information from The City of Ballarat and relevant authorities. The investigation has identified that existing services in the growth areas are limited and / or nearing capacity.

Upgrades will be required in all asset categories. This report outlines all key upgrades required in each asset category.

High level cost estimates have been completed based on conceptual infrastructure plans. Table 1 provides a summary of each major service and its high-level cost estimate within each growth area.

Table 1: Western and North-Western Growth Areas Major Services Summary.

Service	Level of upgrade	High-level cost estimate	Comments
Drinking Water	Significant upgrades	W \$50mil NW \$27mil	In both growth areas, the existing potable water network has capacity to service the existing community but will not be able to service the growth without significant augmentation to the supply networks.
Recycled Water	Not available	Not available	No recycled water mains are available for the Western and North-Western Growth Areas.
Sewerage	Significant upgrades	W \$59mil NW \$39mil	In both growth areas, the network has capacity to service existing customer base but will not be able to service the growth without significant augmentation to the supply networks.
Electricity	Upgrades	TBC	Upgrades will be required in both growth areas.
Telecommunications	Significant upgrades	TBC	Extension of the current infrastructure within the growth areas will be required.
Gas	Impact of policy change to be considered	TBC	Due to the Victorian Government policy change, new residential homes will not be supplied with natural gas. It is yet to be confirmed whether commercial and/or industrial uses may be provided natural gas supply via extensions to the existing distribution network.

Note: The above estimates are only indicative at this stage and subject to further design, approval and funding.

In addition, where possible, this report outlines key high-level funding of infrastructure by authorities and developers, as well as items likely to be included in a Development Contributions Plan to be developed as part of the Precinct Structure Plan.

Key trunk infrastructure and shared infrastructure for sewer and potable water assets are likely to be fully or partly funded by the relevant authority, Central Highlands Water, and recouped via a customer contributions levy on a basis approved by the Essential Services Commission. The balance of sewer and potable water reticulation systems to and within estates, any temporary reticulation works, connections and agreement to bring forward construction of trunk assets are proposed to be developer funded.

In relation to funding electricity infrastructure, the relevant authority, Powercor, is likely to fund zone substations and sub-transmission network augmentation. Out-of-sequence upgrades may incur costs to developers. Developers will need to fund other electrical infrastructure to and within their developments and may be entitled to some reimbursement for high-voltage infrastructure.

It will be the Developer's responsibility to pay for the design and installation of telecommunications infrastructure along with connection fees. The relevant authority for telecommunications, NBN Co., confirmed they would consider significant one-off investments to accommodate future growth. Note: NBN Co and other providers will normally pass on the cost of headworks for remote or out of sequence development on to the developers.

Flood Risk, Stormwater Management and Integrated Water Management

The current drainage infrastructure within the North-Western and Western Growth Areas has been extensively modified by agriculture. This history of land use and modification means that none of the vegetation along the waterways can be considered locally rare or threatened and for this reason have low geomorphic value. The addition of stormwater flows from the development of the Growth Areas is likely to exacerbate backwater ponding upstream of the existing drainage infrastructure and has the potential to cause some deepening of the waterways. Overall, establishing appropriately designed constructed waterways, wetlands, sediment basins, culverts, drainage pipelines, and outfall works that convey the runoff from the Growth Areas is the appropriate management of the increased stormwater expected as development occurs.

As part of the Stormwater Management Strategy (SWMS), a hydrologic analysis of the Growth Areas was completed to determine the post development peak runoff flow rates for various flood events. The hydrologic analysis was used to calculate the storage requirements of proposed retarding basins required to restrict the post development peak stormwater runoff rates to equivalent predeveloped peak flowrates. The analysis also determined the stormwater treatment wetland sizes to be located within the base of each retarding basin.

The SWMS analysis considered corridor requirements for the conveyance of water. It was noted that an existing waterway traverses inside and outside of the western boundary of the Western Growth Area in a number of locations. It is recommended that consideration be given to extending the Growth Area boundary to include the meandering waterway to maximise the benefits of this stormwater asset and to provide a natural buffer between the urbanised residential area and existing rural living area.

Refer to Table 2 for a summary of the drainage infrastructure required during the development of the Western and North-Western Growth Areas, together with a high-level cost estimate.

Table 2: Western and North-Western Growth Areas Drainage Infrastructure Summary.

Service	Level of upgrade	High-level cost estimate	Comments
Drainage infrastructure	Significant upgrades	W \$162.4 mil NW \$86.7 mil	The stormwater management strategy identified the following drainage infrastructure requirements for the North-Western and Western Growth Areas <ul style="list-style-type: none"> - 20 waterways - 31 wetland retarding basins - 1 sediment basin - 15 road crossing culverts - 12 main drainage pipelines - 5 downstream outfall grade outworks

Stormwater infrastructure providing benefit to the Growth Areas could be funded through a number of mechanisms including:

- Subdivision construction works by developers,
- Development contributions (development infrastructure levy) and

- Capital works projects by City of Ballarat and State Government agencies.

To explore the provision of sustainable water, wastewater, and stormwater services and build system resilience, whilst enhancing urban and natural landscapes and assets, the implementation of Integrated Water Management (IWM) initiatives was also considered as part of the investigation. The IWM Plan presented proposes a series of actions to achieve outcomes such as safe, secure, and affordable water supplies, healthy and valued waterways, wetlands and water bodies, healthy and valued landscapes and community values reflected in place-based planning.

The funding for IWM measures will be spread across all stakeholders such as developers for streetscapes, authorities for waterbodies, builders for rainwater tanks and property owners for water efficient appliances. The success will also rely upon aligned values and collaboration between all stakeholders.

As part of future investigations consider the need for Growling Grass Frog (GGF) habitat and the potential to co-locate GGF habitat and treatment wetlands along the drainage reserve network.

Traffic and Transport

In the preparation of the traffic and transport strategy relevant background reports, policies and strategies were reviewed and traffic data was collected in the vicinity of the Growth Areas to establish existing traffic conditions and road network characteristics. The data was analysed, and traffic modelling completed to inform the selection of a suitable road network and intersection upgrades to cater for the traffic and transport demands for both the low and high growth scenarios.

The investigation also considered public transport requirements across the Growth Areas to ensure adequate provision for the future delivery of time competitive services to private vehicles, and that services be delivered early during subdivisions to ensure resident's transport choices are not limited as they establish new travel patterns at their new home. The report provides a series of public transport recommendations for incorporation into the infrastructure servicing strategy, including the provision for a future railway station, high-frequency routes along the transit corridors, secondary bus routes along adjacent major roads and provision for bus head start infrastructure at all signalised intersections. The traffic and transport strategy recommends the provision of fully separated pedestrian and cycling facilities on major cycling routes to attract commuter cyclists seeking direct and fast connections.

Table 3 details the road and intersection upgrades and high-level cost estimates for the traffic and transport infrastructure required within and around the growth areas to adequately address the increase in demand.

Table 3: Western and North-Western Growth Areas Road and Intersection Infrastructure Summary.

Service	Level of upgrade	High-level cost estimate	Comments
Roads and intersections	Significant upgrades	W \$275mil NW \$234mil	North-Western Growth Area upgrades - 7 intersections projects - 15 road projects approx. 25km Western Growth Area upgrades - 5 intersections projects - 20 road projects approx. 28km

Traffic & Transport infrastructure in the Growth Areas could be funded through a number of mechanisms including:

- Subdivision construction works by developers,
- Development contributions (development infrastructure levy) and
- Capital works projects by City of Ballarat and state government agencies.

The relevant Ministerial Direction stipulates the traffic and transport infrastructure that can be funded through a Development Contributions Plan (DCP), including the acquisition of land for roads, public transport corridors; construction of roads, including bicycle and foot paths, and traffic management and control devices; and construction of public transport infrastructure, including fixed rail infrastructure, railway stations, bus stops and tram stops.

The traffic and transport strategy also provides an analysis of the development capacity and traffic impacts to the Growth Areas if a Link Road extension to Bells Road cannot be delivered. Notable observations in the missing Link Road analysis included that it would place a greater reliance on alternative north-south road connections and linking routes. The report also determined development thresholds (number of developed lots) at which point critical roads must be upgraded to provide additional mid-block capacity.

The upgrade requirements of Remembrance Drive, particularly east of the Link Road are a major challenge because of the heritage significance of the Avenue of Honour. It is recommended that in preparing the Framework Plan, traffic diversion / incentive measures are considered as alternatives.

Noting that the traffic and transport analysis and conclusions in the report are drawn from a conventional “predict and provide” approach to modelling. The development of these growth areas is a long-term prospect, and likely represents a land supply in excess of 30 years. This long-term development horizon suggests likely changes in household trip generation, and ongoing reductions in car trips. Subject to appropriate investments to achieve Council’s aspirations for increased active and public transport use, there will naturally be reduced reliance on private vehicle trips, and less requirements for supporting road infrastructure.

Additionally, there are both “push” and “pull” factors that influence travel mode choice. Introduction of improved sustainable transport services and facilities “pull” more trips by improving the relative attractiveness of these modes. “Push” factors include elements like traffic congestion or parking pricing that offer a disincentive to private vehicle trips and are an important travel demand management tool.

It should be noted that Golder Plains Shire Council is currently considering a planning application for a 3,000-lot development in Cambrian Hill. This development has the potential to impact traffic volumes within the Growth Areas, particularly on the Link Road. The potential impacts of this development were not considered in the preparation of the Traffic and Transport Report.

Sequencing

Due to the size of the Ballarat North-Western and Western Growth Areas, the two areas were divided up into five precincts. The rationale behind the precincts was to get the two Growth Areas back to a scalable size for development, with major roads being the key divider between the precincts.

Development across the five precincts will need to be rolled out in a logical order or sequence. A matrix method was used to consider and rank the anticipated sequencing of the precincts based on available estimated project costs, project complexity, benefit to the broader Community, estimated lot yield and estimated cost per lot. Advice from Authorities on the likely sequencing for their infrastructure was also considered as part of the project complexity.

The estimated infrastructure project costs, yield and cost per ha metrics are based on engineering principles. The infrastructure project complexity and benefit to the wider community, while still founded on engineering principles, cannot be confirmed until further design is undertaken. The anticipated sequencing therefore could be changed based on several factors including appropriate interim strategies, infrastructure contributions plan project funding, and landowner/developer cooperation. Refer Figure 2: Locality Plan & Proposed Precincts.

The sequencing assessment determined the following order:

1. The central portion of the Western Growth Area (Precinct 2),
2. The southern portion of the Western Growth Area (Precinct 1),
3. The northern portion of the Western Growth Area (Precinct 3),

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



4. The southern portion of the North-Western Growth Area (Precinct 4),
5. The northern portion of the North-Western Growth Area (Precinct 5).

Alternate sequencing may be considered; however it is subject to, and limited to, the developer's support of interim measures. Examples of these interim measures are:

- temporary alternate stormwater and water quality management measures, or
- limiting precinct densities so they would not trigger the requirements for major external road upgrades.

However, any interim measures that would not require external road upgrades would still be required to provide a proportional contribution for the ultimate upgrades to ensure appropriate and sustainable provisions for the new and broader community.

2 INTRODUCTION

Ballarat's population is expected to grow to 170,000 by 2041, which represents an increase of 57,947 persons requiring approximately 29,000 dwellings, or 1,450 dwellings per year across the municipality. DELWP Planning Practice Note 90 requires that Local Authorities plan to accommodate projected population growth over at least a 15-year period and provide clear direction on locations where growth should occur.

In February 2022 the City of Ballarat committed to preparing a Growth Area Framework Plan for the Western and North-Western Growth Areas. The purpose of preparing a Growth Area Framework Plan is to identify any high-level infrastructure requirements, and to determine a logical sequence for future Precinct Structure Plan preparation in the areas.

The purpose of this report is to develop an Infrastructure Servicing Strategy informed by technical investigations and consultation with Utility Service Providers. This Infrastructure Servicing Strategy will underpin the preparation of the Growth Area Framework Plan.

This report first provides details on the site and its location, the proposed growth options, and details of the Utility Service Providers whose information was sourced and analysed, along with some limitations and assumptions.

The main body of the report "Findings and Discussions" consists of eight sections providing information on the:

- Water Supply,
- Sewerage,
- Electricity,
- Telecommunications,
- Gas,
- Stormwater Management,
- Integrated Water Management, and
- Traffic and Transport.

Based on the findings and discussions on each service listed above, sections 9, 10, and 11 provide information on the potential future sequencing and servicing innovation and sustainability opportunities, concluding with recommendations on further investigations to aid in developing the Growth Area Framework Plan.

3 COMMISSION

Taylors has been engaged by the City of Ballarat to undertake an investigation into the location of existing services and determine their ability to service proposed development of the North-Western and Western Growth Areas. Accordingly, the objective of this report is to identify existing and future infrastructure servicing requirements within the precincts and to identify any associated implications that need to be considered during the preparation of the Growth Area Framework Plan.

This assessment will enable the City of Ballarat and relevant authorities to plan the future urban structure with greater certainty and identify infrastructure which will be required and should be encouraged within the study areas to serve the needs of the local community.

This report includes:

- The site description and existing conditions,
- The provision of a servicing plan,
- Identification of all current service and utility infrastructure,
- Identification of the current capacity of all service and utility infrastructure,
- Identification of key opportunities and constraints for the provision of all future service and utility infrastructure,
- Assessment of opportunities for innovative approaches to servicing, based on projected land use,
- Identification of specifications and notional routes through the PSP areas for future service and utility infrastructure,
- Investigations on the access to services and recommendations as to how provision of these services can be achieved in the short and long-term,
- Considerations on expected funding arrangements (based on the views of relevant servicing agencies and any relevant principles established by the Essential Services Commission),
- Advice on probable staging (relative to service infrastructure location and capacity),
- Provision of a plan that will identify Integrated Water Management opportunities and Water Sensitive Urban Design requirements to meet Best Practice Environmental Management (BPEM) pollution reduction requirements,
- Anticipation of location and approximate cost of trunk infrastructure,
- Considerations of the future development of the area, e.g. how much land or size of easement is required for particular items of key infrastructure,
- Recommendations to assist in the preparation of the Growth Area Framework Plan and PSP,
- Issues requiring further investigation at each stage of the development process following initialization of the Framework Plan or PSP, and
- Supporting evidence of the above investigations and advice using maps, plans and documentation, particularly regarding the location of all existing and future service and utility infrastructure and its staging.

4 SITE DESCRIPTION

The Ballarat North-Western and Western Growth Areas are estimated to have a Net Developable Area of 500 hectares and 896 hectares respectively. An aerial photograph is provided in Figure 1 and a locality plan is provided in Figure 2.

The North-Western Growth Area is bounded by the rail line to the north, Draffins Road and the rear of properties fronting Whites Road to the west, Cuthberts Road to the south, Ballarat Skipton Rail Trail / Alfredton West, Remembrance Drive halfway to the north and Dowling Road to the top east.

The Western Growth Area is bounded by Ballarat Skipton Rail Trail to the top west, Cuthberts Road / Alfredton West to the north-east, Dyson Drive / Carngham Road and Greenhalghs to the east, Bonshaw Creek to the south-east, Bells Road to the south, the rear of Hayes Drive properties to the west and Ballarat-Carngham Road mid-way.

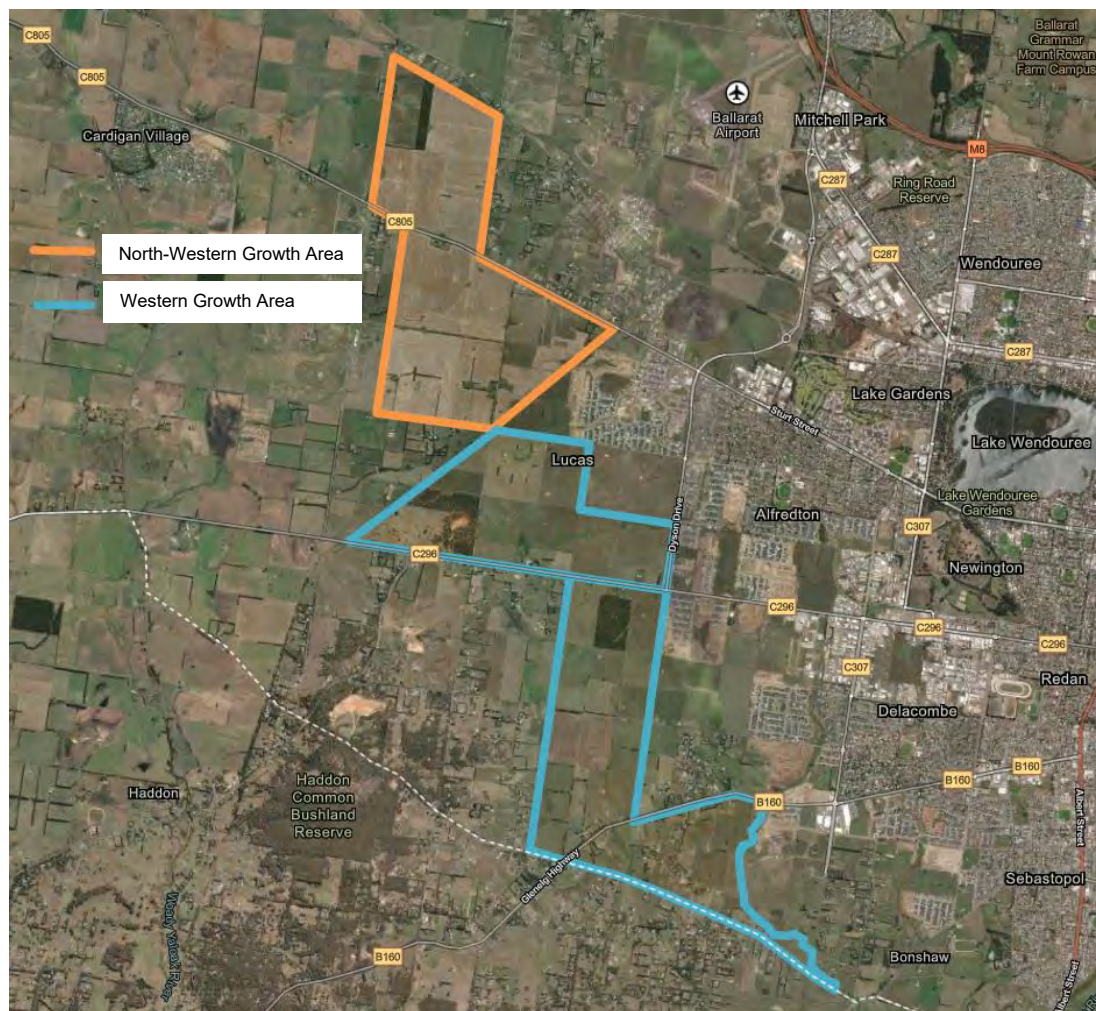


Figure 1: Aerial Photograph (Taylors GIS).

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

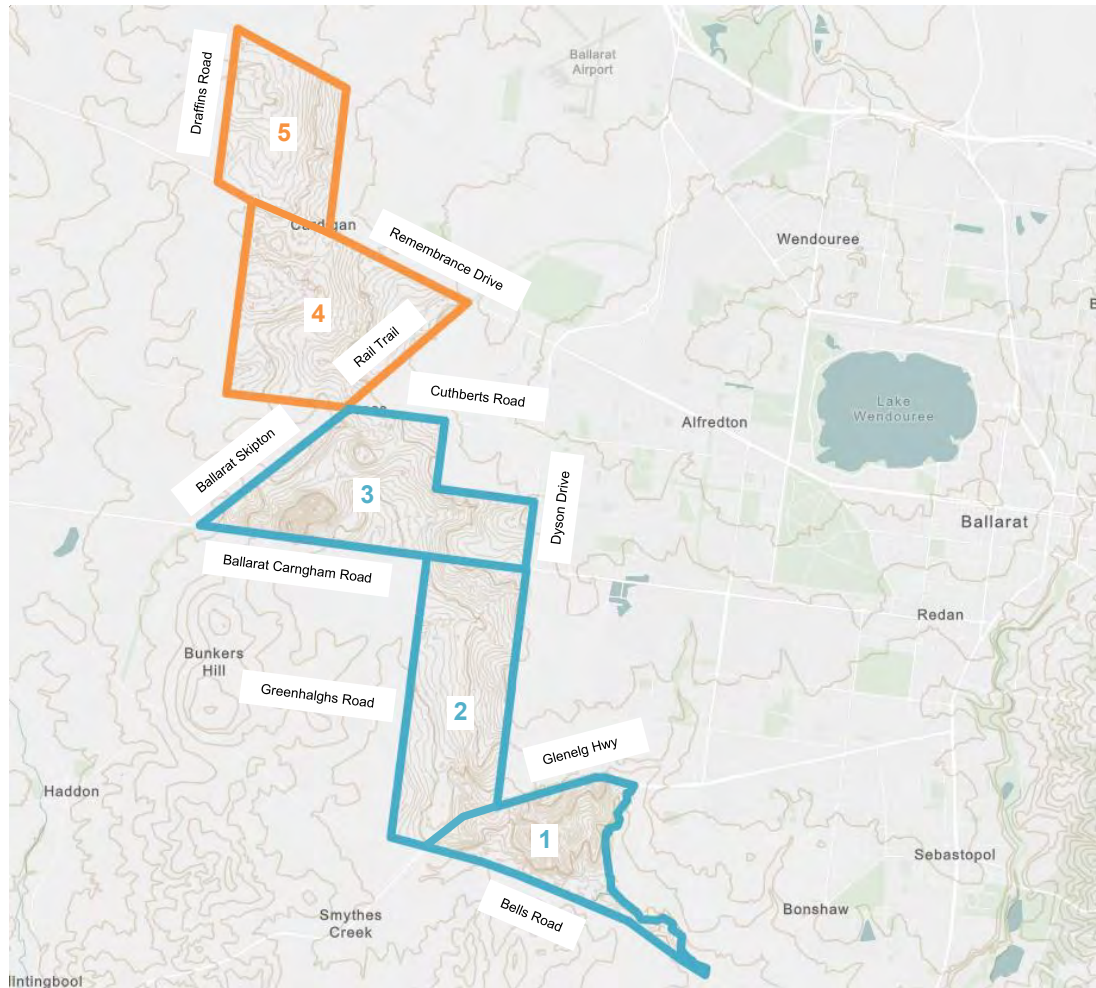


Figure 2: Locality Plan & Proposed Precincts.

5 PROPOSAL

This report has considered both a base case growth option of 15 dwellings per Net Developable Hectare (NDHA) and a higher growth option in-line with the VPA PSP Guidelines 2.0 across the Ballarat Western and North-Western Growth Areas, as specified in the project brief.

The baseline density of 15 dwellings per hectare NDA has the capacity to yield more than 20,000 lots.

The VPA PSP Guidelines 2.0 have the following density targets:

- An average of 20 dwellings or more per NDHA across the entire PSP area.
- An average of 30 dwellings or more per Net Developable Hectare (NDHA) within:
 - 400m walkable catchment of an activity centre or train station and
 - 50m of open space (both credited and encumbered open space), boulevards and major public transport routes, including but not limited to the Principal Public Transport Network (PPTN) or similar.

The exact number of dwellings achieved in the Ballarat Western and North-Western Growth Areas under the VPA PSP guidelines will not be known until the PSP is prepared, however, for the purpose of this exercise, based on targets in the VPA guidelines this report assumes a maximum of 20 dwellings per developable hectare, refer Table 4. In addition, based on Ballarat West PSP this report assumes 4% of the net developable area is for non-residential / commercial.

Table 4: Indicative Lot Yield.

Growth Area	NDHA	Non-Residential NDHA (4%)	Residential NDHA	Indicative Lot Yield 15 dwellings / ha	Indicative Lot Yield 20 dwellings / ha
North-Western	500 ha	20 ha	480 ha	7,200	9,600
Western	896 ha	36 ha	860 ha	12,902	17,203
Totals	1396 ha	56 ha	1340 ha	20,102	26,803

6 INVESTIGATION:

Our investigation into the availability of services to the above-mentioned development included a desktop and field survey. The desktop survey comprised obtaining existing service information from the following sources:

- Ballarat City Council
- Central Highlands Water Authority
- National Broadband Network Co (NBN)
- AusNet Gas Services
- Powercor
- Department of Transport
- Glenelg Hopkins Catchment Management Authority
- Corangamite Catchment Management Authority
- Stantec Australia
- NearMap.com
- Site Visit

7 LIMITATIONS AND ASSUMPTIONS

This investigation has been scoped and undertaken as a desktop study to provide preliminary advice on the anticipated servicing works at the proposed development site. There are limitations on the level of detail that can be given due to the nature of this review. Desktop studies such as this are reliant on information that is made available from service authorities, with an assumption that it provides an accurate representation of existing site conditions.

8 SERVICING STRATEGY

8.1 WATER SUPPLY – Potable Water

Note: Any proposed potable water infrastructure solutions or projects relevant to the growth areas that are mentioned in this report are conceptual at this stage and will be subject to further design, funding and approvals before commitment can be made. Central Highlands Water reserves the right to change and amend any solutions at its discretion.

8.1.1 Existing Services, North-Western Growth Area

The responsible authority for potable water supply to the North-Western Growth Area is Central Highlands Water. Central Highlands Water provided information on the location of existing potable water main infrastructure. The following paragraphs and figures detail the locations, size and construction material of the existing mains.

There is an existing 200mm diameter asbestos cement main on the southern side of Remembrance Drive (Ballarat-Burrumbeet Road), and a 75mm PVC / 100mm diameter asbestos cement main on the eastern side of Dowling Road, refer to Figure 3.

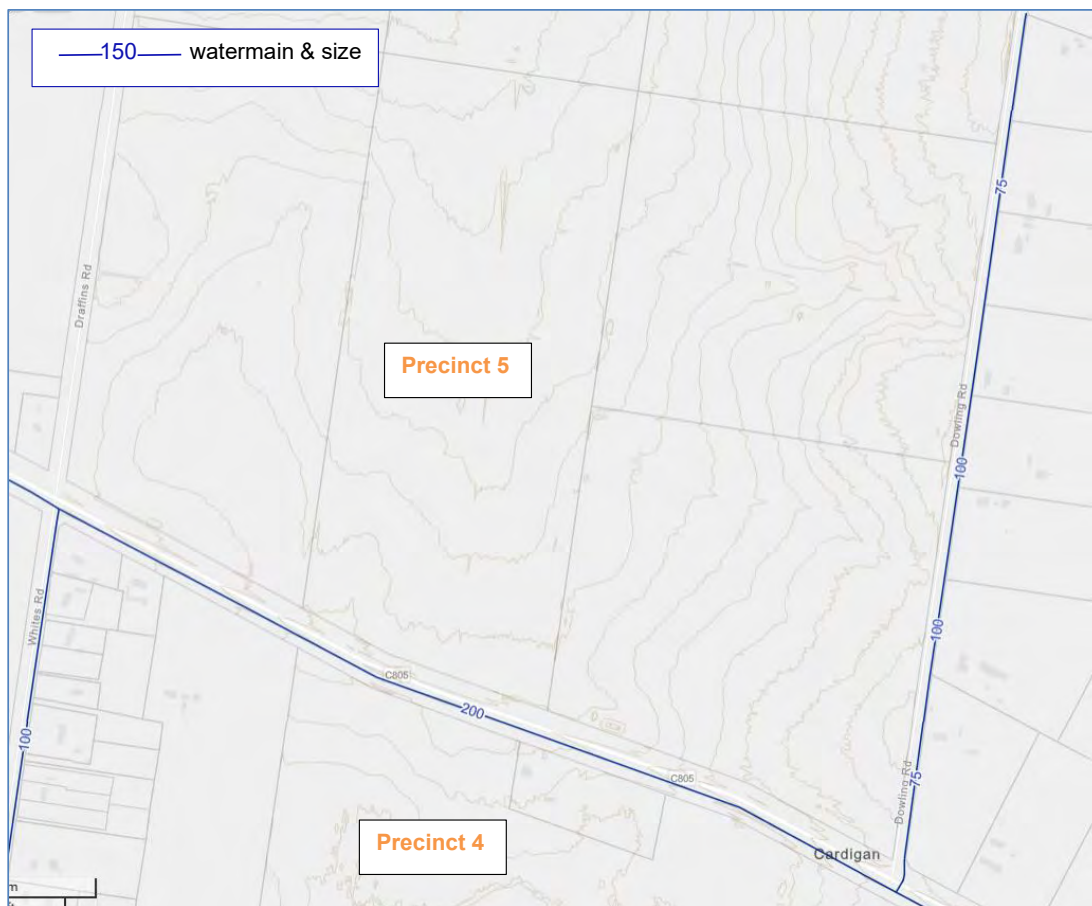


Figure 3: North-Western Growth Area north of Remembrance Drive.

Additionally, there are 100mm / 150mm diameter PVC reticulation assets within the Lucas Estate to the south-east; however, they are separated from the North-Western Growth Area by the Ballarat-Skipton Rail Trail reserve, refer to Figure 4.

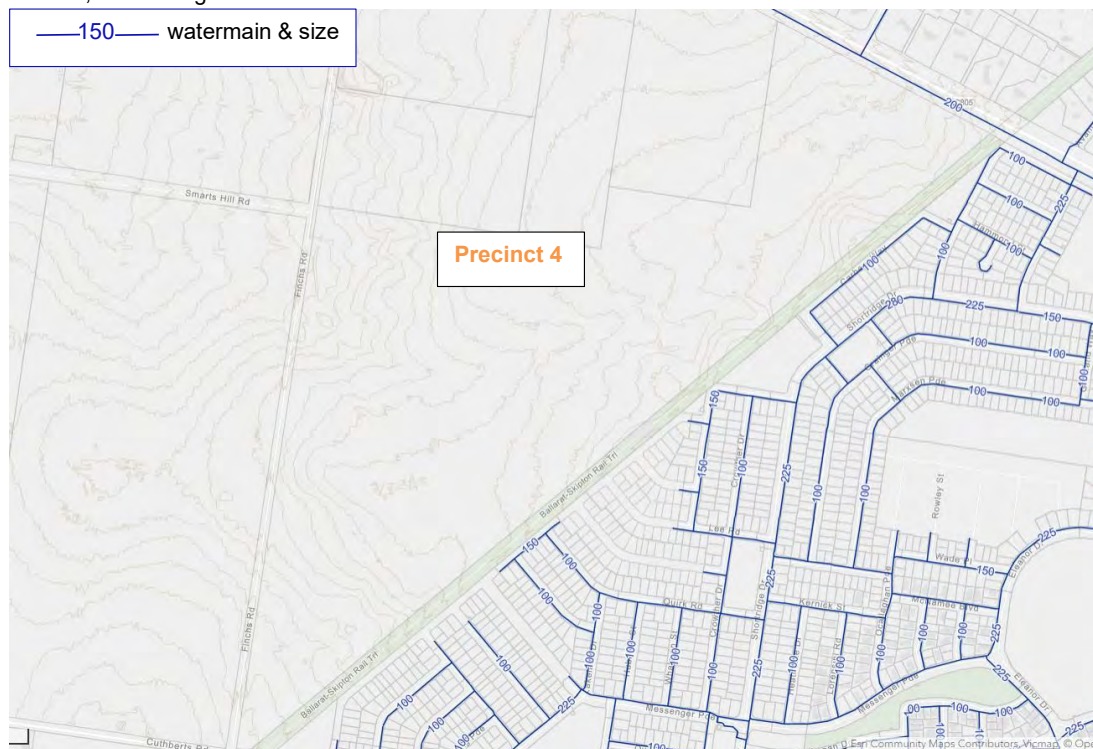


Figure 4: North-Western Growth Area south of Remembrance Drive.

There are no recycled water mains available in the vicinity of the North-Western Growth Area.

Central Highlands Water has advised that their existing potable water network has capacity to service the existing community but will not be able to service the North-Western Growth Area without significant augmentation to the supply network.

8.1.2 Existing Services, Western Growth Area

The responsible authority for potable water supply to the Western Growth Area is Central Highlands Water. Central Highlands Water provided information on the location of existing potable water main infrastructure. The following paragraphs and figures detail the locations, size and construction material of the mains.

There is a 225mm diameter PVC main on the north side of Cuthberts Road in the north-east corner of the Western Growth Area and a 225mm diameter PVC main on the western side of Lakeland Drive continuing through the intersection with Cuthberts Road approximately midway along the northern boundary of the Western Growth Area, refer to Figure 5.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

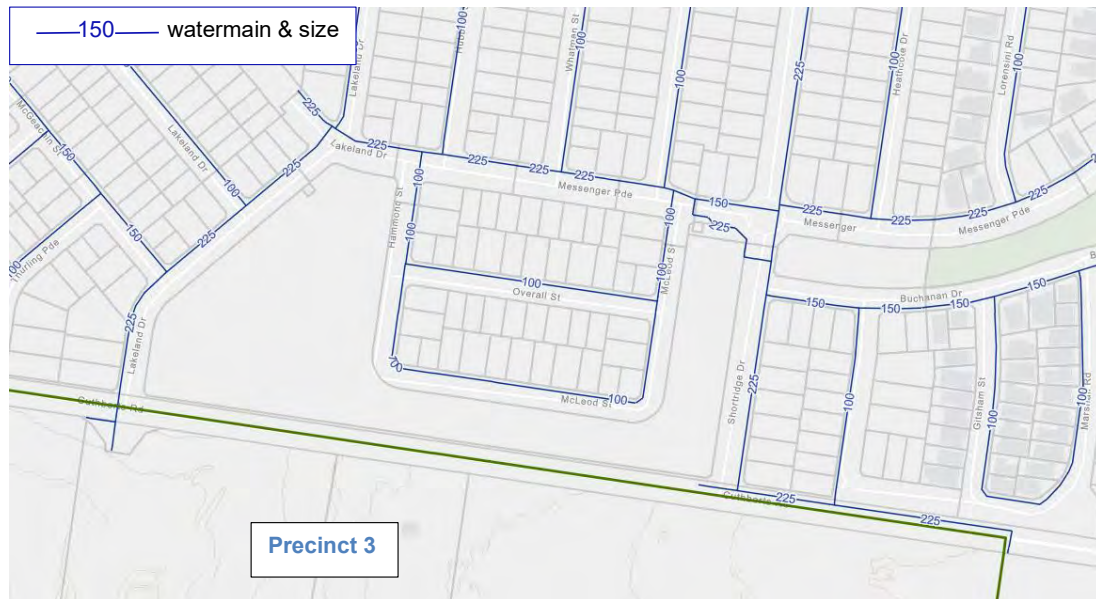


Figure 5: Western Growth Area north of Cuthberts Road.

There is a 225mm diameter asbestos cement main on the south side of Ballarat-Carngham Road, between Dyson Road and Sago Hill Road, and a 100mm diameter PVC main continues to the west along Ballarat-Carngham Road from Sago Hill Road for a length of approximately 500 metres. A 225mm diameter PVC main is located on the eastern side of Dyson Road along the eastern boundary of the upper Western Growth Area, refer to Figure 6.

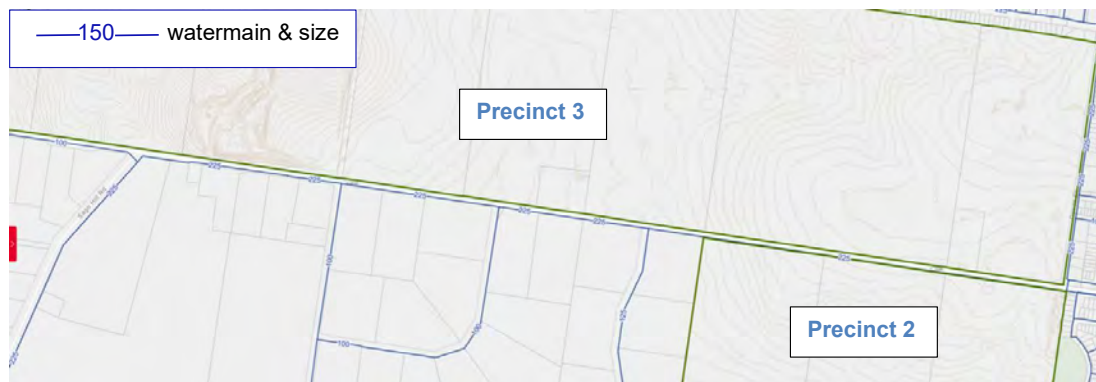


Figure 6: Western Growth Area South of Ballarat-Carngham Road.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



There is a 375mm diameter ductile iron, cement lined main and a 150mm diameter asbestos cement main on the southern side of Glenelg Highway between Kensington Creek and Bells Road, refer to Figure 7.

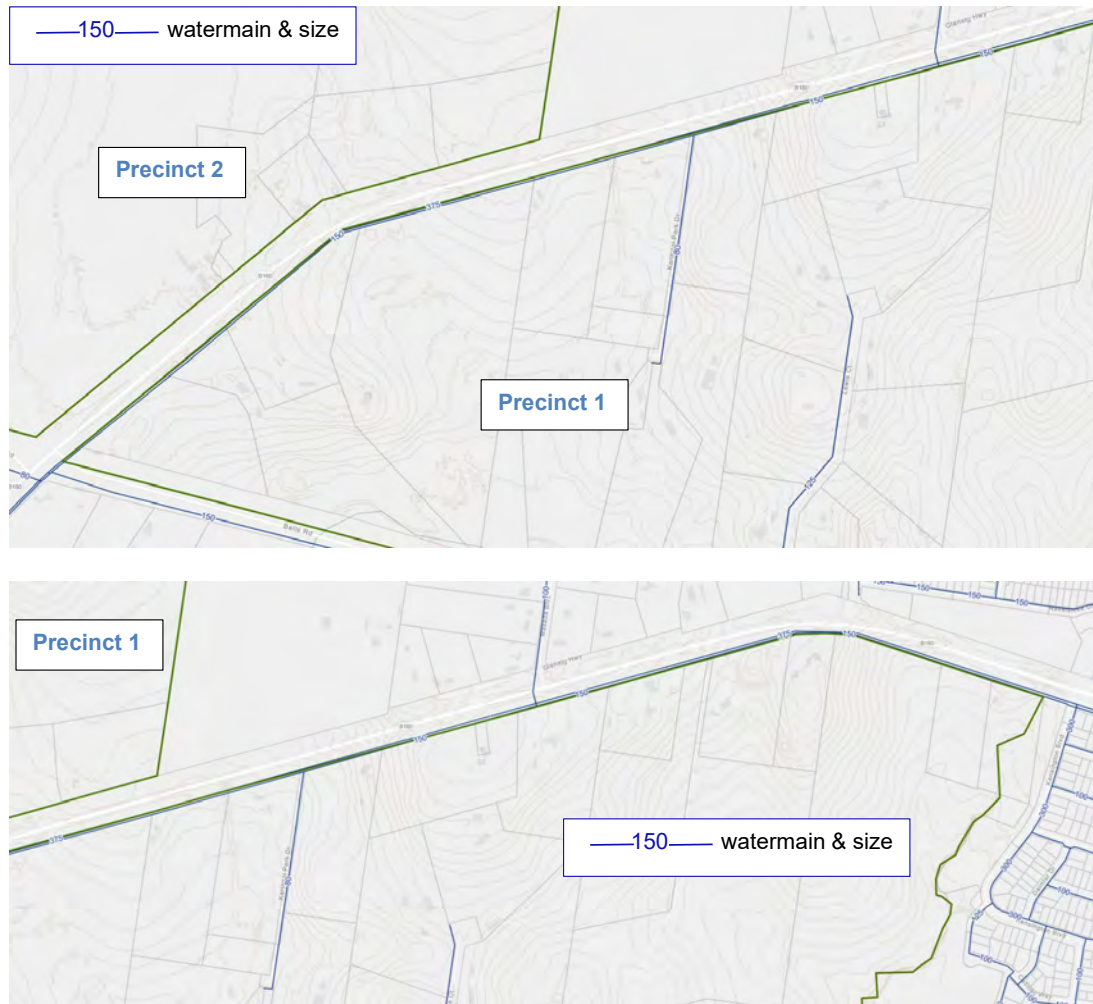


Figure 7: Western Growth Area South of Glenelg Highway.

There is a 150mm diameter asbestos cement main on the south side of Bells Road between Glenelg Highway and Westgate Road. The main reduces to a 100mm diameter asbestos cement main between Westgate Road and Doble Road and then increases back to 150mm diameter PVC main between Doble Road and Cherry Flat Road. There is a 150mm diameter asbestos cement main on the western side of Cherry Flat Road, refer to Figure 8 and Figure 9.

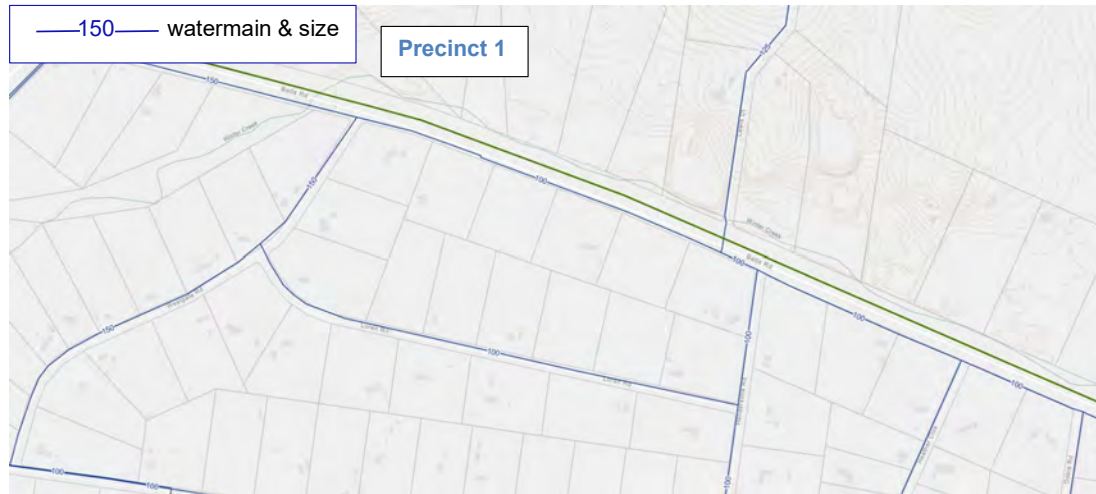


Figure 8: Western end of Bells Road.

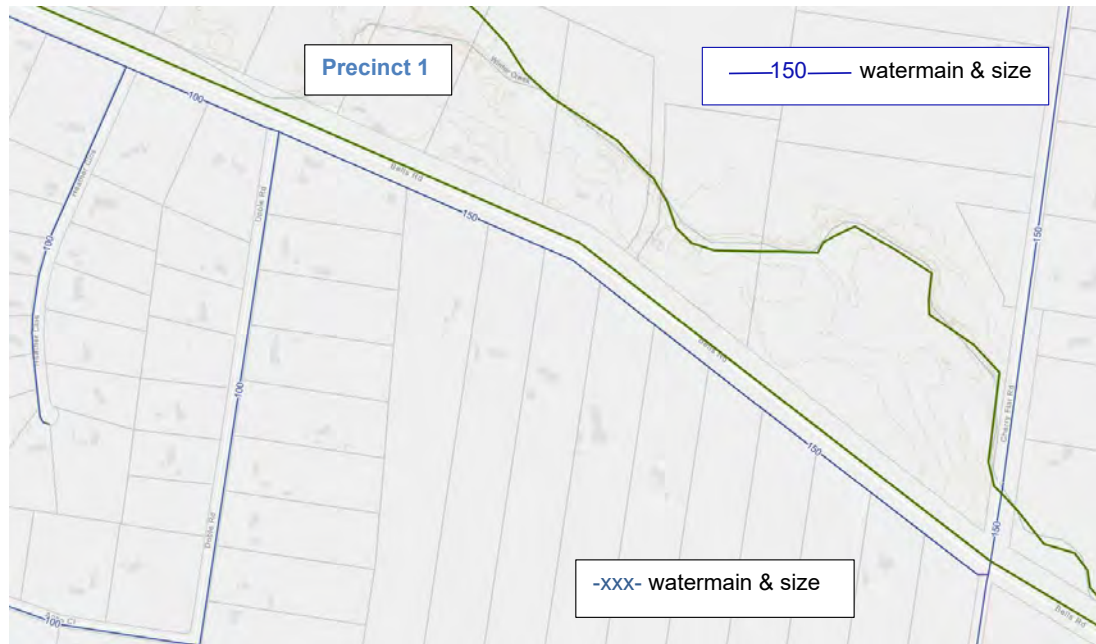


Figure 9: South-Eastern end of Bells Road.

The Bells Road main continues the southern side of the road reserve to the west of Glenelg Highway, however it is only an 80mm diameter PVC main, refer to Figure 10.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Figure 10: South of Bells Road to west of Glenelg Highway.

Additionally, there is an 80mm diameter PVC main on the eastern side of Karingal Park Drive and a 125mm diameter polyethylene main on the western side of Lewis Court, refer to Figure 11.



Figure 11: East of Karingal Park Drive.

There are no recycled water mains available in the vicinity of the Western Growth Area.

Central Highlands Water has advised that their existing potable water network has capacity to service the existing community but will not be able to service the Western Growth Area without significant augmentation to the supply network.

8.1.3 Future Servicing Arrangements, North-Western Growth Area

Note: Any proposed potable water infrastructure solutions or projects relevant to the growth areas that are mentioned in this report are conceptual at this stage and will be subject to further design, funding and approvals before commitment can be made. Central Highlands Water reserves the right to change and amend any solutions at its discretion.

Central Highlands Water is currently investigating significant upgrades to the potable water supply network by augmenting and extending the existing network to and through the North-Western Growth Area. Significant upgrades to the existing network are required to provide adequate potable water supply to the Ballarat North Growth Area including a large diameter trunk main to the north of the city.

The North-Western Growth Area will also benefit from other upgrades currently being considered, including:

- A large trunk main from Ballarat North to Remembrance Drive.
- A trunk main along Remembrance Drive west of the Ballarat Ring Road extending to Crown and Sceptre Road.

The network will also require additional upgrades that are likely to be developer delivered, including:

- Potable water main in Dowling Road and Draffins Road, with interconnection via Blind Creek Rd.
- Potable water main along Cuthberts Road, Smarts Hill Road and Finchs Road.

Refer to Figure 12 for indicative locations. Noting these are conceptual in nature and will be subject to detailed design and approval.

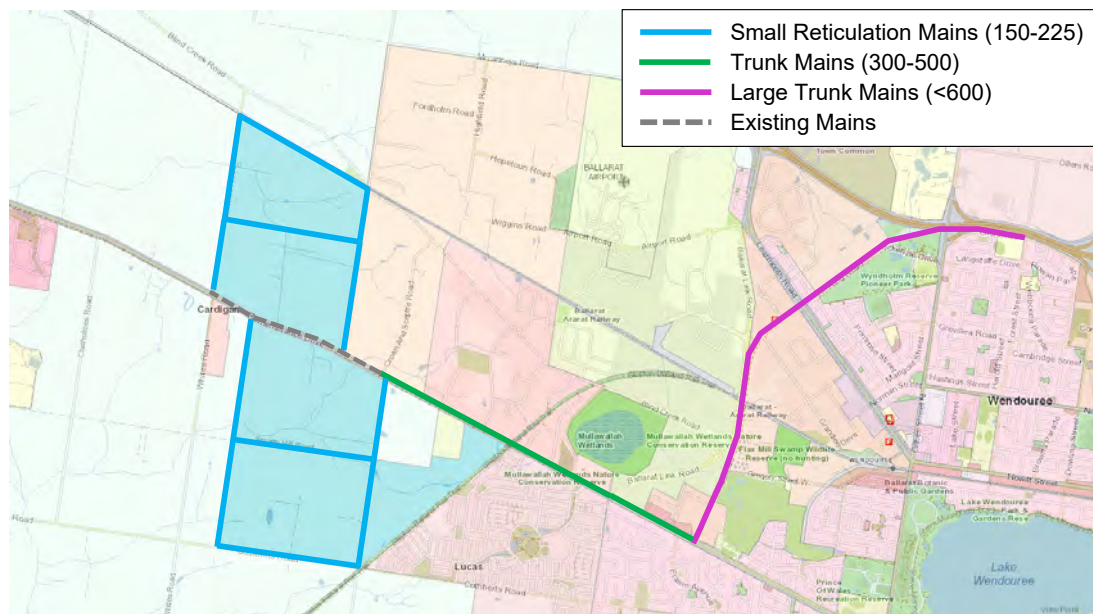


Figure 12: Potable water network extension under investigation – North-Western Growth Area.

All water supply projects shown in Figure 12 above are conceptual and subject to change.

The smaller reticulation assets within the study area are anticipated to be delivered by the developers of these areas in a logical sequence to be determined at the time.

The potential potable water supply requirements of the growth area have been estimated, refer to Table 5 and Table 6. Noting, these estimates are indicative only and sizing and performance requirements will be confirmed through detailed design and approval process.

Table 5: North-Western Growth Area, Estimated Peak Hour Water Demand, 15 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 15 dw / ha	Estimated Peak Hour Demand
4	321 ha	13 ha	308 ha	4,620	221-265 L/s
5	179 ha	7 ha	172 ha	2,580	123-148 L/s

Table 6: North-Western Growth Area, Estimated Peak Hour Water Demand, 20 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 20 dw / ha	Estimated Peak Hour Demand
4	321 ha	13 ha	308 ha	6,160	259-311 L/s
5	179 ha	7 ha	172 ha	3,440	145-174 L/s

Central Highlands Water reviewed and commented on proposed staging precincts within the North-Western Growth Area. This growth area has been considered as two precincts divided by Remembrance Drive into roughly northern (Precinct 5) and southern (Precinct 4) halves, refer to Table 7.

Table 7: North-Western Growth Area, Central Highlands Water Pros and Cons, Water Supply.

Precinct	Potential Works	Pros	Cons
4	Complete renewal/upgrade of Sturt Remembrance Drive, Ballarat West Ring Road upgrade, works downstream of Vic Park valving, Invermay upgrade, redundancy works and Ballarat West UGZ works.	<ul style="list-style-type: none"> Small number of landowners. 	<ul style="list-style-type: none"> Requires works in the Western Growth Area. Multiple major water supply projects required. Risk of impact on existing network and customer base due to topography. Interim solution may require operational controls to manage. Potential influence from all specific existing customer and licence areas due to heavy water usage.
5	Complete renewal/upgrade of Sturt Remembrance Drive, Ballarat West Ring Road upgrade, works downstream of Vic Park valving, Invermay upgrade, redundancy works and Ballarat West UGZ works.	<ul style="list-style-type: none"> Potential alternative servicing options via Airport Road if sequenced ahead of Precinct 4. Small number of landowners. 	<ul style="list-style-type: none"> Requires works in the Western Growth Area. Multiple major water supply projects required. Risk of impact on existing network and customer base due to topography. Interim solution may require operational controls to manage. Potential influence from all specific existing customer and licence areas due to heavy water usage.

8.1.4 Future Servicing Arrangements, Western Growth Area

Note: Any proposed potable water infrastructure solutions or projects relevant to the growth areas that are mentioned in this report are conceptual at this stage and will be subject to further design, funding and approvals before commitment can be made. Central Highlands Water reserves the right to change and amend any solutions at its discretion.

Central Highlands Water is currently investigating significant upgrades of the potable water supply network by augmenting and extending the existing network to and through the Western Growth Area. Significant upgrades to the existing water supply network are required to provide adequate potable water supply to the Ballarat North Growth Area including a major trunk main between the White Swan Reservoir and Ballarat North. The Western Growth Area will benefit from these upgrades but will also require additional network upgrades.

The North area of the Western Growth Area will also benefit from other upgrades currently being considered, including:

- Large trunk main in Eyre Street between Drummond Street South and Armstrong Street South and in York Street, Larter Street and Wilsons Street between Main Road and Joseph Street.
- Trunk main in Remembrance Drive (Sturt Street) between the Ballarat Ring Road and Learmonth Street.
- Trunk main in Learmonth Street between Remembrance Drive and Whitelaw Avenue.
- Trunk mains in Latrobe Street between Learmonth Street and Pleasant Street South and Pleasant Street South to Eyre Street.
- Trunk main in Dyson Drive between Remembrance Drive and Ballarat – Carngham Road.
- Trunk main in Glenelg Highway between Tait Street and Kensington Boulevard.

The supply network will also require additional upgrades that are likely to be developer delivered, including:

- Potable water main running parallel to the Ballarat Skipton Rail Trail between Cuthberts Road and Ballarat – Carngham Road.
- Potable water main in Ballarat – Carngham Road between Dyson Drive and Sago Hill Road.
- Potable water main in Finchs Road north of Ballarat-Carngham Road with interconnecting mains along future development access roads.
- Potable water main along the western boundary of the Western Growth Area between Ballarat – Carngham Road and Bells Road.
- Potable water main along the future Dyson Road extension south of Ballarat – Carngham Road for a distance of approximately 800 metres.
- Potable water main in Glenelg Highway from Kensington Boulevard to Bells Road.
- Potable water main in Bells Road between Glenelg Highway and Cherry Flat Road.

Refer to Figure 13 for indicative locations. Noting these are conceptual in nature and will be subject to detailed design & approval.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

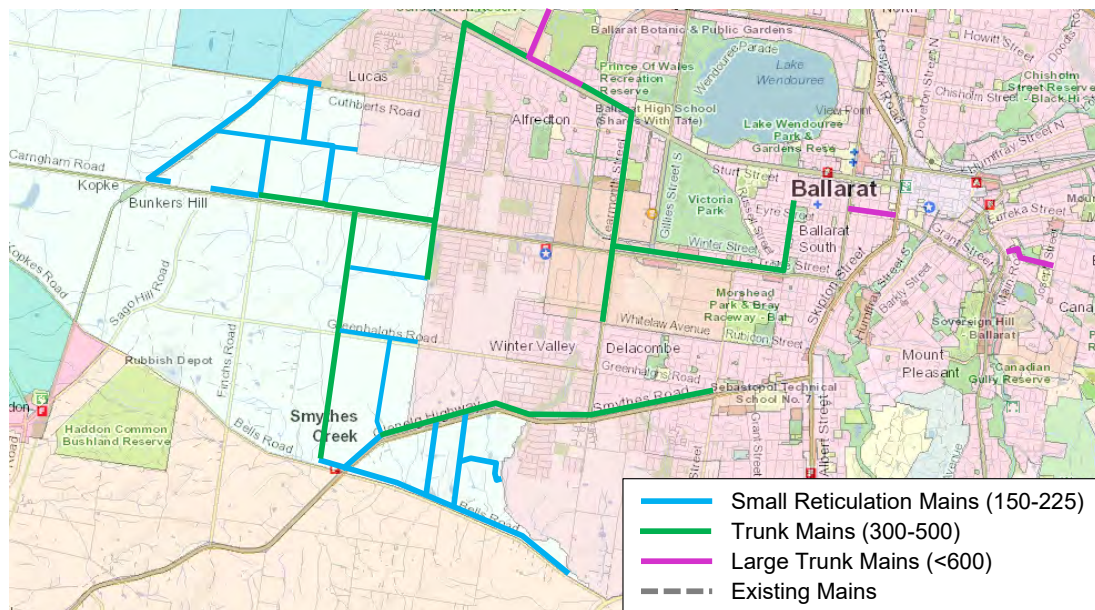


Figure 13: Potable water network extension under investigation – Western Growth Area.

All water supply projects shown in Figure 13 above are conceptual and subject to change.

The smaller reticulation assets within the study area are anticipated to be delivered by the developers of these areas in a logical sequence to be determined at the time.

The potential potable water supply requirements of the growth area have been estimated, refer to Table 8 and Table 9. Noting, these estimates are indicative only and sizing and performance requirements will be confirmed through detailed design and approval process.

Table 8: Western Growth Area, Estimated Peak Hour Water Demand, 15 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 15 dw / ha	Estimated Peak Hour Demand
1	199 ha	8 ha	191 ha	2,865	137-164 L/s
2	333 ha	13 ha	320 ha	4,800	229-275 L/s
3	364 ha	15 ha	349 ha	5,235	251-301 L/s

Table 9: Western Growth Area, Estimated Peak Hour Water Demand, 20 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 20 dw / ha	Estimated Peak Hour Demand
1	199 ha	8 ha	191 ha	3,820	160-193 L/s
2	333 ha	13 ha	320 ha	6,400	269-323 L/s
3	364 ha	15 ha	349 ha	6,980	294-353 L/s

Central Highlands Water reviewed and commented on proposed staging precincts within the North-Western Growth Area. This growth area has been considered as three precincts divided by Glenelg Highway and Ballarat-Carnham Road, refer to Table 10.

Table 10: Western Growth Area, Central Highlands Water Pros and Cons, Water Supply.

Precinct	Potential Works	Pros	Cons
1	Minor network upgrades, supporting future redundancy and Ballarat West UGZ works.	<ul style="list-style-type: none"> • Smallest Area (Lots). • South of Victoria valving flow split. • Lowest Topography. 	<ul style="list-style-type: none"> • Reduced service levels for south-west area (Smythesdale, Haddon, etc...) • Works on Glenelg Hwy. • Requires completion of Ballarat West UGZ works.
2	Minor network upgrades, supporting future redundancy and Ballarat West UGZ works.	<ul style="list-style-type: none"> • Smallest Area (Lots). • South of Victoria valving flow split. • Lowest Topography. 	<ul style="list-style-type: none"> • Reduced service levels for south-west area (Smythesdale, Haddon, etc...) • Works on Glenelg Hwy. • Requires completion of Ballarat West UGZ works. • Additional servicing requirements for northern half of precinct. • Large service area.
3	Extension of water main along Ballarat West Ring Road to Dyson Drive to protect Insignia Estate and Ballarat West UGZ works.	<ul style="list-style-type: none"> • Doesn't rely as heavily on Ring Road extension. • Uses Wilson Street / Vic Park system. • Potential initial servicing ahead of Precinct 4 & 5. 	<ul style="list-style-type: none"> • Reduced service levels for south-west area (Smythesdale, Haddon, etc...) • Requires completion of Ballarat West UGZ works. • Potentially affects existing network and customer base. • Large service area.

8.1.5 Expected Funding Arrangements

The Essential Services Commission (ESC) specifies how water businesses levy new customer contributions (NCC). Central Highlands Water applies this levy on a per lot basis. The levies collected by Central Highlands Water are utilised to fund trunk infrastructure and shared asset projects which are essential to service areas of new development. The current NCC charge for the 2022/23 financial year is \$1504.34 for each allotment.

Funding arrangements can vary depending on the nature of the work and stakeholders involved, however Central Highlands Water is typically responsible for funding trunk infrastructure and shared assets. Developers are responsible for providing reticulation assets and temporary reticulation works and the cost to connect the development to the Central Highlands Water network. Developers are also responsible for the financing costs associated with bringing forward the provision of shared assets and temporary shared works that Central Highlands Water had programmed to be constructed at a future date. The ESC guidelines determine that Central Highlands Water may levy a charge that will cover the financing costs associated with bringing forward the provision of Shared Assets. This is referred to as an Incremental Financing Cost charge.

8.1.6 Estimated Project Costs, North-Western Growth Area

High level construction costs for the water main projects identified in section 8.1.3 have been estimated by Taylors, refer to Table 11. These costs include allowance for pipe construction, contingency, survey & design, traffic management and contractor overheads.

Table 11: North-Western Growth Area, Estimated Water Main Project Costs.

Project Location	* Indicative Pipe Diameter	Pipe Length	Estimated Cost
Ballarat West Ring Road (Pre 4 & 5)	750mm	5,500m	\$16.58M
Remembrance Drive (Pre 4 & 5)	300-500mm	2,900m	\$2.35M
Finchs Road (Precinct 4)	225mm	1,950m	\$1.40M
Smarts Hill Road (Precinct 4)	225mm	1,400m	\$0.90M
Cuthberts Road (Precinct 4)	225mm	1,400m	\$1.00M
Dowling Road (Precinct 5)	225mm	1,125m	\$0.80M
Draffins Road (Precinct 5)	225mm	800m	\$0.57M
		Total	\$23.60M

Note: * Pipe diameters used here are indicative for the purpose of high-level cost estimates.

8.1.7 Estimated Project Costs, Western Growth Area

High level construction costs for the water main projects identified in section 8.1.4 have been estimated by Taylors, refer to Table 12. These costs include allowance for pipe construction, contingency, survey & design, traffic management and contractor overheads.

Table 12: Western Growth Area, Estimated Water Main Project Costs.

Project Location	* Indicative Pipe Diameter	Pipe Length	Estimated Cost
Eyre Street (Pre 1, 2 & 3)	750mm	780m	\$2.35M
York, Larter & Wilsons Street (Pre 1, 2 & 3)	750mm	870m	\$2.62M
Sturt & Learmonth Street (Pre 1, 2 & 3)	300-500-600mm	4,480m	\$8.53M
Dyson Drive (Pre 1, 2 & 3)	450-500mm	2,270m	\$5.14M
Latrobe & Pleasant Street Sth (Pre 1, 2 & 3)	450mm	3,300m	\$5.97M
Ballarat – Carngham Road (Precinct 2 & 3)	300-375mm	2,400m	\$2.98M
Glenelg Highway (Precinct 1 & 2)	300mm	4,700m	\$5.67M
Dyson Street Extension (Precinct 2)	300mm	840m	\$0.85M
North-South Connector (Precinct 2)	300mm	3,500m	\$3.52M
Skipton Rail Trail Interface Road (Precinct 3)	225mm	2,500m	\$1.68M
Cuthberts Road (Precinct 3)	225mm	580m	\$0.45M
Finchs Road (Precinct 3)	225mm	810m	\$0.63M
Lakeland Drive Extension (Precinct 3)	225mm	825m	\$0.55M
North-South Connector (Precinct 3)	225mm	810m	\$0.54M
Bells Road (Precinct 2)	225mm	350m	\$0.27M
Bells Road (Precinct 1)	225mm	3,400m	\$2.65M
Glenelg Highway (Precinct 1 & 2)	225mm	685m	\$0.55M
North-South Connector East (Precinct 1)	225mm	1,050m	\$0.73M
North-South Connector West (Precinct 1)	225mm	1,300m	\$0.90M
East-West Connector (Precinct 1)	225mm	1,050m	\$0.77M
East-West Connector (Precinct 3)	225mm	360m	\$0.25M
		Total	\$47.60M

Note: * Pipe diameters used here are indicative for the purpose of high-level cost estimates.

8.1.8 Summary of Outcomes

- Central Highlands Water owns and maintains a significant potable water supply network in Ballarat including existing infrastructure in the vicinity of the North-Western and Western Growth Areas.
- Central Highlands Water has advised that its existing potable water network has capacity to service the existing community but will not be able to service the North-Western and Western Growth Areas without significant augmentation to the supply network.
- Significant network upgrade projects are required to service the North-Western and Western Growth Areas, however additional works including completion of the Ballarat West PSP servicing works and Central Highlands Water network redundancy works are required.
- Central Highlands Water may reimburse Developers for construction of shared assets using funds collected from new customer contributions. Where shared assets are proposed to be constructed by Developers prior to their scheduled delivery, then Developers may be liable for incremental finance costs.
- Interim solutions will be considered and assessed by Central Highlands Water on a case-by-case basis. Central Highlands Water has already advised that the existing potable water supply network is at capacity and network upgrades are required to supply the North-Western and Western Growth Areas. Any interim solutions may still require operational controls or network augmentations to limit impact to existing customers.

8.2 SEWERAGE

Note: Any proposed sewerage infrastructure solutions or projects relevant to the growth areas that are mentioned in this report are conceptual at this stage and will be subject to further design, funding and approvals before commitment can be made. Central Highlands Water reserves the right to change and amend any solutions at its discretion.

8.2.1 Existing Services, North-Western Growth Area

The responsible authority for sewer reticulation to the North-Western Growth Area is Central Highlands Water.

Central Highlands Water has confirmed that there are no reticulation sewer assets within the North-Western Growth Area.

There are existing sewer assets surrounding the North-Western Growth Area, including a 125mm diameter polyethylene pressure sewer on the northern side of Remembrance Drive (Ballarat-Burrumbeet Road) at the very eastern edge of the growth area and 150mm and 225mm diameter PVC mains have been constructed to service the Lucas Estate to the south-east however they are separated from the North-Western Growth Area by the Ballarat-Skipton Rail Trail reserve, refer to Figure 14.

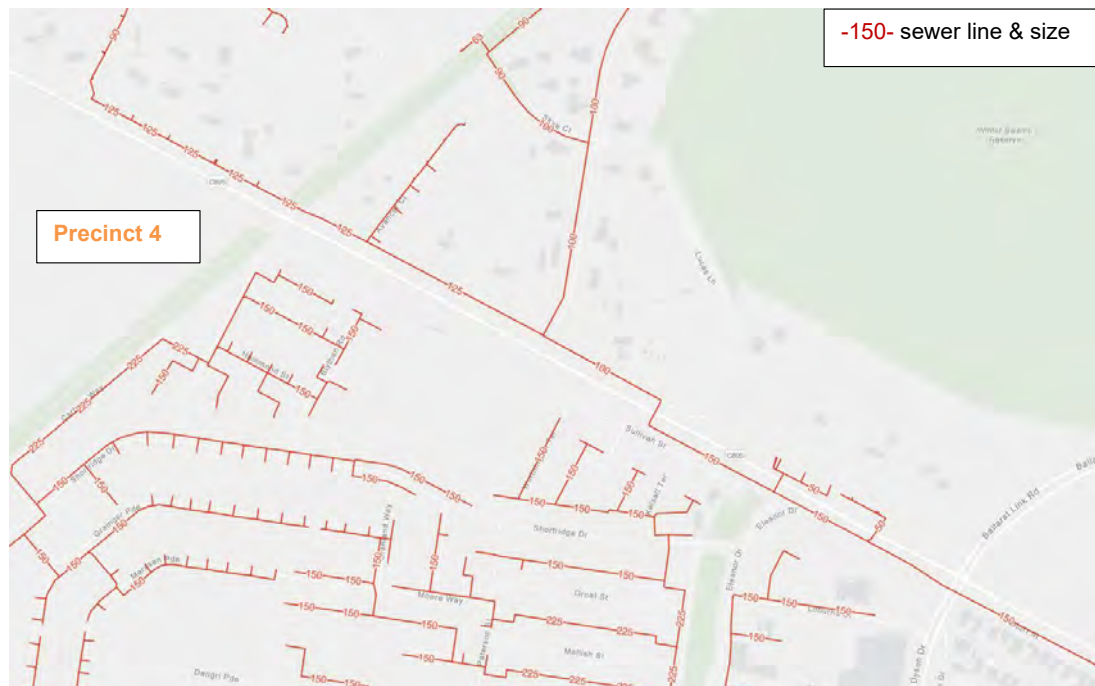


Figure 14: North-Western Growth Area, Remembrance Drive.

Central Highlands Water has advised that its existing sewer network has capacity to service the existing community but will not be able to service the North-Western Growth Area without significant augmentation to the supply network.

8.2.2 Existing Services, Western Growth Area

The responsible authority for sewer reticulation to the Western Growth Area is Central Highlands Water.

Central Highlands Water has confirmed that there is a 450mm diameter PVC sewer in the north-west corner of the Western Growth Area adjacent to the Ballarat-Skipton Rail Trail reserve, and discharges into a sewer pump station. There is a 400mm diameter polyethylene rising main that follows the same alignment as the 450mm diameter gravity sewer. This infrastructure predominantly services the Lucas Estate, refer to Figure 15.

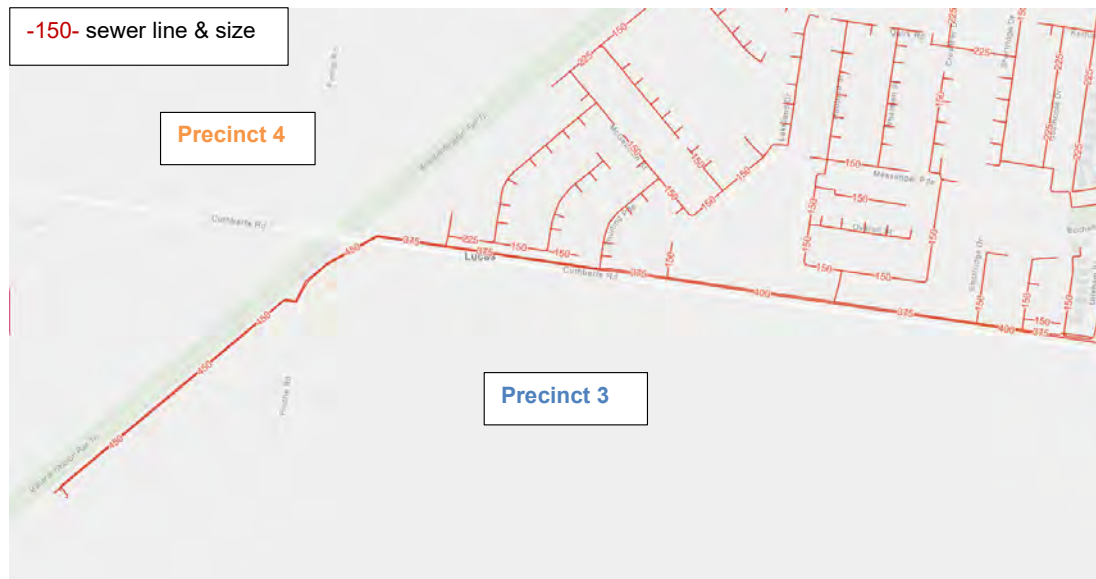


Figure 15: North-Western Growth Area adjacent to the Ballarat-Skipton Rail Trail reserve.

There are some sewer assets surrounding the Western Growth Area, including a 375mm diameter PVC sewer on the north side of Cuthberts Road and continuation of the 400mm diameter polyethylene rising main and 225mm/300mm diameter PVC sewer at the rear of properties fronting Fawcett Road adjacent to the north-east boundary of the Western Growth Area, refer to Figure 16. A sewer pump station is located at the end of Fawcett Road (Grange SPS) and sends sewerage flows east to Cuzens Road, however it is fully and solely committed to servicing this estate and has no capacity to service the Western Growth Area.

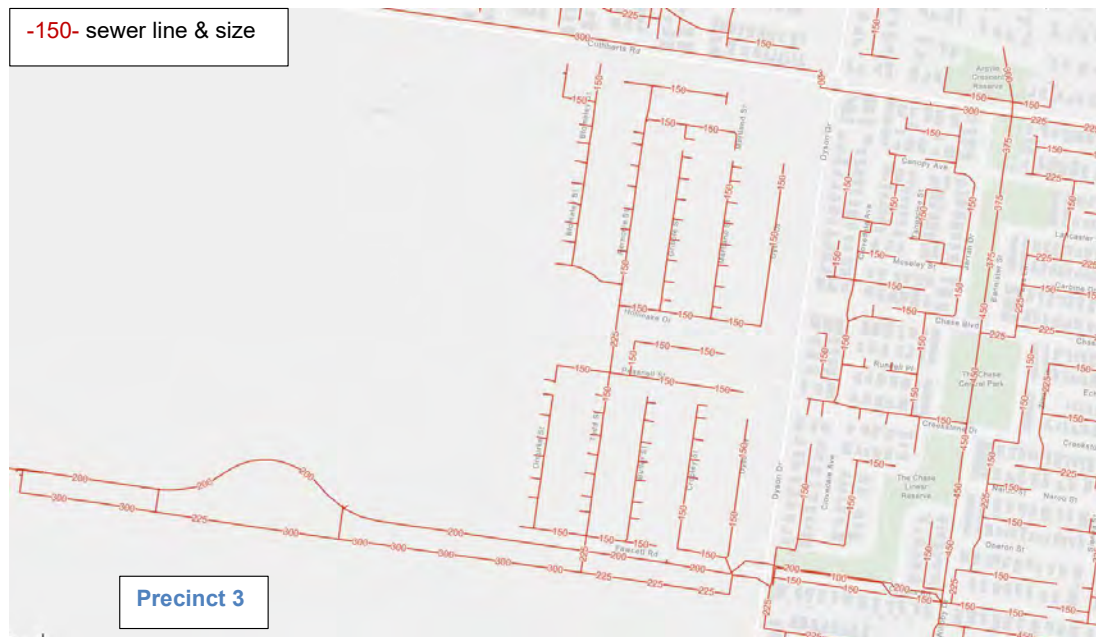


Figure 16: Western Growth Area rear of properties fronting Fawcett Road.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



There are 150mm and 225mm diameter PVC sewers in Dyson Road that services the Chase Estate on the eastern side of Dyson Road. These assets continue south of Ballarat-Carrnham Road and service the Conroy's Green and Winter Valley Estates, refer to Figure 17.

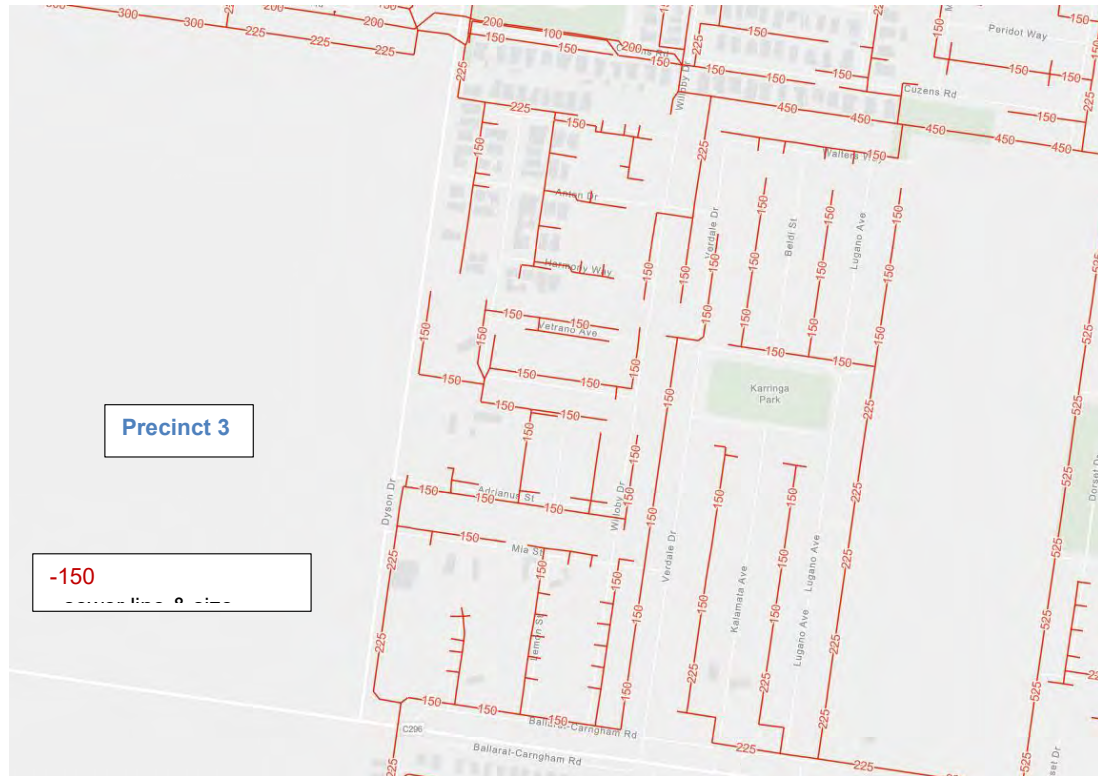


Figure 17: Western Growth Area East of Dyson Road.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



There is 525mm diameter GRP sewer on the western side of Kensington Boulevard within the Pinnacle Estate on the eastern side of Kensington Creek south of Glenelg Highway and a 450mm diameter GRP sewer on the north side of Glenelg Highway, refer to Figure 18.

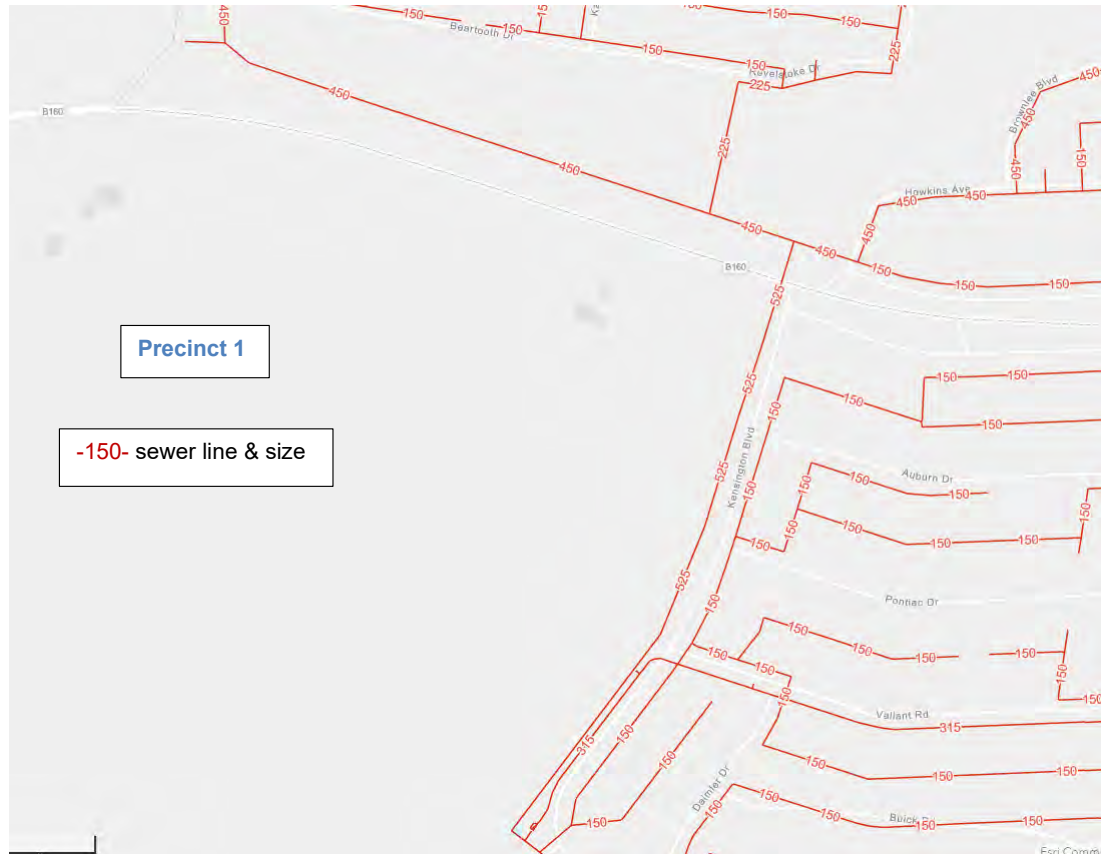


Figure 18: Western Growth Area East of Kensington Creek.

Central Highlands Water has advised that its existing sewer network has capacity to service the existing customer base but will not be able to service the Western Growth Area without significant augmentation to the supply network.

8.2.3 Future Servicing Arrangements, North-Western Growth Area

Central Highlands Water is currently investigating upgrades of the sewer reticulation network by augmenting and extending the existing network to and through the investigation area. Significant upgrades to the existing sewer network are required to provide adequate levels of service to the Ballarat North-Western Growth Area. Due to difficult terrain, particularly in Precinct 5 which falls towards the north-west, several sewer pump stations will be required to service the North-Western Growth Area. Ultimately, sewer flows from the North-Western Growth Area will be conveyed and treated at the Ballarat South Wastewater Treatment Plant to the south-east of the North-Western Growth Area. Several sewer projects will be required downstream of Precincts 4 & 5 outside of the North-Western Growth Area. These projects are discussed further in Section 8.2.4.

Central Highlands Water has developed a high-level sewer concept plan for servicing the North-Western Growth Area, including:

- Draffins Road SPS – Sewer pump station located in the north-west corner of Precinct 5 adjacent to Draffins Road and the Serviceton Railway line level crossing including a rising main south along Draffins Road to Smarts Hill Road.
- Smarts Hill Road SPS – Sewer pump station located along the western boundary of Precinct 4, adjacent to Smarts Hill Road and the future north-south connector road along the western precinct interface, including a rising main south to Cuthberts Road.
- Cuthberts Road SPS – Sewer pump station located in the south-west corner of Precinct 4 adjacent to the intersection of Cuthberts Road and the future north-south connector road including a rising main east along Cuthberts Road.
- Trunk Sewer – Smarts Hill Road small diameter trunk asset (375-525mm diameter) discharging to the proposed Smarts Hill Road sewer pump station.
- Trunk Sewer – Finchs Road small diameter trunk asset (375-525mm diameter) discharging to existing gravity infrastructure in Cuthberts Road, ultimately discharging to Alfredton West sewer pump station.
- Trunk Sewer – Draffins Road small diameter trunk asset (375-525mm diameter) discharging to the proposed Draffins Road sewer pump station.
- Reticulation Sewers – Reticulation assets (225-300mm diameter) to convey flows within Precincts 4 and 5 to the proposed sewer pump stations. These reticulation sewers are to be delivered by the developer as required to support development.

Refer to Figure 19 below for high level concept options currently under investigation. Noting these are purely conceptual at this stage and subject to design, approval and funding.

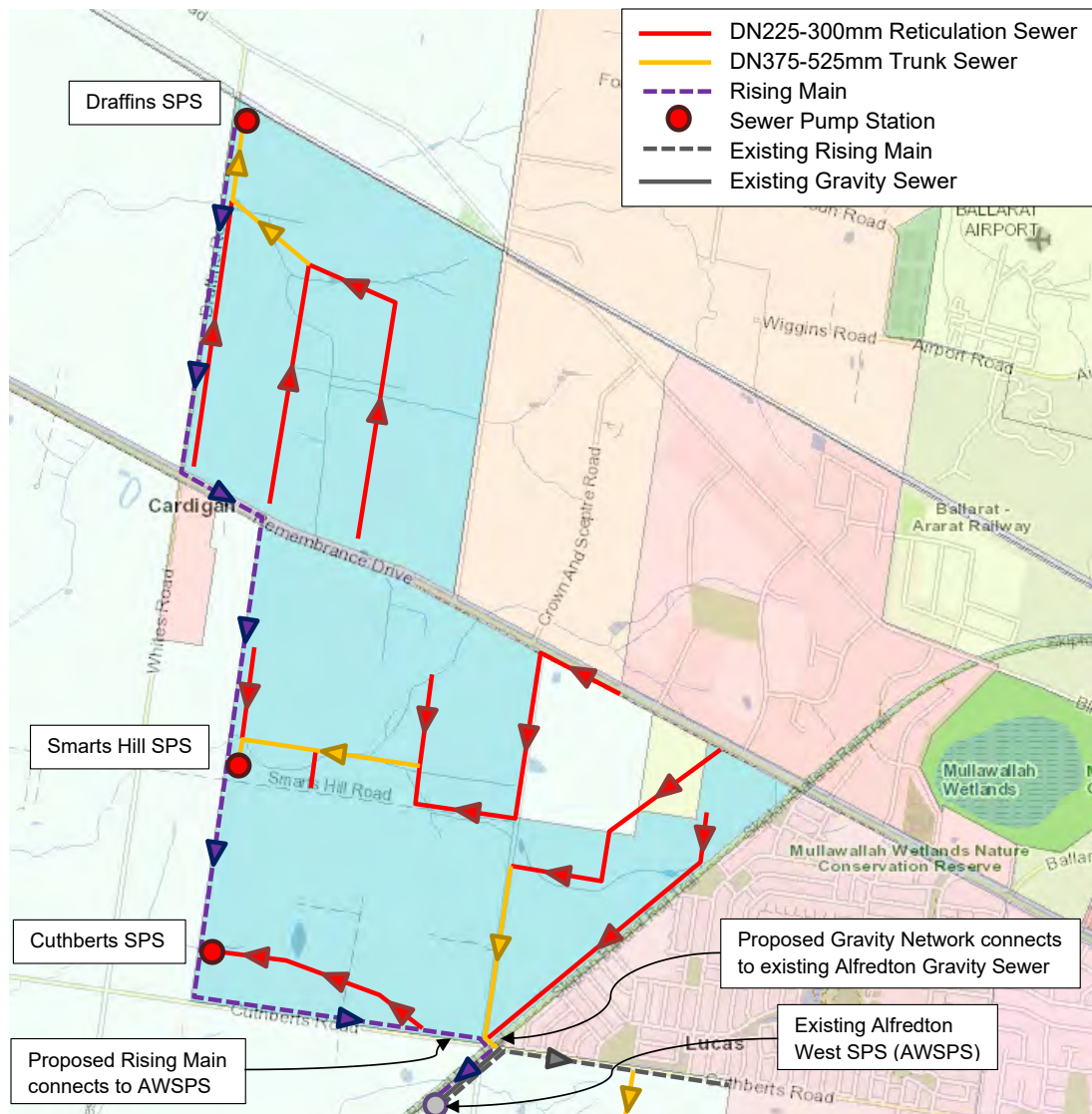


Figure 19: Possible sewer network extensions under investigation – North-Western Growth Area.

Table 13: North-Western Growth Area, Estimated Sewer Design Flow, 15 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 15 dw / ha	Estimated Design Flow
4	321 ha	13 ha	308 ha	4,620	204-245 L/s
5	179 ha	7 ha	172 ha	2,580	123-147 L/s

Table 14: North-Western Growth Area, Estimated Sewer Design Flow, 20 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 20 dw / ha	Estimated Design Flow
4	321 ha	13 ha	308 ha	6,160	236-283 L/s
5	179 ha	7 ha	172 ha	3,440	142-170 L/s

Central Highlands Water reviewed and commented on proposed staging precincts within the North-Western Growth Area. This growth area has been considered as two precincts divided by Remembrance Dr into roughly northern (Precinct 5) and southern (Precinct 4) halves.

Table 15: North-Western Growth Area, Central Highlands Water Pros and Cons, Sewer Reticulation.

Precinct	Potential Works	Pros	Cons
4	Construction of multiple sewer pump stations and rising mains. Potential Flow Management Facility (FMF) at Alfredton West sewer pump station, depending on sequencing.	<ul style="list-style-type: none"> Small catchment can initially be serviced by the Alfredton West sewer pump station (south-east corner). Small number of landowners. Potentially hydraulically independent of Precincts 1-3 (initially) through FMF. 	<ul style="list-style-type: none"> Multiple sewer pump station arrangement resulting in higher operational costs relative to other precincts in the growth areas. Difficult topography to service. Interim solutions may require operational controls for management. Ultimately requires trunk sewer through Precincts 1-3.
5	Single permanent sewer pump station and rising main.	<ul style="list-style-type: none"> Simple servicing arrangement (single SPS). Small number of landowners. Potential different discharge locations depending on timing of Precinct 4. 	<ul style="list-style-type: none"> Difficult topography to service. Interim solutions may require operational controls for management. Significant distance to discharge if timing ahead of Precinct 4. Ultimately requires trunk sewer through Precincts 1-3.

8.2.4 Future Servicing Arrangements, Western Growth Area

Central Highlands Water is currently planning upgrades of the sewer reticulation network by augmenting and extending the existing network to and through the investigation area. Significant upgrades to the existing sewer network are required to provide adequate levels of service to the Ballarat Western Growth Area. Due to some areas with difficult terrain, particularly in Precinct 3 which falls towards the west, sewer pump stations will be required to service the Western Growth Area. The outfall for the Western Growth Area relies upon the completion of network upgrades to service the Ballarat West Urban Growth Zone (UGZ), including the Winter Creek trunk sewer and Winter Creek sewer pump station and rising main. Ultimately, sewer flows from the Western Growth Area will be conveyed and treated at the Ballarat South Wastewater Treatment Plant to the south-east of the Western Growth Area.

Central Highlands Water has developed a high-level sewer concept plan for servicing the Western Growth Area. This involves trunk infrastructure that conveys flow ultimately down to the proposed Winter Creek Sewer Pump Station and at this stage includes:

- Trunk Lead Road SPS – Sewer pump station located in the south-west corner of Precinct 3 adjacent to Ballarat-Carngham Road, Trunk Lead Road and Skipton Rail Trail including a rising main east along Ballarat-Carngham Road.

- Trunk Sewer – Bells Road large diameter trunk asset (825-1050mm diameter) following the alignment of Bells Road, from Glenelg Highway and discharging into the proposed Ballarat West UGZ outfall sewer at Ross Creek Road (Precinct 1).
- Trunk Sewer – North-South Connector Road large diameter trunk asset (825-1050mm diameter) discharging to Glenelg Highway (Precinct 2).
- Trunk Sewer – North South Connector Road medium diameter trunk asset (600-750mm diameter) discharging south to the large diameter trunk sewer.
- Trunk Sewer – Conroy's Green small diameter trunk asset (375-525mm diameter) discharging west to the North South Connector Road enabling the decommissioning of the existing Conroy's Green and Winter Valley sewer pump stations.
- Trunk Sewer – Prospect Drive small diameter trunk asset (375-525mm diameter) discharging south-east to the North South Connector Road providing an outlet for Precinct 3.
- Trunk Sewer – Lakeland Drive Extension small diameter trunk asset (375-525mm diameter) discharging south to Prospect Drive and provides a gravity outlet for Lucas Estate and ultimately enables the decommissioning of Alfredton West sewer pump station.
- Trunk Sewer – Ballarat-Carngham Road West small diameter trunk asset (375-525mm diameter) discharging to Prospect Drive.
- Trunk Sewer – Ballarat-Carngham Road East small diameter trunk asset (375-525mm diameter) discharging to Prospect Drive and providing an outlet for the Trunk Lead Road sewer pump station.
- Trunk Sewer – Ballarat Skipton Rail Trail small diameter trunk asset (375-525mm diameter) discharging to the Trunk Lead sewer pump station and provides a gravity outlet for the Alfredton West Sewer Pump Station.
- Reticulation Sewers – Reticulation assets (225-300mm diameter) to convey flows within Precincts 1, 2 and 3 to the trunk sewers described above. These reticulation sewers are to be delivered by the developer as required to support development.

Refer to Figure 20, Figure 21 and Figure 22 below for high level concept options currently under investigation. Noting these are purely conceptual at this stage and subject to design, approval and funding.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

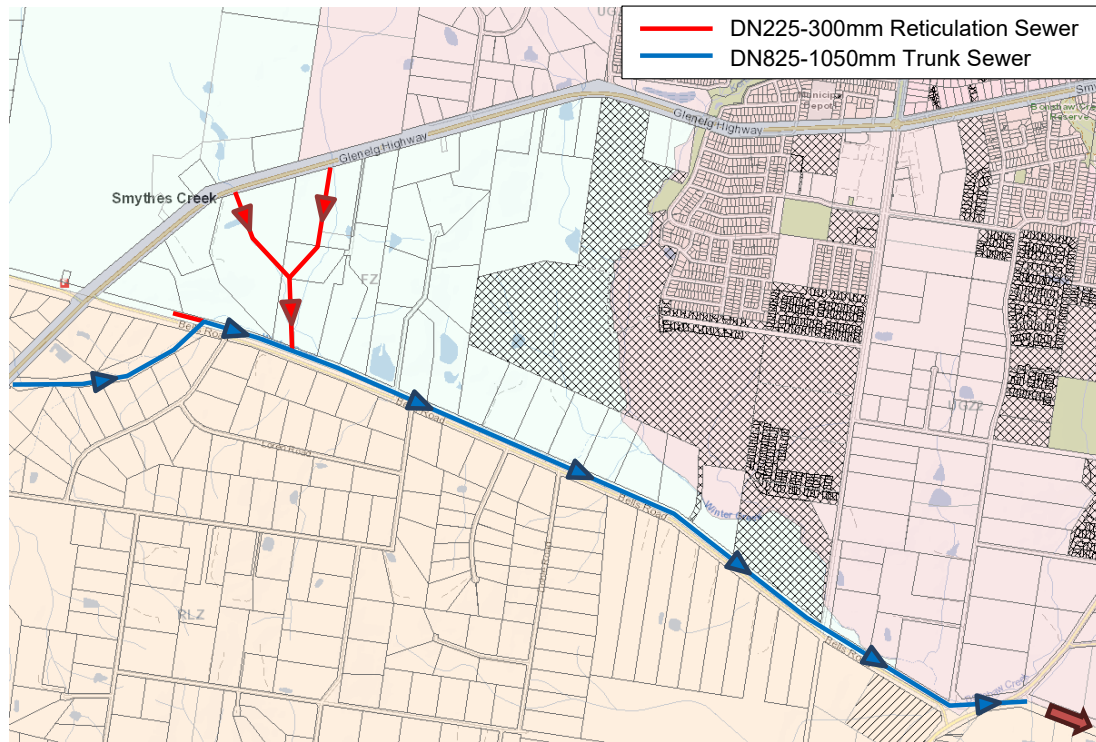


Figure 20: Possible sewer network extensions under investigation – Western Growth Area, Precinct 1.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

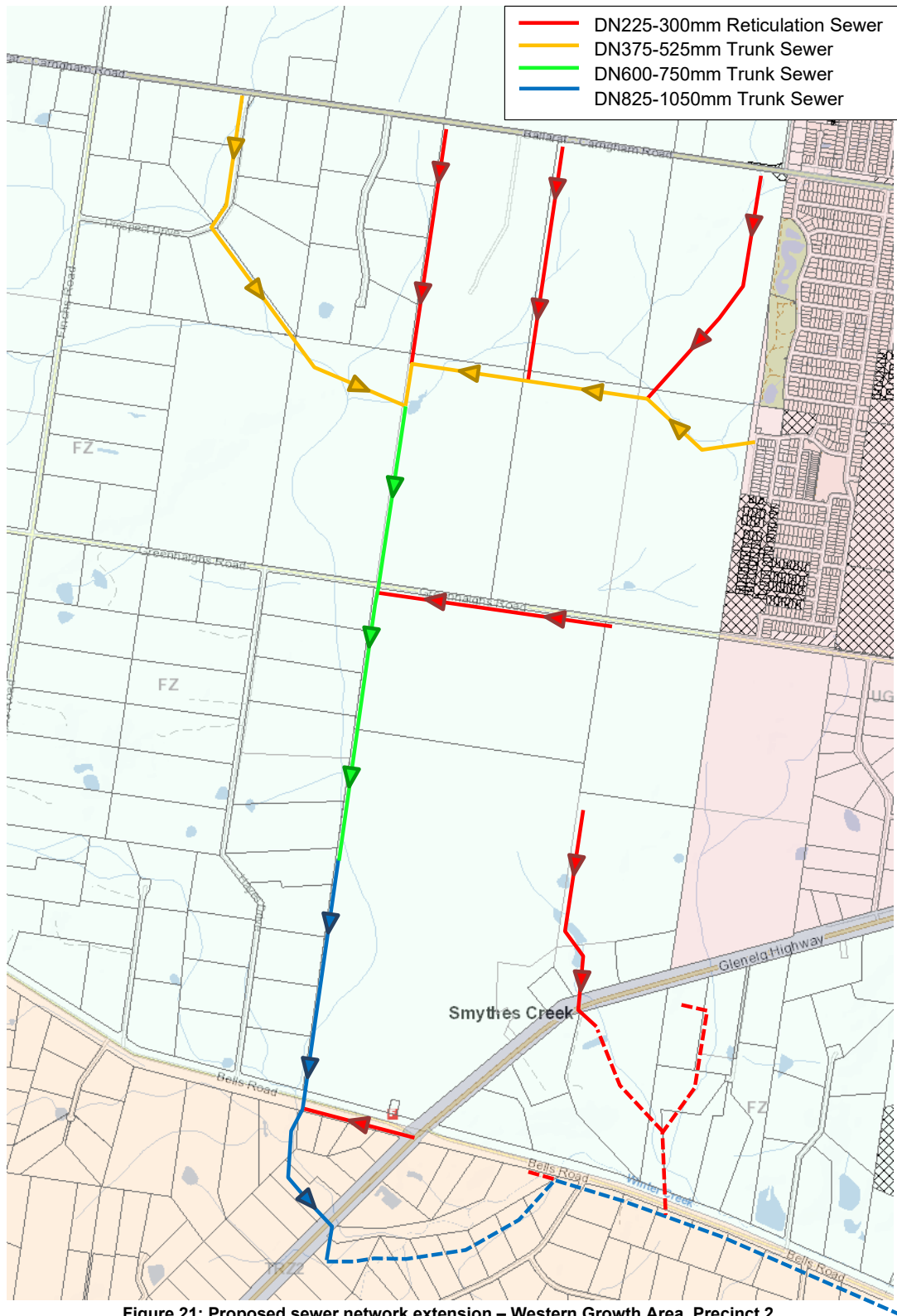


Figure 21: Proposed sewer network extension – Western Growth Area, Precinct 2.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

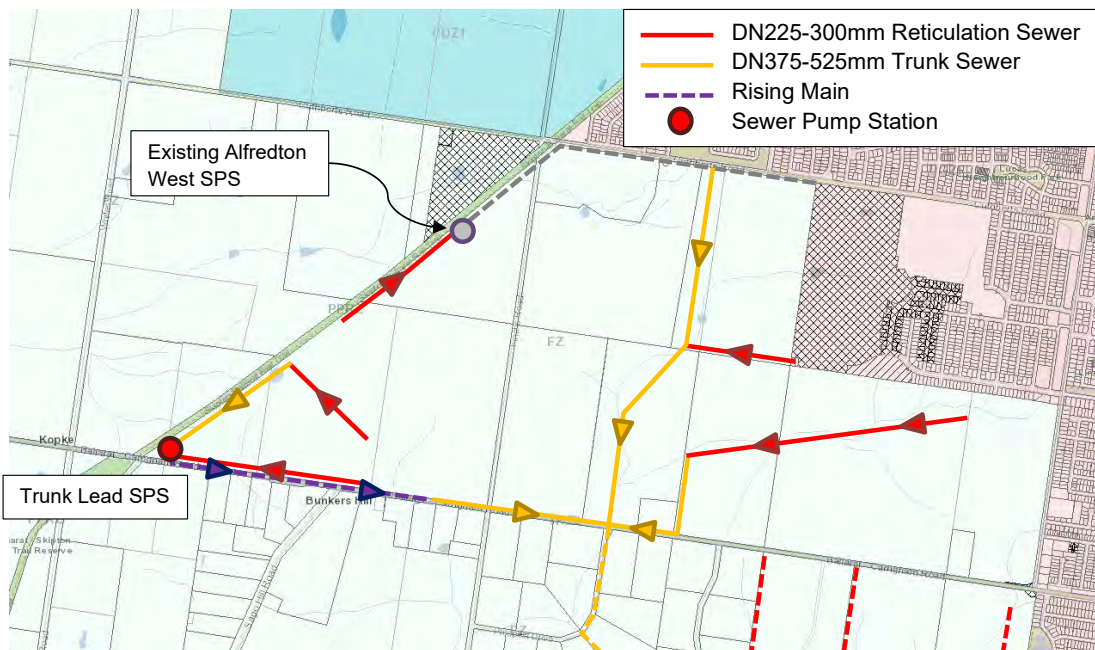


Figure 22: Proposed sewer network extension – Western Growth Area, Precinct 3.

Table 16: Western Growth Area, Estimated Sewer Design Flow, 15 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 15 dw / ha	Estimated Design Flow
1	199 ha	8 ha	191 ha	2,865	134-161 L/s
2	333 ha	13 ha	320 ha	4,800	211-253 L/s
3	364 ha	15 ha	349 ha	5,235	228-274 L/s

Table 17: Western Growth Area, Estimated Sewer Design Flow, 20 dwellings per hectare.

Precinct	Approx. NDHA	Non-Residential NDHA (4%)	Residential NDHA	Estimate Lot Yield 20 dw / ha	Estimated Design Flow
1	199 ha	8 ha	191 ha	3,820	155-186 L/s
2	333 ha	13 ha	320 ha	6,400	244-292 L/s
3	364 ha	15 ha	349 ha	6,980	263-316 L/s

Central Highlands Water reviewed and commented on proposed staging precincts within the North-Western Growth Area. This growth area has been considered as three precincts divided by Glenelg Highway and Ballarat-Carngham Road.

Table 18: Western Growth Area, Central Highlands Water Pros and Cons, Sewer Reticulation.

Precinct	Potential Works	Pros	Cons
1	Trunk sewer to connect to the Winter Creek Trunk Scheme and sewer pump station.	<ul style="list-style-type: none"> • Bottom of sewer catchment. • Road alignment for trunk sewer (Bells Road). • Consistent integration with Ballarat West UGZ. 	<ul style="list-style-type: none"> • Multiple landowners. • Risk of Winter Creek sewer pump station going ahead due to lack of capacity. • Oversized infrastructure initially.
2	Trunk sewer to link up with Precinct 1 works and rationalise sewer pump stations within adjacent catchments.	<ul style="list-style-type: none"> • Rationalise sewer pump stations at Aberdeen, Winter Valley etc.... • Large land parcels, fewer ownership issues. • Simple Topography • Simple interim solution (single SPS). 	<ul style="list-style-type: none"> • Requires trunk sewer to be constructed through Precinct 1. • Existing downstream constraints at Delacombe and Cherry Flat. • Oversized infrastructure initially.
3	Trunk sewer to link up with Precinct 2 works and rationalise sewer pump stations within adjacent catchments, sewer pump station at adjacent to Skipton Rail Trail and rising main.	<ul style="list-style-type: none"> • Partial area serviced by the existing Alfredton West sewer pump station. • Rationalise sewer pump station at Lucas Grange Estate. • Potential to accept excess flows from Cardigan Village. 	<ul style="list-style-type: none"> • Requires trunk sewer to be constructed through Precinct 1 & 2. • Requires additional sewer pump stations. • Interim solution (SPS) may have downstream restrictions at discharge point.

8.2.5 Expected Funding Arrangements

The Essential Services Commission (ESC) specifies how water businesses levy New Customer Contributions (NCC). Central Highlands Water applies a Network Connection Charge. The levies collected by Central Highlands Water are utilised to fund trunk infrastructure and shared asset projects which are essential to service areas of new development.

Central Highlands Water is responsible for funding trunk infrastructure and shared assets. Developers are responsible for providing reticulation assets and temporary reticulation works and the cost to connect the development to the Central Highlands Water network. Developers are also responsible for the financing costs associated with bringing forward the provision of shared assets and temporary shared works that Central Highlands Water had programmed to be constructed at a future date. The ESC guidelines determine that Central Highlands Water may levy a charge that will cover the financing costs associated with bringing forward the provision of Shared Assets. This is referred to as an Incremental Financing Cost charge.

8.2.6 Estimated Project Costs, North-Western Growth Area

High level construction costs for the sewer main projects identified in section 8.2.3 have been estimated by Taylors. These costs include allowance for pipe construction, contingency, survey & design, traffic management and contractor overheads, refer to Table 19.

Table 19: North-Western Growth Area, Estimated Sewer Main Project Costs.

Project Location	Project Type	Pipe Length	Estimated Cost
Smarts Hill Road (Precinct 4)	Trunk Sewer (375-525mm)	1,075m	\$1.89M
Finchs Road (Precinct 4)	Trunk Sewer (375-525mm)	1,025m	\$2.16M
Draffins Road (Precinct 5)	Trunk Sewer (375-525mm)	950m	\$1.75M
Cuthberts SPS & Rising Main (Pre 4)	SPS & Rising Main (375-525mm)	1,700m	\$6.00M
Smarts Hill SPS & Rising Main (Pre 4)	SPS & Rising Main (375-525mm)	850m	\$5.03M
Draffins SPS & Rising Main (Pre 5)	SPS & Rising Main (375-525mm)	3,350m	\$6.97M
Developer Reticulation Sewers (Pre 4)	Reticulation Sewer (225-300mm)	7,050m	\$10.25M
Developer Reticulation Sewers (Pre 5)	Reticulation Sewer (225-300mm)	3,800m	\$5.30M
		Total	\$39.35M

8.2.7 Estimated Project Costs, Western Growth Area

High level construction costs for the sewer main projects identified in section 8.2.4 have been estimated by Taylors. These costs include allowance for pipe construction, contingency, survey & design, traffic management and contractor overheads, refer to Table 20.

Table 20: Western Growth Area, Estimated Sewer Main Project Costs.

Project Location	Project Type	Pipe Length	Estimated Cost
Bells Road (Precinct 1)	Trunk Sewer (825-1050mm)	4,900m	\$18.23M
North South Sewer to Glenelg Hwy (Pre 2)	Trunk Sewer (825-1050mm)	1,400m	\$4.71M
North South Sewer (Precinct 2)	Trunk Sewer (600-750mm)	1,600m	\$3.91M
Conroy's Green Outfall Sewer (Precinct 2)	Trunk Sewer (375-525mm)	1,450m	\$2.55M
Prospect Drive (Precinct 2)	Trunk Sewer (375-525mm)	1,400m	\$2.86M
Lakeland Drive Extension (Precinct 3)	Trunk Sewer (375-525mm)	850m	\$1.55M
Ballarat Carngham Road East (Precinct 3)	Trunk Sewer (375-525mm)	700m	\$1.37M
Ballarat Carngham Road West (Precinct 3)	Trunk Sewer (375-525mm)	1,050m	\$2.20M
Ballarat Skipton Rail Trail (Precinct 3)	Trunk Sewer (375-525mm)	1,700m	\$2.99M
Trunk Lead SPS & Rising Main (Precinct 3)	SPS & Rising Main (375-525mm)	1,050m	\$5.76M

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Project Location	Project Type	Pipe Length	Estimated Cost
Developer Reticulation Sewers (Pre 1)	Reticulation Sewer (225-300mm)	1,325m	\$1.86M
Developer Reticulation Sewers (Pre 2)	Reticulation Sewer (225-300mm)	4,200m	\$6.10M
Developer Reticulation Sewers (Pre 3)	Reticulation Sewer (225-300mm)	3,300m	\$4.60M
		Total	\$58.69

8.2.8 Summary of Outcomes

- Central Highlands Water owns and maintains a significant reticulated sewer network in Ballarat including existing infrastructure in the vicinity of the North-Western and Western Growth Areas.
- The existing sewer network has capacity to service the existing customer base but will not be able to service the Western and North-Western Growth Areas without significant augmentation to the supply network.
- Sewer flows from the North-Western and Western Growth Areas ultimately discharge to the Ballarat South Wastewater Treatment Plant.
- A high-level concept plan for upgrades has been prepared including large diameter trunk sewer mains and sewer pump stations. Noting the concept plan is indicative at this stage and will be subject to change as design, approval and funding is obtained.
- Central Highlands Water may reimburse Developers for construction of shared assets using funds collected from new customer contributions. Where shared assets are proposed to be constructed by Developers prior to their scheduled delivery, then Developers may be liable for incremental finance costs.
- Interim solutions will be considered and assessed by Central Highlands Water on a case-by-case basis. Any interim solutions may still require operational controls or network augmentation to ensure adequate levels of service.

8.3 ELECTRICITY

Powercor is the responsible authority for the provision of electricity supply to the Ballarat North-Western and Western Growth Areas.

Powercor has two existing zone substations in Ballarat. These two zone substations are the Ballarat North (BAN) zone substation in Norman Street, Wendouree and the Ballarat South (BAS) zone substation in Sutton Street, Delacombe. Powercor's existing 22kV high voltage feeder network is coloured blue in Figure 23 below. Solid blue lines represent overhead high voltage lines and dotted blue lines represent underground high voltage cables.

8.3.1 Existing Services, North-Western Growth Area

Powercor has advised that existing high voltage overhead feeders run through the North-Western Growth Area. The existing feeder BAS24 runs along the northern side of Remembrance Drive with additional feeders on the eastern side of Dowling Road and on the eastern side of Draffins Road. Additionally, there is a two-phase overhead line on the southern side of Cuthberts Road which is fed via Whites Road, refer to Figure 23.

There are underground high voltage cables in Lucas Estate to the south-east however they are separated from the North-Western Growth Area by the Ballarat-Skipton Rail Trail reserve.

It important to note that Powercor has advised there will need to be upgrades to the existing infrastructure to accommodate ultimate development of the new growth area.

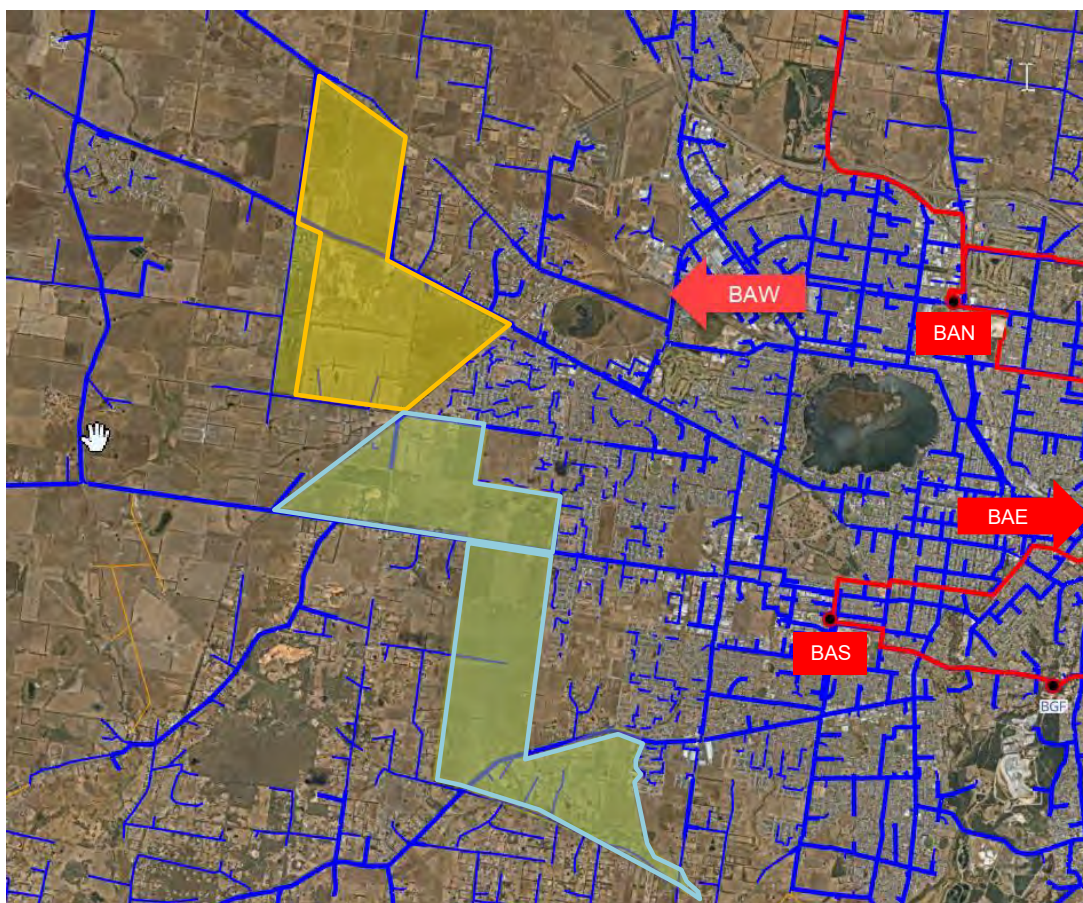


Figure 23: Existing Powercor Network.

8.3.2 Existing Services, Western Growth Area

Powercor has advised that existing high voltage overhead feeders run through the Western Growth Area. The existing BAS11 feeder runs along the northern side of Ballarat – Carngham Road and existing BAS33 feeder runs along the southern side Glenelg Highway. There are additional overhead feeders in Cuthberts Road to the east of the Ballarat-Skipton Rail Trail reserve, approximately 800 metres of overhead line along Finchs Road south of Cuthberts Road, approximately 600 metres of overhead line along Greenhalghs Road from the western boundary, and an overhead feeder on the southern side of Bells Road, refer to Figure 24.



Figure 24: Western Growth Area south of Cuthberts Road.

There are underground high voltage cables in Lucas Estate on the north side of Cuthbert Road and on the eastern side of Dyson Road servicing Chase Estate, Conroy's Green and Winter Valley Estates along the eastern boundary of the growth area, refer to Figure 25.

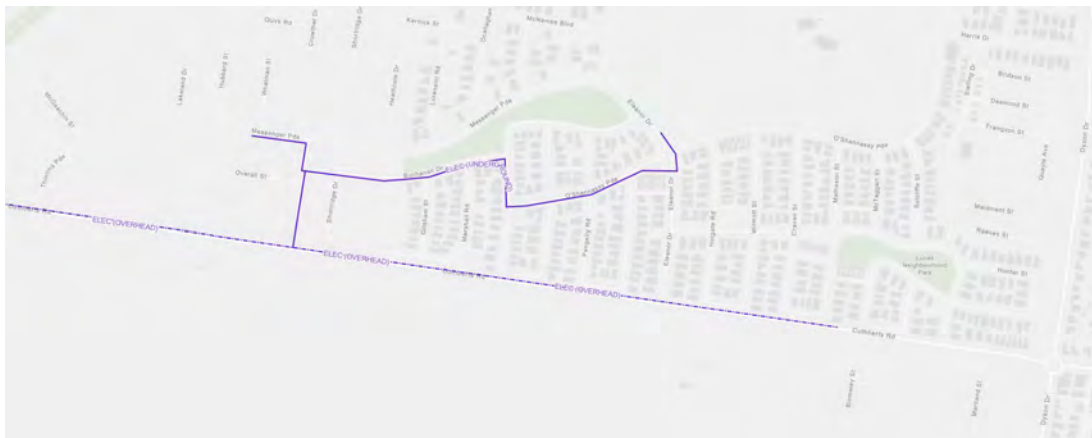


Figure 25: Western Growth Area North of Cuthberts Road.

It important to note that Powercor has advised that the existing electrical supply network will need to be upgraded to accommodate ultimate development of the new growth area.

8.3.3 Future Servicing Arrangements

Powercor's current infrastructure upgrade planning includes the Ballarat East (BAE) zone substation, located in York Street, Ballarat East, and is programmed for construction in 2025. Longer term planning (ten plus years) includes the construction of the Ballarat West (BAW) zone substation at Ballarat Link Road near Blind Creek Road, Cardigan. The timing of the future Ballarat West (BAW) zone substation is subject to load growth.

Powercor plans to build a new BAS31 feeder to Sebastopol and Delacombe in 2023/24 which will provide additional capacity in the Western and North-western Growth Areas. Additionally, Powercor plans to build a new high voltage feeder in Cuthberts Road in 2023 and then extend the BAN13 feeder into the Alfredton area which will also provide additional capacity in the Western and North-Western Growth Areas.

Powercor advises that Ballarat is an existing Rapid Earth Fault Current Limiter (REFCL) area. A REFCL operates like a big safety switch in the electricity network. These are used to help reduce the risk of bushfires and have been operating in some locations in Victoria since 2017.

As the name suggests, the REFCL network limits the amount of energy released when an earth fault occurs on a powerline. An earth fault happens when a powerline touches the ground, a tree falls on a powerline, or wildlife touches the pole and powerline at the same time. A REFCL can detect when a fault occurs and significantly limits the energy flow within a tenth of a second. For example, if one line out of a three-phase powerline falls to the ground, the REFCL reduces the voltage on the fallen line and at the same time increases the voltage on the remaining two lines.

This means power supply can be maintained to surrounding homes and businesses while reducing the possibility of a fire starting, or of a person or animal nearby receiving an electric shock. Without a REFCL network, these faults can cut power for several minutes or even hours, can lead to fires, or even property damage.

It is likely that REFCL isolating transformers will be required within new development areas. The location of REFCL isolating transformers within new development areas will be in the vicinity of existing feeders as noted above. The requirement for, and location of, any REFCL isolating transformers will be evaluated and communicated on a case-by-case basis for each specific development.

All future electricity infrastructure within new developments will be underground and kiosk substations will be required within new development areas. When determining supply requirements in new development areas Powercor will take into account that new dwellings may include solar, battery storage and electric vehicle charging capability (nominal After Diversity Maximum Demand of 5kVA per residential allotment).

The Victorian Government's recent announcement to ban gas connections to new homes from January 2024 will increase the demand on electricity and it is anticipated Powercor's requirement per lot will increase to 8kVA. This will increase requirements for both cables and kiosk substations.

Powercor can provide supply for new development areas adjacent to the existing high voltage feeders. More specifically:

- BAN13 to be extended into the Alfredton area
 - forecast load (summer time 50% Probability of Exceedance, with augmentation) at summer 2024/2025 will be 11.04MVA with a summer time feeder rating of 12MVA, with spare capacity of 0.96MVA.
- BAS24 northern side of Remembrance Drive
 - forecast load (summer time 50% Probability of Exceedance, with augmentation) at summer 2024/2025 will be 6.74MVA with a summer time feeder rating of 14.2MVA, with spare capacity of 7.46MVA.
- BAS11 northern side of Ballarat – Carngham Road
 - forecast load (summer time 50% Probability of Exceedance, with augmentation) at summer 2024/2025 will be 10.18MVA with a summer time feeder rating of 12MVA, with spare capacity of 1.82MVA.
- BAS31 feeder to Sebastopol and Delacombe in 2023/24
 - forecast load (summer time 50% Probability of Exceedance, with augmentation) at summer 2024/2025 will be 7.29MVA with a summer time feeder rating of 12MVA, with spare capacity of 4.71MVA.
- BAS33 southern side Glenelg Highway
 - forecast load (summer time 50% Probability of Exceedance, with augmentation) at summer 2024/2025 will be 6.99MVA with a summer time feeder rating of 12MVA, with spare capacity of 5.01MVA.

8.3.4 Expected Funding Arrangements

Zone substations and sub-transmission network augmentation will likely be funded by Powercor as part of the shared upstream network augmentation. Out of sequence upgrades to the 22kV feeder network may incur cost to the Developer, however this cannot be confirmed until an application is made.

8.3.5 Summary of Outcomes

- Existing overhead 22kV feeders currently run through the North-Western and Western Growth Areas and are supplied by the Ballarat North (BAN) and Ballarat South (BAS) Zone Substations.
- Powercor plans to construct a new Ballarat East (BAE) Zone Substation most likely in 2025 and longer term a new Ballarat West (BAW) Zone Substation to meet increased load as development continues and new high voltage feeders to service Sebastopol, Delacombe and Alfredton.
- All new developments within the North-Western and Western Growth Areas are to be provided with underground electricity infrastructure in accordance with Powercor's subdivisional guidelines. At this stage kiosk substations supply requirements are based on a nominal After Diversity Maximum Demand of 5kVA per residential allotment. As a result of the Victorian Government's recent ban on gas connections to new homes from January 2024, we are expecting Powercor's requirement per lot to increase to 8kVA. This will increase requirements for both cables and kiosk substations.
- Powercor can supply the North-Western and Western Growth Areas from within the spare capacity in the existing overhead feeders based on current forecast loads, however ultimate development of the growth areas will require upgrades to the Powercor network.
- Interim solutions will be considered and assessed by Powercor on a case-by-case basis. Out of sequence works or upgrades to the 22kV feeder network may incur costs to the Developer.

8.4 TELECOMMUNICATION SERVICES

The Australian Government’s Telecommunications Infrastructure in New Developments Policy requires developers to provide telecommunications infrastructure in new residential developments. If a developer does not want to use a private telecommunications supplier National Broadband Network (NBN) Co and Telstra are the infrastructure providers of last resort (IPOLR). This means NBN Co or Telstra must provide infrastructure on commercially agreed terms if no one else is supplying it. Generally, NBN Co is the IPOLR for developments larger than 100 allotments and Telstra is the IPOLR for developments smaller than 100 allotments.

8.4.1 Existing Services, North-Western Growth Area

NBN Co. has advised that the proposed North-Western Growth Area is not currently serviced by its fixed line, fibre optic network, however some assets are available along the eastern growth area boundary particularly within the Lucas Estate, albeit separated from the growth area by the Ballarat-Skipton Rail Trail reserve. NBN Co. advises that substantial investment will need to be made to extend current infrastructure into the North-Western Growth Area however it does not foresee any constraints or issues with future infrastructure installation, but any extensions are most likely to be developer lead.

The existing rural properties within the North-Western Growth Area are currently serviced via the existing Telstra network comprising both copper and optic fibre cables. Telstra cables are located on both sides of Remembrance Drive, the eastern side of Dowling Road, the western side of Draffins Road, the western side of Finchs Road and on the northern side of Cuthberts Road, refer to Figure 26.

Optus has an optic fibre cable that runs through the southern half of the North-Western Growth Area with the cable on the southern side of Smarts Hill Road, the eastern side of Finchs Road and then continuing east along the northern side of Cuthberts Road.

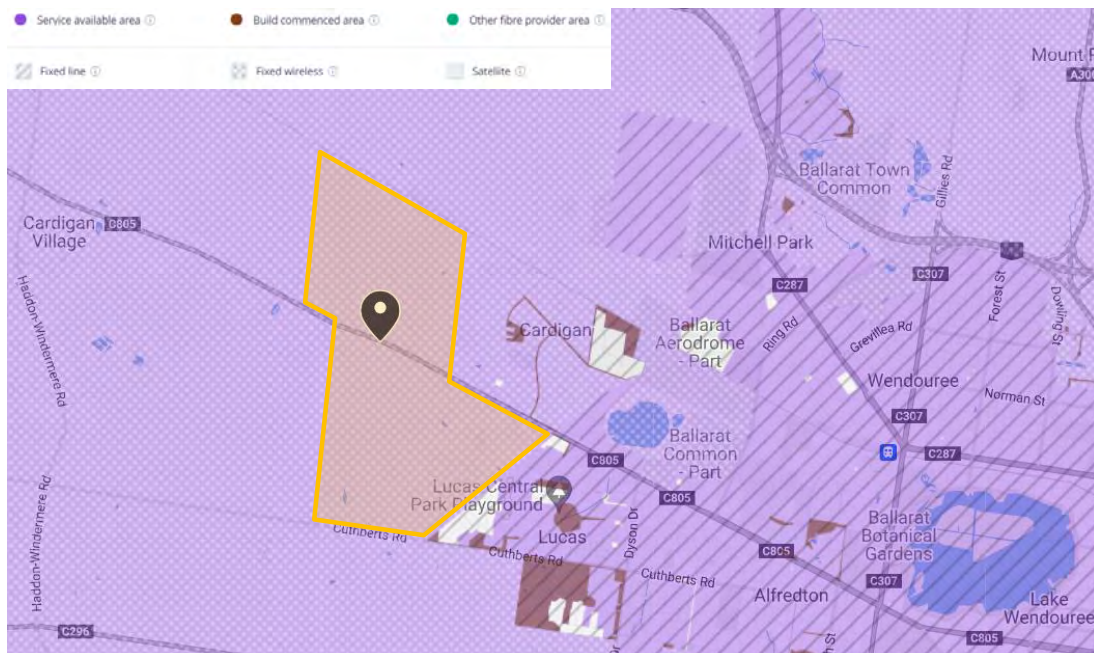


Figure 26: NBN Network – North-Western Growth Area.

8.4.2 Existing Services, Western Growth Area

NBN Co. has advised that the proposed Western Growth Area is not currently serviced by its fixed line fibre optic network, however some assets are available along the northern boundary within the Lucas Estate and along the eastern and south-eastern boundary, particularly within the Chase Estate, Conroy’s Green, Winter Valley and Pinnacle Estates. NBN Co. advises that substantial investment will need to be made to extend current infrastructure into the Western Growth Area however it does not foresee any constraints or issues with future infrastructure installation, but any extensions are most likely to be developer lead.

The existing rural properties within the Western Growth Area are currently serviced via the existing Telstra network comprising both copper and optic fibre cables. Telstra cables are located on both sides of Cuthberts Road, both sides of Finchs Road, the southern side of Ballarat-Carngham Road, the western side of Dyson Road, the southern side of Greenhalghs Road, both sides of Glenelg Highway and both sides of Bells Road. Critically, there is a cable that runs between Greenhalghs Road and Bells Road through the property at 624 Glenelg Highway and Lot 1 Greenhalghs Road, refer to Figure 27.

Optus has an optic fibre cable that runs along the northern side of Cuthberts Road along the north boundary of the Western Growth Area and also on the southern side of Greenhalghs Road.

There are two mobile phone towers within the Western Growth Area which include a tower on the eastern side of Finchs Road approximately 800 metres south of Cuthberts Road, and on the southern side of Greenhalghs Road approximately 2 kilometres east of Finchs Road. Discussion with Telstra has indicated that cost to relocate the phone towers and associated infrastructure is expected to be between \$2-4 million and where there are multiple service providers using the tower these costs can be higher. Further, relocation of the towers would not be acceptable if it resulted in a loss of network coverage or quality. It is recommended by Telstra that phone towers be retained in their current location unless there is a strong case for relocation.

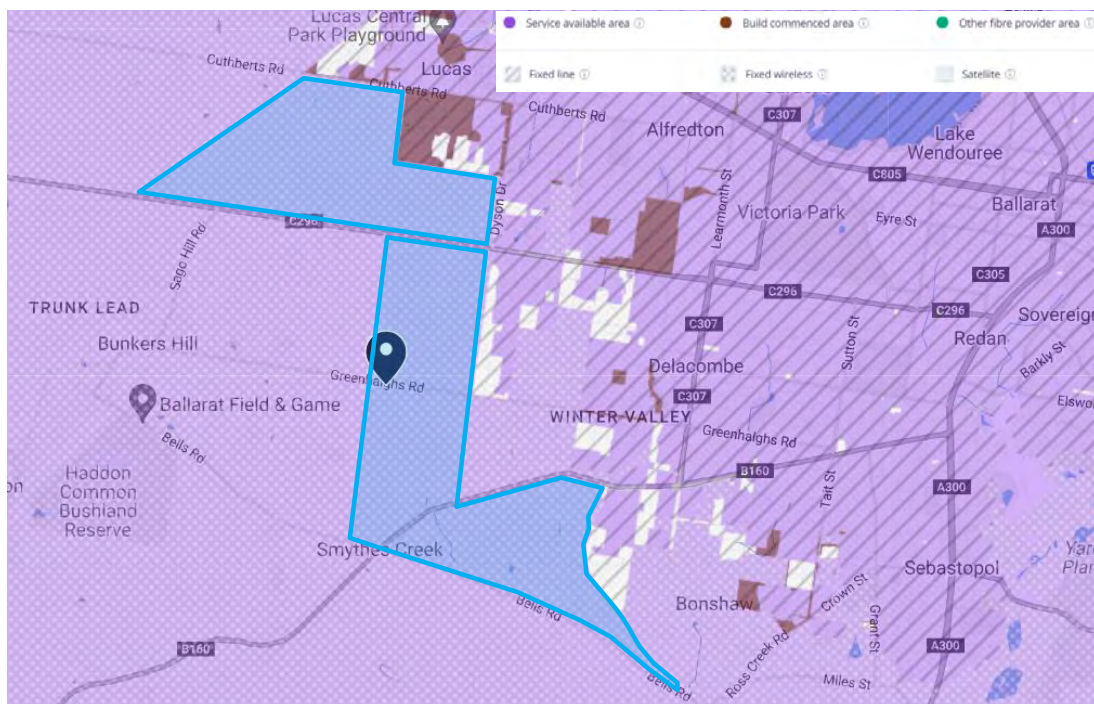


Figure 27: NBN Network – Western Growth Area.

8.4.3 Future Servicing Arrangements

NBN Co. has confirmed that due to proximity of the existing fixed line network in Lucas, Winter Valley and Delacombe, there is no foreseeable impediment to expansion of the network into the North-Western and Western Growth Areas. It is likely that fixed line service, such as Fibre to the Premises (FTTP) technology would be made available to new developments within the future growth areas.

The North-Western Growth Area will connect to the NBN Fibre Access Node (FAN) site at 1113 Howitt Street, Wendouree. NBN Co. advises that the Wendouree FAN site has capacity to service the North-Western Growth Area.

The Western Growth Area will connect to the NBN FAN site located at 904 Skipton Street, Redan. NBN Co. advises that the Redan FAN site has capacity to service the Western Growth Area.

Servicing of the North-Western and Western Growth Areas would be planned on a case-by-case basis and driven primarily by customer-initiated demand, utilising developer supplied trenching arrangements. Any new build (conduit & cable) within the growth areas would connect to the NBN network via the main road arterial routes through the growth area. Main road arterial routes are identified but not limited to Remembrance Drive, Cuthberts Road, Ballarat-Carngham Road, Greenhalghs Road and Glenelg Highway.

All NBN conduits and cabling are to be routed along existing and proposed road reserves. No dedicated easements through private property will be permitted.

8.4.4 Expected Funding Arrangements

The developer's responsibilities will include:

- Design of pit and pipe infrastructure to NBN's specifications and standards and submission to NBN for review prior to installation.
- Installation of pit and pipe infrastructure to NBN's specifications and standards.
- Payment of NBN deployment contributions in accordance with the Telecommunications Infrastructure in New Developments (TIND) policy. Developer contribution charges only apply to developers and builders. It is a flat rate charged for:
 - Single Dwelling Units (SDUs): \$600 inc. GST per premises.
 - Multi Dwelling Units (MDUs): \$400 inc. GST per premises.
- Payment of Backhaul contributions if applicable.

NBN Co. has advised it is open to working with other Utility Service Providers (USPs), Government and other utilities to cater for the growth within the North-Western and Western Growth Areas. NBN Co. would also consider significant one-off investments, if deemed necessary, to accommodate future growth. Opportunities may arise to facilitate possible trench sharing opportunities either with Council/Department of Transport and Planning or other utility owners.

NBN Co. advises that some difficulties may arise with the NBN network being located on both sides of the Ballarat-Skipton rail line. As such, NBN would be interested in being involved in any additional service crossings that occur. NBN are constrained by boundaries such as railways, freeways, and watercourses, so any additional crossings enable NBN to increase the robustness of the network.

8.4.5 Summary of Outcomes

- The North-Western and Western Growth Areas are not currently serviced by NBN's fixed line fibre optic network.
- Telstra supplies existing rural properties within the North-Western and Western Growth Areas via its copper and optic fibre network.
- Optus owns and maintains optic fibre cables in the North-Western and Western Growth Areas.
- The Western Growth Area contains two mobile phone towers. It is recommended that the phone towers be retained in their current locations unless there is a strong case for relocation.

- The North-Western Growth Area can be serviced via extension of the NBN fixed line fibre optic network along Remembrance Drive and Cuthberts Road and will connect to the Wendouree Fibre Access Node site.
- The Western Growth Area can be serviced via extension of the NBN fixed line fibre optic network along Cuthberts Road, Ballarat-Carngham Road, Greenhalghs Road and Glenelg Highway and will connect to the Redan Fibre Access Node site.
- Interim solutions will be considered and assessed by NBN Co. on a case-by-case basis. Out of sequence works or upgrades to the fixed line network may incur backhaul costs to be borne by the Developer.

8.5 GAS

APA Group is the responsible authority for gas transmission pipelines with Victoria and AusNet Gas Services is responsible for the gas distribution network. Natural Gas is conveyed through transmission pressure pipelines at pressures greater than 2,500 kPa. The high gas pressures are reduced at specific locations along the transmission network, known as City Gates. A City Gate includes a custody transfer meter and gas regulator heater. The custody transfer meter allows APA to monitor gas volumes extracted from the transmission pipeline. The gas regulator heater is used to regulate temperature fluctuations that occur due to pressures changes. Once the gas pressures have been reduced, they are transferred to the gas distribution network which supplies customers.

8.5.1 Existing Servicing, North-Western Growth Area

AusNet Gas Services has advised that it owns and operates an existing high pressure distribution network in the North-Western Growth Area, which includes a 150mm diameter steel pipeline on the southern side of Remembrance Drive that supplies natural gas to Cardigan Village. A 63mm diameter polyethylene main has been extended approximately 90 metres south along the eastern side of Whites Road, refer to Figure 28.

The balance of the North-Western Growth Area is not serviced with reticulated natural gas supply.



Figure 28: High Pressure Reticulation Gas Main – Remembrance Drive.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



The suburb of Lucas, to the east of the North-Western Growth Area, has been fully reticulated with natural gas supply and is fed from the 150mm diameter main in Remembrance Drive, refer to Figure 29.

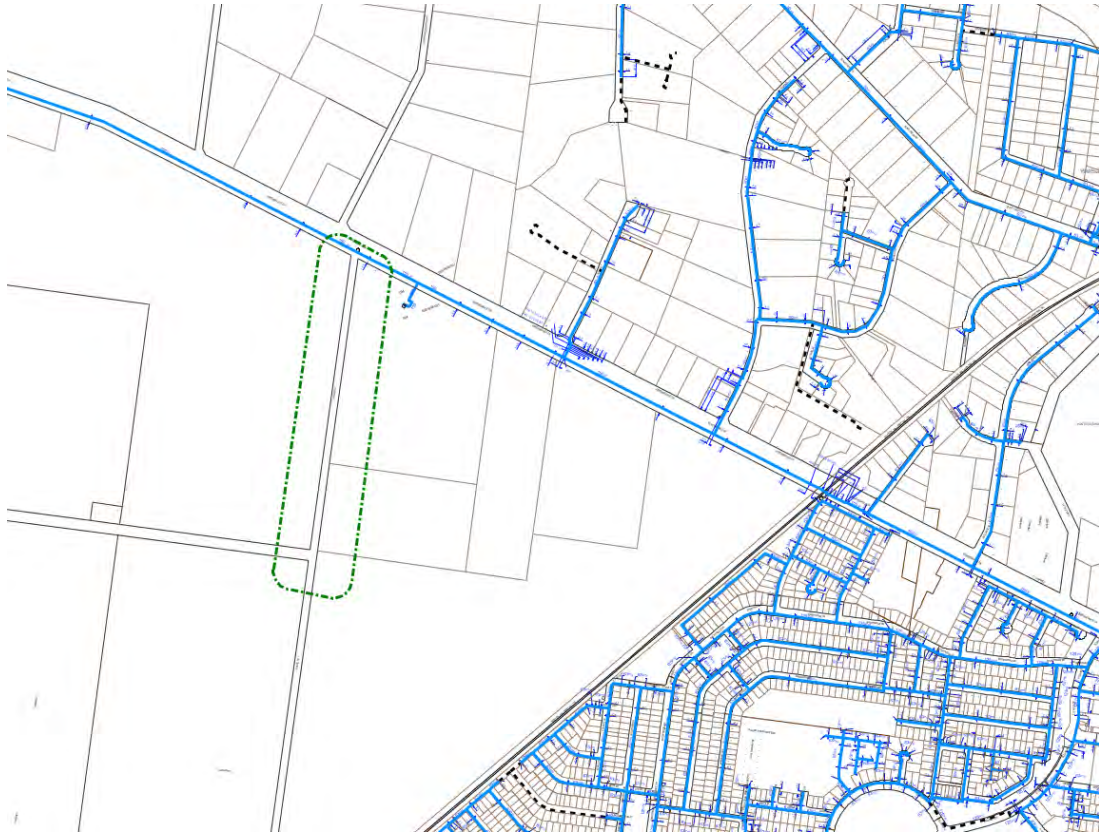


Figure 29: High Pressure Reticulation Gas Main – Remembrance Drive & Lucas.

8.5.2 Existing Servicing, Western Growth Area

AusNet Gas Services has advised that it owns and operates an existing high pressure distribution network in the Western Growth Area (refer to Figure 30), and includes:

- a 125mm diameter polyethylene main on the north side of Cuthberts Road.
- a 63mm diameter polyethylene main at the intersection of Cuthberts Road and Lakeland Drive, including an extension into Lot 2 (PS835474) Cuthberts Road ready for the extension of Lakeland Drive.
- a 125mm diameter polyethylene main on the western side of Dyson Drive between Fawcett Road and Ballarat-Carngham Road.
- a 125mm diameter polyethylene main on the north side of Greenhalghs Road, however it has not been extended to the boundary of the Western Growth Area. It currently terminates approximately 1.2km to the east at Winter Valley.
- a 125mm diameter polyethylene main on the northern side of Glenelg Highway with a 63mm diameter main on the eastern side of Kensington Boulevard. These mains terminate at the boundary of the Western Growth Area.
- a 125mm diameter polyethylene main has been constructed on the eastern side of Cherry Flat Road, however, it currently does not extend to Bells Road. It terminates approximately 1.6km from Cherry Flat Road, however plans show the main to be extended to Schreenans Road.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



The balance of the Western Growth Area is not serviced with reticulated natural gas supply.

The existing residential subdivisions to the east of the Western Growth Area have been fully reticulated with natural gas supply and are fed from the 125mm diameter mains in Dyson Drive, Ballarat-Carngham Road, Greenhalghs Road and Glenelg Highway, refer to Figure 31, Figure 32 and Figure 33.



Figure 30: High Pressure Reticulation Gas Main – Cuthbert Road & Surrounding Developments.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Figure 31: High Pressure Reticulation Gas Main – Dyson Drive & Surrounding Developments.



Figure 32: High Pressure Reticulation Gas Main – Greenhalghs Road & Surrounding Developments.



Figure 33: High Pressure Reticulation Gas Main – Glenelg Highway & Surrounding Developments.

8.5.3 Future Servicing Arrangements

APA Group has confirmed that it does not have current plans to extend the transmission network further west, so a Ballarat West city gate is unlikely to be required.

AusNet Gas Services has advised that significant augmentation to its existing distribution network would be required to support the North-Western and Western Growth Areas. Planning is already underway to augment the supply to the Ballarat West UGZ which will also support the NGA and NWGA in the order of 2,000 to 2,500 allotments. AusNet advises that a new field regulator may be required to extend the high-pressure distribution network, however, these can be accommodated within a pit and reserve land. Providing capacity to the new growth areas will require a staged solution over multiple years.

Recently, the Victorian Government announced a new policy to phase out natural gas supply to new homes from the 1st of January 2024 to reduce Victoria's reliance on fossil fuels. This will be implemented through an amendment to the Victorian Planning Provisions and all planning schemes. This policy will affect the construction of new dwellings and residential subdivisions with planning permits but will not impact new dwellings that do not require a planning permit, existing homes with existing gas connections and will not impact renovations or extensions to existing dwellings. New residential subdivisions within the North-Western and Western Growth Areas will be impacted by the policy changes and will not be supplied with reticulated natural gas. Non-residential (commercial and/or industrial) uses may require natural gas supply and as such will need to be supplied via extensions to the existing distribution network. This matter should be reviewed prior to preparation of the Precinct Structure Plans as clean alternatives to natural gas may also have advanced enough for consideration.

8.5.4 Expected Funding Arrangements

AusNet Gas Services has advised that network augmentation to increase network capacity to service the future network expansion into the North-Western and Western Growth Areas would be funded by its Gas Access Arrangement Review (GAAR) submission. Developers would need to contribute to any mains extensions to reach their property. This contribution is based on an economic feasibility test which calculates the anticipated revenue from the provision of natural gas to the development and the anticipated cost of servicing the development. The feasibility test occurs when the formal new estate application is made by the developer.

8.5.5 Summary of Outcomes

- The North-Western and Western Growth Areas are largely not serviced by AusNet Gas Services' existing natural gas distribution network, with exception of a 150mm diameter main in Remembrance Drive and an existing distribution network within the Ballarat West UGZ.
- AusNet Gas Services has advised that significant augmentation to its existing distribution network would be required to support the North-Western and Western Growth Areas.
- The Victorian Government announced a new policy to phase out natural gas supply to new homes from the 1st of January 2024. This will be implemented through an amendment to the Victorian Planning Provisions and all planning schemes.
- Network augmentation to increase network capacity to service the future network expansion into the North-Western and Western Growth Areas would be funded by AusNet. Developers would need to contribute to any mains extensions to reach their property. This contribution is based on an economic feasibility test which calculates the anticipated revenue versus the anticipated cost to service.
- Interim solutions will be considered and assessed by AusNet Services on a case-by-case basis. Out of sequence works or upgrades to the natural gas distribution network may incur costs to the Developer.

8.6 STORMWATER MANAGEMENT

8.6.1 Existing Services

Alluvium Consulting (Alluvium) was engaged by Taylors to undertake an existing site analysis and assessment of drainage and waterway conditions. The high-level surface water and geomorphology assessment of the existing conditions has been completed to inform the future drainage strategy of the growth areas. This site analysis / preliminary strategy report is a first step in defining surface water management conditions for the two growth areas.

The Existing Conditions / Situational Analysis report is part of the Stormwater Management Strategy in Appendix A. The relevant sections summarise existing conditions and the current surface water runoff on the site, as well as issues and constraints that may impact upon the implementation of future stormwater management strategies.

Figure 34 shows the topography across the North-Western Growth Area. Elevation ranges from 448 m AHD along the south-eastern boundary of the site, to 409 m AHD at the north-western boundary along Draffins Road. The site generally falls in a north-westerly direction with the northern portion grades varying from 0.5% to 2.5%. The section south of Remembrance Drive is more complicated with separation of a ridge and trough lines which results in the land falling in south-westerly and north-westerly directions.

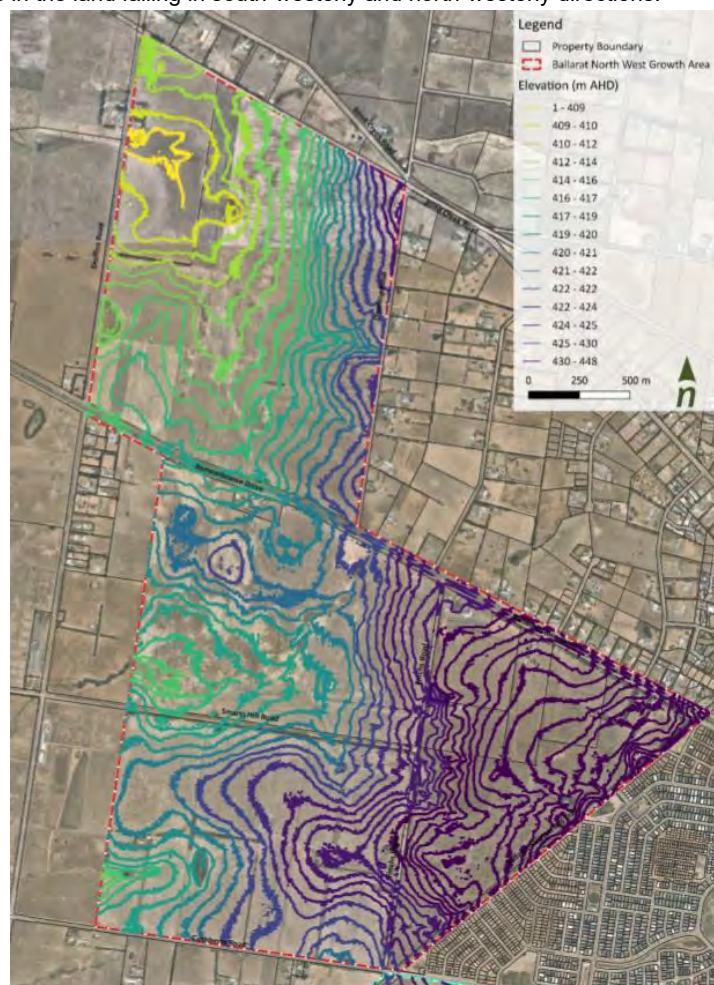


Figure 34: Topography - North-Western Growth Area.

Figure 35 shows the topography across the Western Growth Area. The elevation in the Western Growth Area ranges from 440 m AHD at the north, to 386 m AHD at the south-eastern end of the area boundary. The overall topography within the Western Growth Area falls in a southerly direction. A higher elevation area at the north results in the topography falling mainly in a southern direction towards the low point around Bells Road. From this location the land continues to fall towards the east along Bells Road. Overall, the Western Growth Area is steeper than the North-Western Growth Area, with grades varying from 1% to 4.5%.

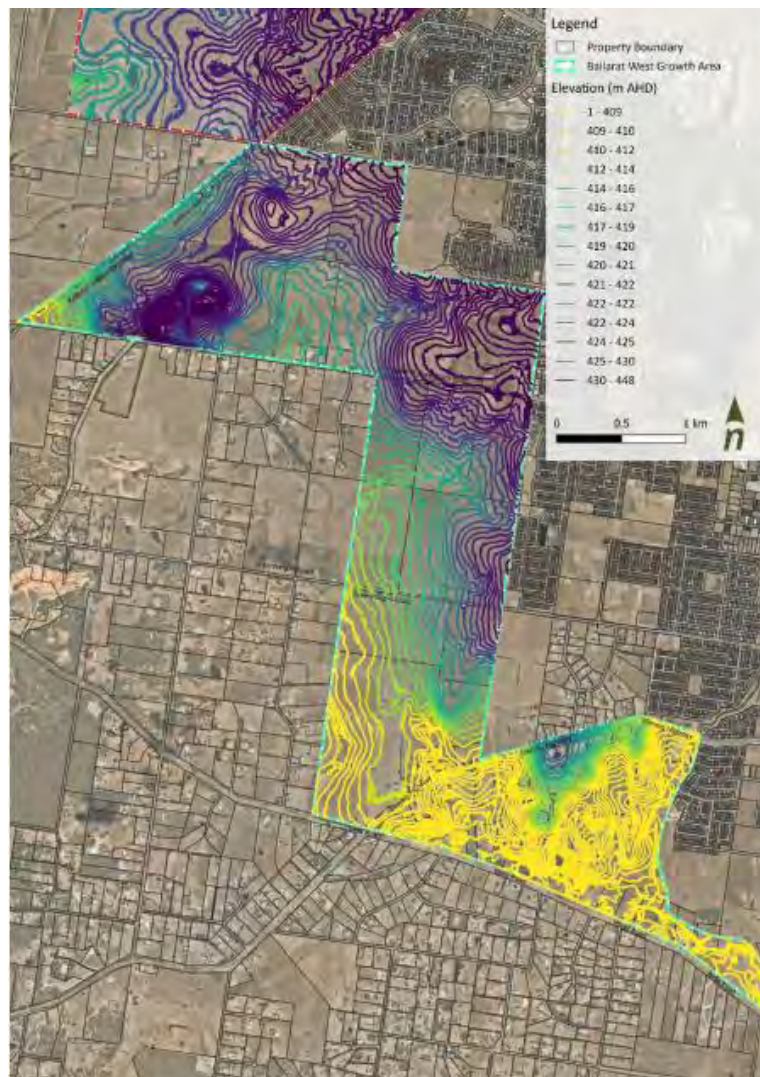


Figure 35: Topography - Western Growth Area.

Overall, the assessment found the headwater streams that line the study area have been extensively modified by agriculture, either by excavation of linear drainage lines, disconnection via road culverts or a complete change in form due to cropping. This history of land use and modification means that none of the waterways can be considered locally rare or threatened and for this reason have low geomorphic value.

Addition of stormwater flows from developments is likely to exacerbate backwater ponding upstream of the existing culverts and has the potential to cause some incision (deepening) of the waterways that are well defined. Overall, establishing appropriately designed constructed waterways that convey the runoff from the developed areas is an appropriate management of these waterways from a purely geomorphic form

perspective. In the upper reaches of the catchment where safe flow conveyance capacity allows, the existing drainage lines could potentially be modified to a pipe and road reserve as part of the urbanisation process.

A biodiversity assessment undertaken by Nature Advisory in 2022 was also reviewed as part of the assessment. The biodiversity assessment highlighted flora and fauna habitats in the south-east portion of the North-Western Growth Area and northern portion of the Western Growth Area where the impacts of development should be minimised to retain biodiversity.

The assessment also included a review of a Cultural Heritage Desktop assessment completed by Archaeological Excavations in 2021. The assessment confirmed no areas were identified within the Ballarat North-Western Growth Area that needed to be prevented from development or required the relevant approval for development; 11 places were identified within 200 m of the eastern boundary of the growth area.

The assessment then included extensive hydrologic modelling of both pre-development conditions and post development conditions. The hydraulic modelling is used to inform the future surface stormwater management strategy required for the growth areas and define the stormwater quantity and stormwater quality assets required to control the impact of development downstream.

The surface water management strategy is designed around:

- Stormwater quantity management – In the event of a 1 in 100 year ARI storm (1% AEP), post-development stormwater runoff rates are to be retarded back to the equivalent pre-development peak flow rates, before discharging downstream.
- Stormwater conveyance - Is typically designed according to a regime where minor flows up to and including a 1 in 5 year ARI storm (20% AEP) are conveyed via the sub-surface stormwater pit and pipe network and major flows between the 20% AEP and 1% AEP event are conveyed on the surface via roadways and waterways.
- Stormwater quality treatment – Concept measures are developed to meet the State Environmental Protection Policy (SEPP) best practice environmental management (BPEM) pollution reduction targets before being discharged into drainage networks and into receiving waters.
- Stormwater flow volume management - The Environment Protection Act includes a “general environmental duty (GED)” provision, which for urban growth requires consideration to be given to options that minimise the risk (as far as reasonably practical) to public health and the environment by managing the impacts from stormwater runoff that arises from land development.

The design and layout of the proposed assets are provided at a conceptual level later in this report.

8.6.2 Future Servicing Arrangements

Refer Appendix A for a full copy of the Stormwater Management Strategy (SWMS). As part of the SWMS a hydrologic analysis of the growth areas was completed to determine the post development peak runoff flow rates for various flood events throughout the catchment. The peak flow rates were then used to calculate the storage capacity requirements of future proposed retarding basins. The basins are designed to restrict the post developed peak stormwater runoff rates to equivalent predeveloped peak flowrate conditions. Analysis also determined the stormwater treatment wetland asset to be located within the base of each basin.

For an overview of basin location and modelling results refer Figure 36, Figure 37 and Figure 38 below.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

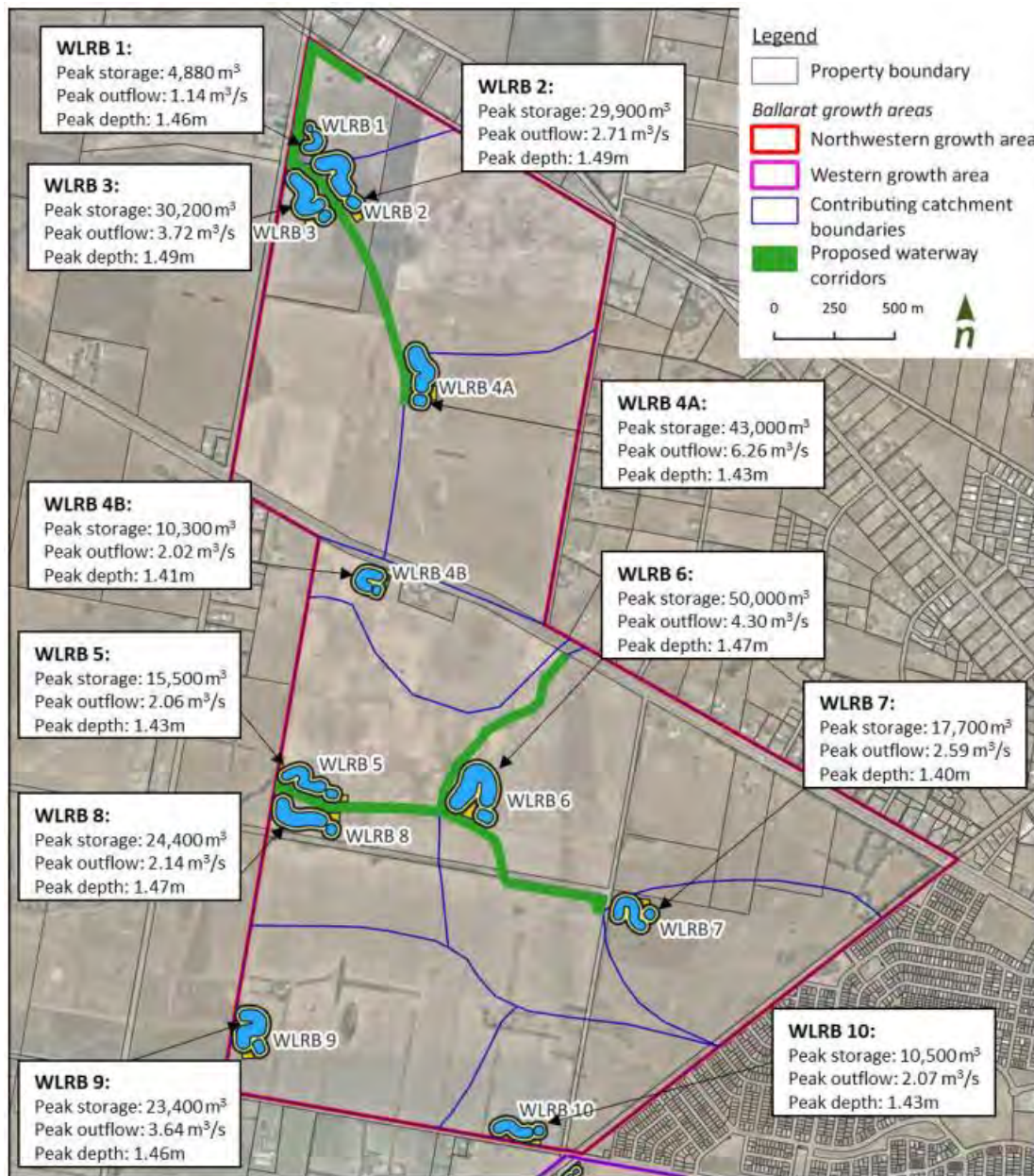


Figure 36: Retarding basin locations and modelling results - North-Western Growth Area.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

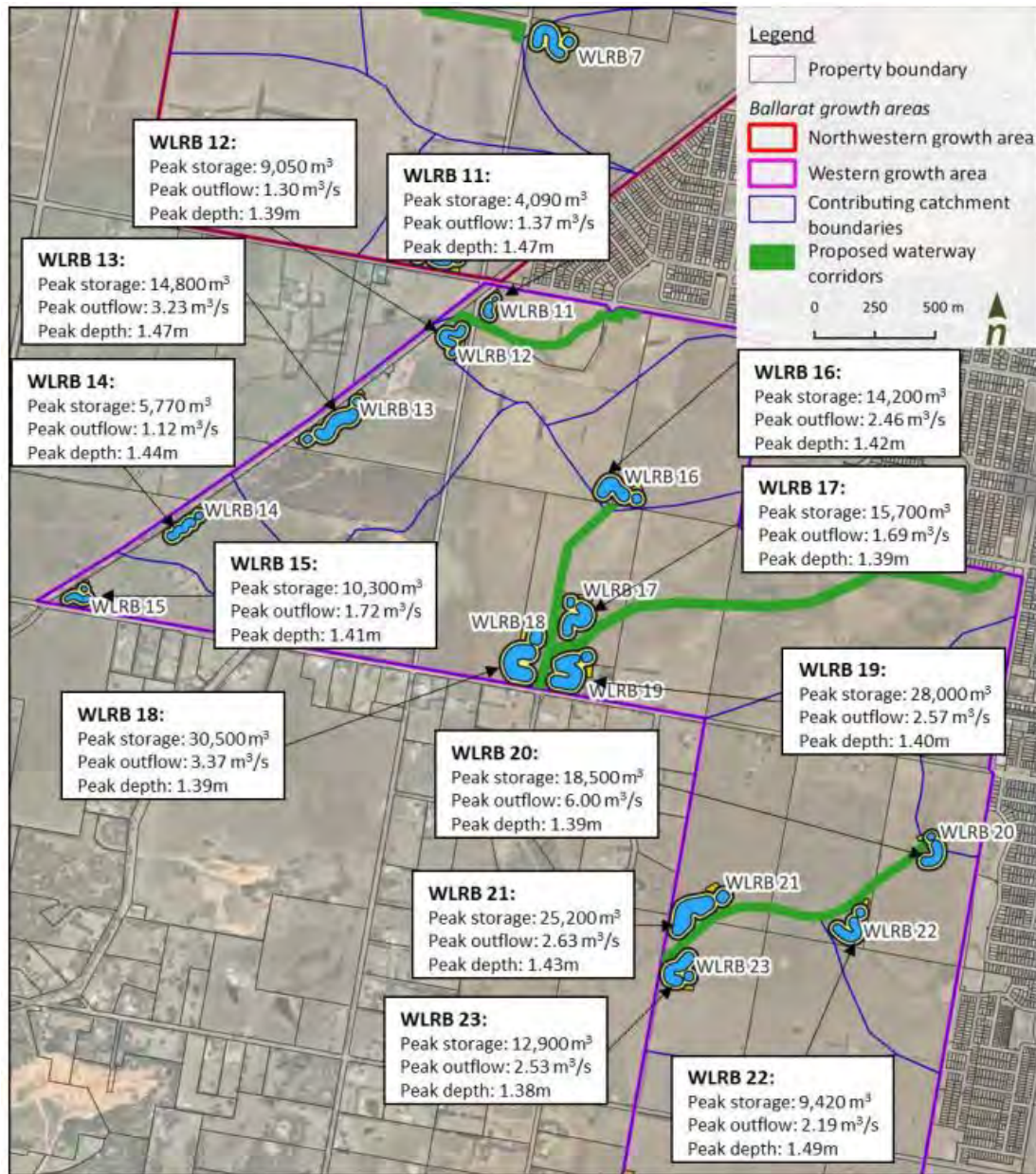


Figure 37: Retarding basin locations and modelling results - North section of the Western Growth Area.

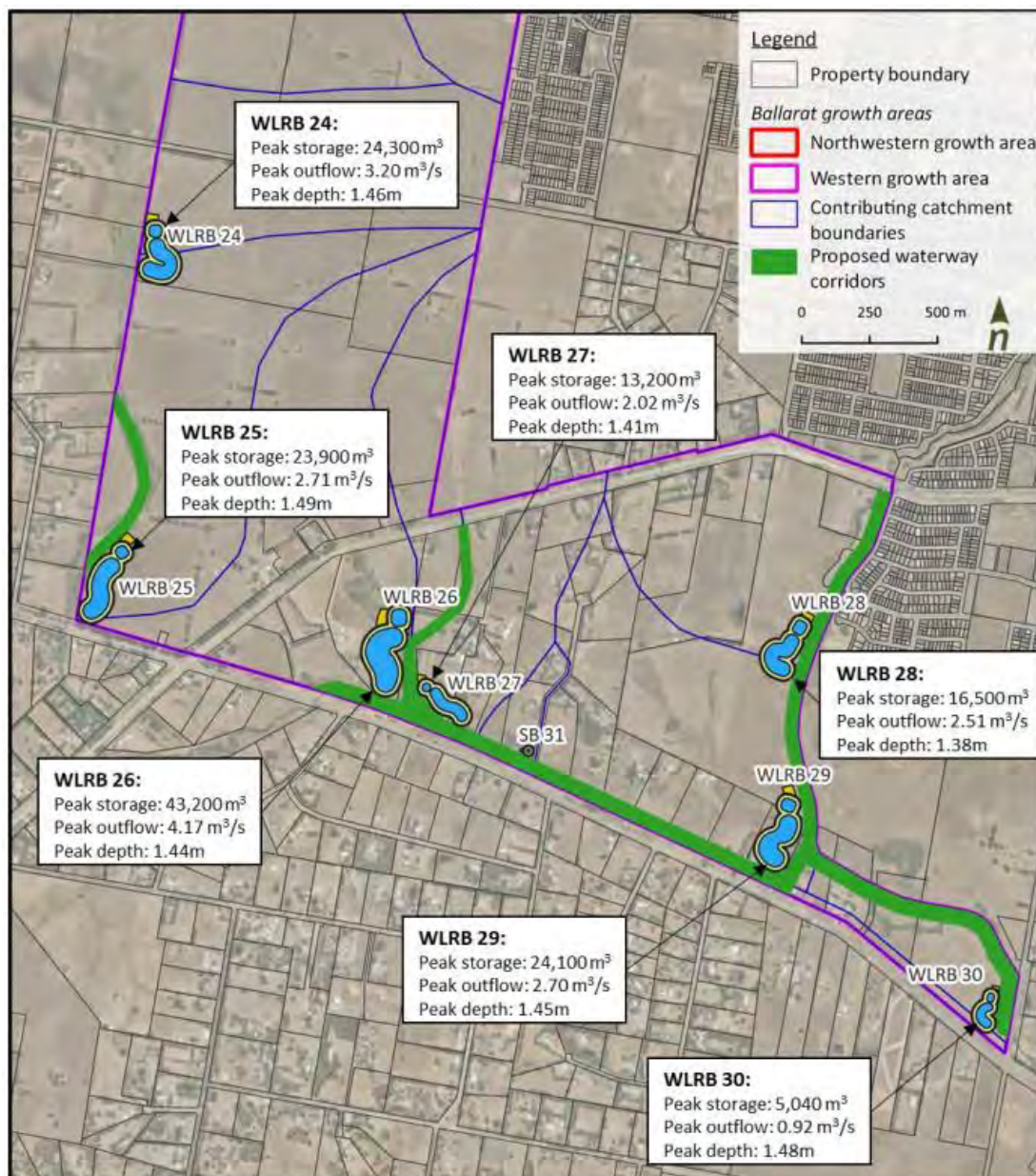


Figure 38: Retarding basin locations and modelling results - South section of Western Growth Area.

The next step was to work through the waterway corridor requirements for conveying water between the basins. Melbourne Water Waterway Corridor Guidelines were used to determine appropriate waterway corridor widths. Waterway corridor alignments were then established based on earlier existing conditions modelling and natural corridor alignment data obtained.

Refer Figure 39: Waterway Corridors - North-Western Growth Area. Figure 40: Waterway Corridors - Northern section of Western Growth Area. and Figure 41: Waterway Corridors - Southern section of the Western Growth Area. for waterway corridor alignments and widths.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

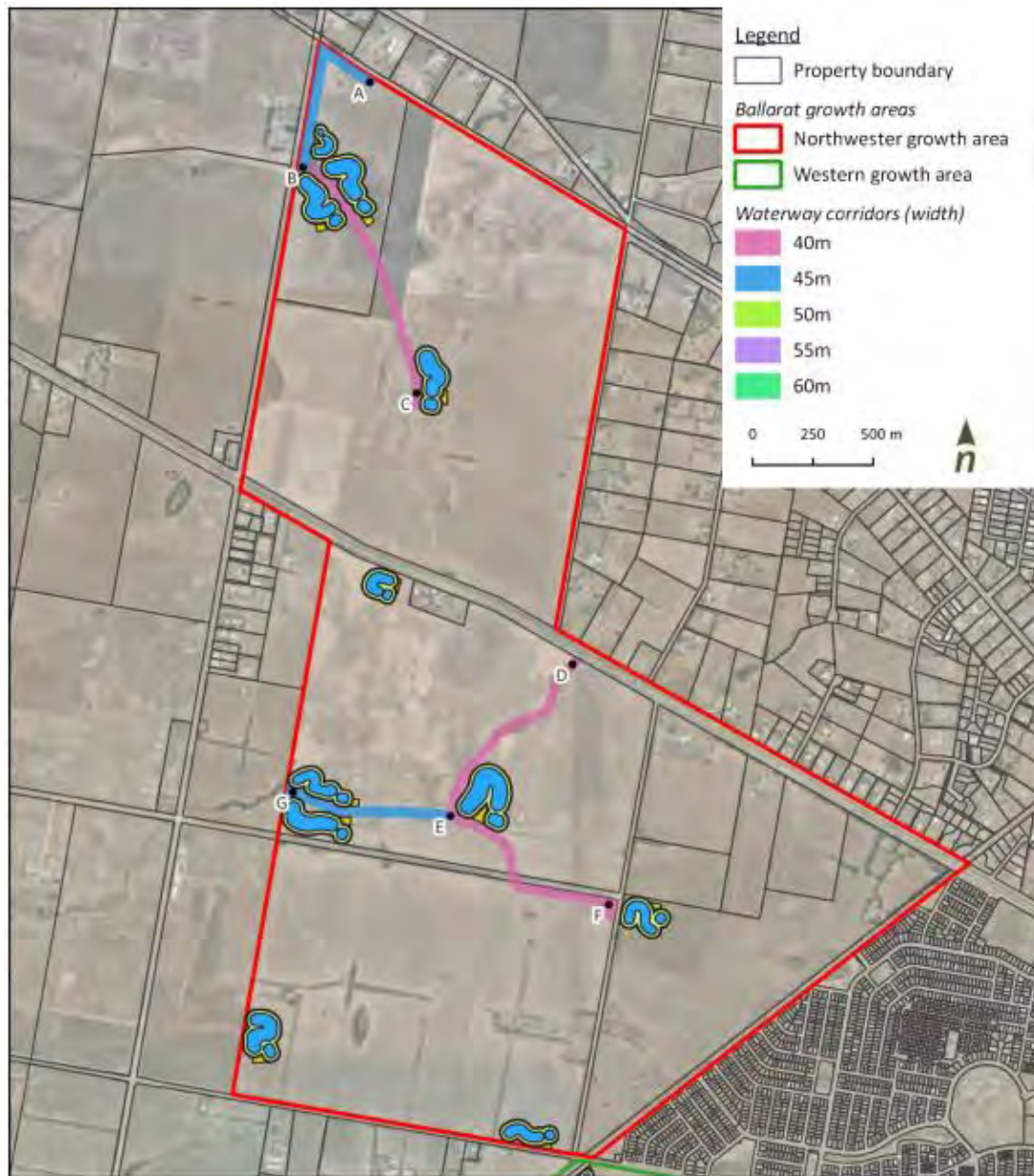


Figure 39: Waterway Corridors - North-Western Growth Area.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Figure 40: Waterway Corridors - Northern section of Western Growth Area.

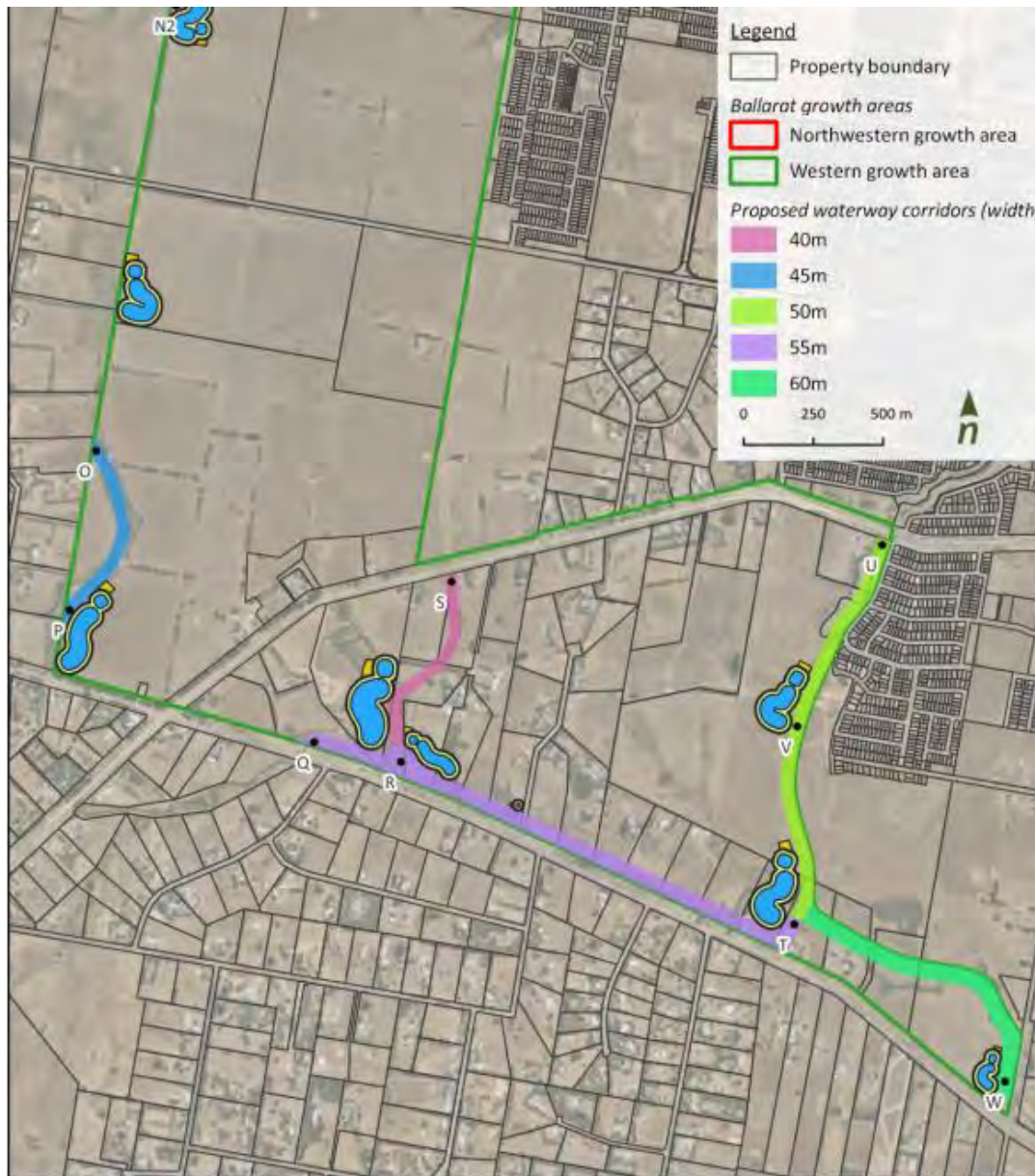


Figure 41: Waterway Corridors - Southern section of the Western Growth Area.

The longitudinal slope is dictated by invert controls at the downstream and upstream extents of the constructed waterway. The provided design features changes in slope along the alignment. A key requirement with respect to waterway longitudinal grades is ensuring grades are no steeper than 1 in 200 for stability and erosion management. Where the average slope of the existing topography is steeper than 1 in 200, grade control structures will be required.

The waterway cross-sectional geometry should be designed to accommodate the 4EY (exceedance per year) to 1EY flows in the low flow channel and the 1% AEP flows in the full compound channel.

As part of the review Alluvium highlighted the importance of the waterway management approach for the south-western draining waterway that intersects the boundary of the Western Growth Area (i.e. Winter Creek). The waterway naturally moves inside and outside of the growth area boundary at a number of locations. As a result Alluvium recommended considering an alternative framework plan option which 'extends' the Western Growth Area boundary to incorporate the entire waterway reach. This will allow future construction of the waterway corridor outside of the current growth area whilst providing a natural buffer between the urbanised residential area and existing rural living area. Refer Figure 42 for suggested changes to the western boundary of the southern portion of the North-Western Growth Area.

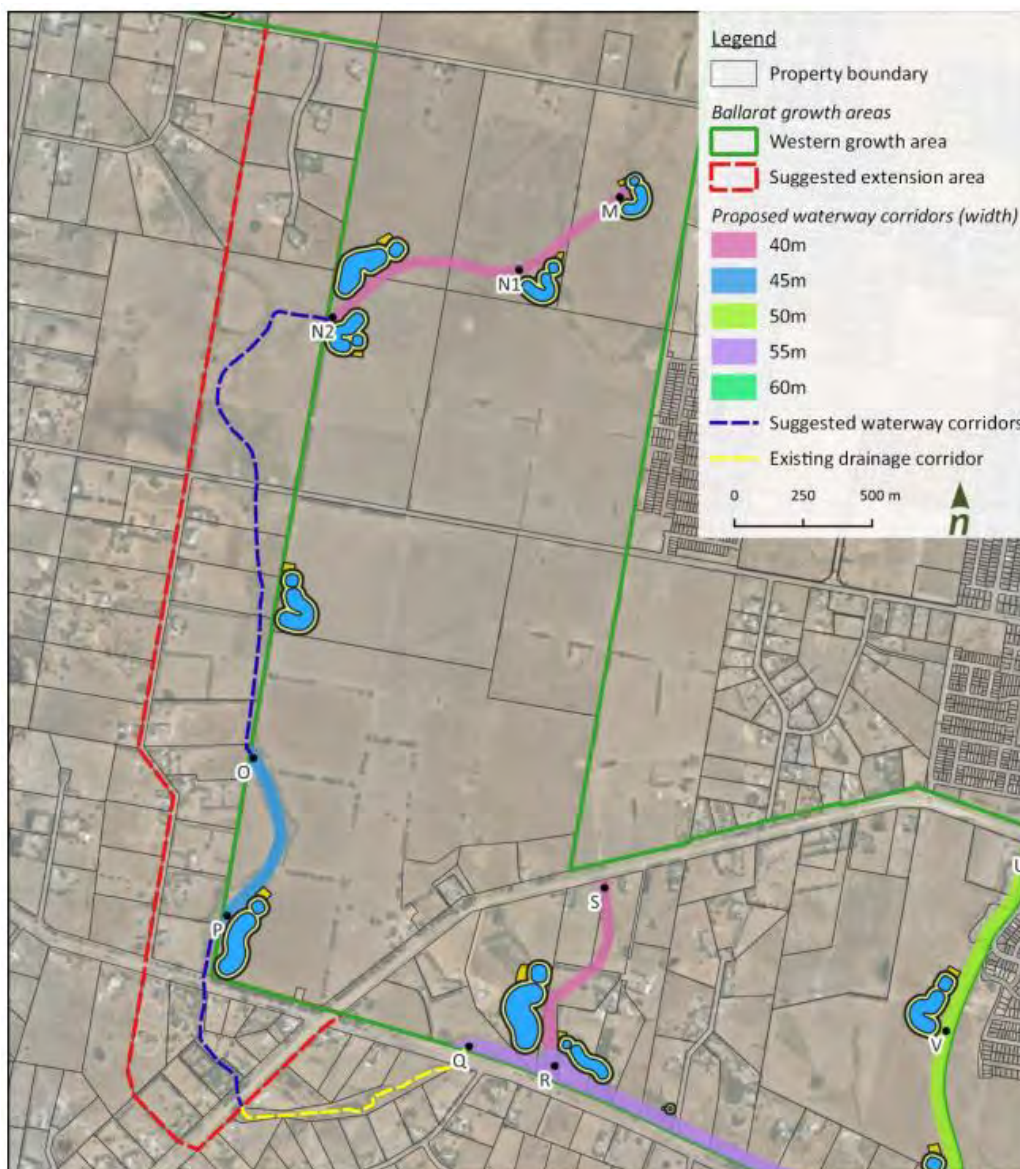


Figure 42: Suggested growth area changes to provide continuity.

If the boundary of the Western Growth Area is to be extended to ensure continuity in the waterway corridor and a more natural buffer between residential growth and rural area, further design of wetland / retarding basins would be required to manage both the quantity and quality of stormwater runoff generated within the extension area.

8.6.3 Expected Funding Arrangements

All retarding basins, associated water quality treatment assets and waterway corridor requirements identified have been costed in the infrastructure list in Appendix C.

Stormwater infrastructure in areas such as the Western and North-Western Growth Areas could be provided through a number of mechanisms including:

- Subdivision construction works by developers,
- Development contributions (development infrastructure levy), and
- Capital works projects by City of Ballarat and state government agencies.

The relevant Ministerial Direction stipulates that drainage assets can be funded through a development contributions levy, but must be shared assets servicing a broader catchment area than individual estates. For infrastructure to be covered in the Development Contributions Plan (DCP), or partly covered, there must be a demonstrated need for the asset created by the development, the levy imposed must be an equitable, fair and reasonable apportionment of the cost and there must be a reasonable nexus between the development and the need satisfaction measures.

As part of the preparation of this report, all key stormwater management infrastructure that could be identified in the phase of the project has been listed and estimated. Refer Appendix C for the full infrastructure list. This list was considered when establishing the recommended sequencing of precincts. The list also includes suggestions for potential funding sources for the assets.

8.7 INTEGRATED WATER MANAGEMENT


8.7.1 Existing Services

Alluvium was engaged by Taylors to complete an Integrated Water Management (IWM) Strategy for the Western and North-Western Growth Areas, refer to Appendix A. As part of the background research all relevant plans and strategies were considered, including but not limited to the Ballarat Integrated Water Management Plan 2017 and Central Highland Urban Water Strategy 2022. All relevant water cycle assets in the region were also considered, along with the challenges and risks climate change presents to water balance in the region, relevant data and catchments, proposed stormwater management and water quality assets in the areas, and all other relevant information to present a strategy that identifies issues and opportunities around integrated water management.

8.7.2 Future Servicing Arrangements



The IWM Strategy listed some opportunities that are already assumed to be rolled out, such as potable water use reduction targets and smart meters, along with other IWM issues and opportunities. Refer Alluvium IWMS sections 4.1 and 4.2 in Appendix B respectively for issues and opportunities identified. From that Alluvium developed an Integrated Water Management Plan at a strategic level. The Plan has a series of proposed actions to achieve outcomes such as safe, secure, and affordable water supplies in an uncertain future. Refer Table 21 for details.

Table 21: IWM Plan Summary.

Outcome	Issue or opportunity	Proposed action	Comment / Next steps
 Safe, secure and affordable supplies in an uncertain future	40% reduction in household potable water use to meet 124 L / person / day.	No action - Assumed to be a CHW requirement for new development.	Require water efficient appliances and rainwater tanks to meet this target, unless an alternative approach is proposed.
	Instal smart meters on all lots.	No action - Assumed to be rolled out as per current CHW policy.	
	Rainwater harvesting as the source of a managed aquifer recharge scheme.	Continue investigations into the viability of rainwater to MAR.	Consider residential and commercial roofs in the Western and North-Western Growth Areas as part of the rainwater to MAR scheme.
	Co-locate commercial and activity centres, open spaces with wetlands to support irrigation and other end uses.	As part of Master planning, ensure that water demand nodes like open spaces are proximate to potential non-potable water sources like stormwater wetlands.	Identify larger open spaces and ensure these and other non-potable demand nodes are well within the 800m theoretical distance limit between source and demand. Propose 400m or similar as a maximum distance.
	Regional stormwater harvesting scheme.	Align investigations with the SDS action Ballarat West Stormwater Harvesting. Undertake initial pre-feasibility investigations into a regional stormwater harvesting scheme that incorporates all or some of the growth area wetlands. As part of that study, consider the potential of supplying farmland to the west with excess treated stormwater.	Engage with Melbourne Water to gather learnings from the Sunbury and Melton Growth Area regional schemes. Smart technologies should be considered as part of the scheme to optimise performance and efficiency.


Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Outcome	Issue or opportunity	Proposed action	Comment / Next steps
 Healthy and valued waterways, wetlands and water bodies	WSUD in areas of high imperviousness to support stormwater management, cooling and place making.	As part of Masterplanning, identify areas with high areas of imperviousness (e.g. > 80%). Consider applying a concentrated WSUD approach that includes passively irrigated canopy cover and 'ground level' greening through WSUD.	This is to address stormwater quality as well as urban heat and amenity issues in car parks, industrial and commercial areas etc.
	Development wide imperviousness targets.	Consider reducing imperviousness across the development as part of Master planning For example reducing from typical residential of 0.75 to 0.6.	Reduced imperviousness targets have been adopted by Sydney Water in the Western Growth Areas of Sydney. This may fundamentally change the approach and requirements for surface water management.
	Leaky wetlands to meet infiltration targets.	As part of wetland design, investigate the potential for stormwater treatment wetlands to have a leaky base to contribute to infiltration. Consider also the potential to reduce costs through changed material and construction requirements.	The confined aquifer means that leaky wetlands are unlikely to impact groundwater quality. As part of this work, consider the impact of leaky wetlands on groundwater dependent ecosystems.
 Healthy and valued landscapes	Passive irrigation of street trees using stormwater. Align passive irrigation to Urban Forest Strategy target of 40% canopy cover in public realm.	Passive irrigation to support trees to meet canopy cover targets. Identify main boulevards and passive transport routes to design enhanced canopy cover or 'shadeways'.	There is a preference for low maintenance passive irrigation options e.g. kerb cuts or similar. Examples of shadeways are available having been designed in Melbourne Metropolitan greenfield developments.
	Climate resilience of canopy trees and habitat vegetation (e.g. along constructed waterways).	Ensure that species selected for street trees and vegetation within open space is: <ul style="list-style-type: none"> • Resilient to the effects of climate change, and • Consistent with broader habitat and biodiversity goals. 	Habitat suitability of street trees.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Outcome	Issue or opportunity	Proposed action	Comment / Next steps
	<p>Mulawalla Wetland management plan (Winter Swamp) maintaining cultural and environmental values.</p>	<p>Undertake an ecohydrology assessment of the Mulawalla Wetland (Winter Swamp) to understand the impact of development on cultural and environmental values.</p>	<p>Ensure that analysis provides options or recommendations for maintaining values and/or mitigating the impacts of development.</p>
	<p>Ecological corridors along constructed waterway corridors with plantings and approach aligning to biodiversity objectives for the region.</p>	<p>Related to canopy trees action above, ensure that plantings around wetlands and along waterway corridors are consistent with broader biodiversity and ecological objectives.</p>	
 <p>Community values reflected in place-based planning</p>	<p>Orientation of dwellings to maximise passive heating / cooling.</p> <p>Maximise connectivity of communities to natural spaces / orientation of households toward natural assets.</p> <p>Co-locate commercial and activity centres, open spaces with wetlands to support irrigation and other end uses.</p>	<p>The masterplan needs to support IWM objectives through:</p> <ul style="list-style-type: none"> • Co-location of wetlands and open spaces, • Alignment of streetscapes (to minimise energy needs), and • Connection of residences to natural areas. 	<p>Input to the master planning process from an IWM perspective to make sure that these opportunities are not eliminated.</p>
	<p>Consideration of wider road widths along key commuter boulevards to accommodate WSUD and passive irrigation assets.</p>	<p>Related to the above, introduce wider road widths along key boulevards and 'shadeways' to accommodate necessary assets and infrastructure e.g. passive irrigation, streetscape WSUD etc.</p>	

8.7.3 Expected Funding Arrangements

The funding for IWM measures will be spread across all stakeholders such as developers for streetscapes, authorities for waterbodies, builders for rainwater tanks and property owners for water efficient appliances. The values and contributions from all stakeholders will be critical to its success.

8.8 TRAFFIC & TRANSPORT

8.8.1 Executive Summary

In the preparation of the Traffic and Transport Strategy, Taylors partnered with One Mile Grid (OMG) to provide specialist traffic engineering and transport planning services. As part of this assessment,

- OMG inspected the site with due consideration of the project context,
- Sourced and reviewed all relevant background reports and outlined relevant aspects in strategic context,
- Considered the Ballarat West PSP area impacts and benefits from infrastructure proposed within it (BW DCP),
- Collected and reviewed traffic data in the vicinity of the site to establish existing traffic conditions and road network characteristic, and
- Considered the application of public transport and active transport principles.

This analysis and data collation allowed the development of recommendations for the high-level transport provisions and networks to be incorporated into the strategy along with traffic modelling. The provision, networks and modelling is then used to inform the selection of a suitable road network to cater for the traffic and transport demands, from both the low and high growth scenarios. Refer Appendix D for a full copy of One Mile Grid report.

The report considers Public Transport requirements across the growth areas to ensure adequate space is provided to enable future provision of time competitive services to private vehicles and that services be delivered early during subdivisions to ensure residents transport choices are not limited as they establish new travel patterns at their new home. In light of the above, the following public transport elements are recommended for incorporation into the infrastructure servicing strategy:

- Provision for a future railway station,
- High-frequency routes along the transit corridors of Ballarat-Carngham Road, Glenelg Highway, Remembrance Drive and the Link Road,
- Secondary bus routes along adjacent major roads to achieve increased coverage, and
- Provision for bus head start infrastructure at all signalised intersections.

Refer Figure 43 for details of the proposed public transport network within the study area.

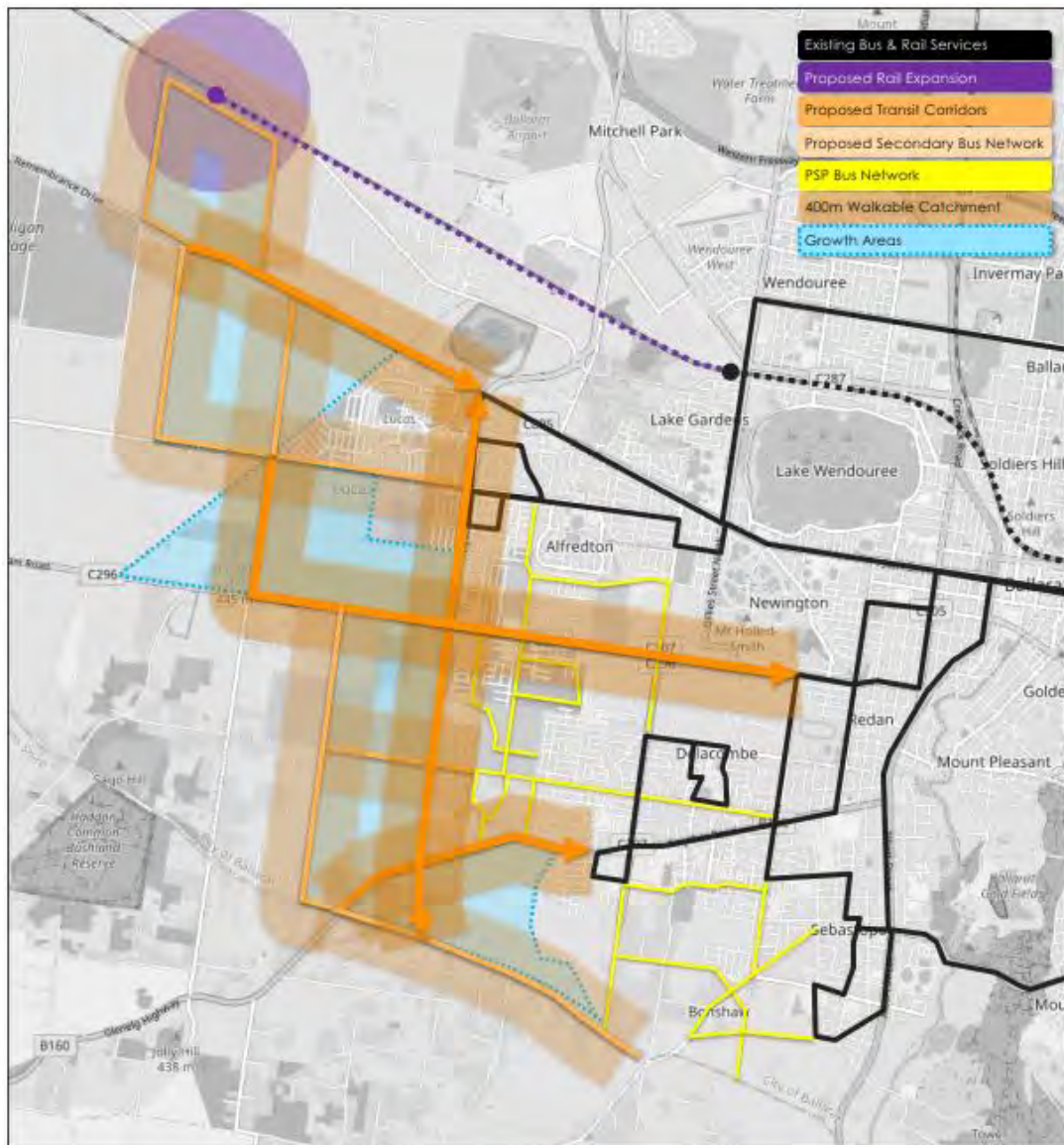


Figure 43: Proposed Public Transport Network.

In relation to Public Transport relevance to sequencing of the five precincts within the two growth areas (Ref Figure 2 in this report for Precincts), Precincts 2 and 3 within the Western Growth Area will be easiest to connect to. There are existing bus connections on Cuthberts Road up to Dyson Drive, which could readily be extended to the boundary of these two areas. There is also a dense network of bus-capable roads within the Ballarat West PSP that could link to other services. Precinct 1 would precede Precinct 4 given there are existing services in the south-east connecting to the boundary. Figure 13 in Appendix D gives a good indication of connectivity to planned routes in the PSP and existing routes servicing western Ballarat.

Note: The Department of Transport and Planning (DTP) has not committed to any extension of public transport.

In relation to Active Transport, Council’s relevant strategic documents and best practice scenarios were considered and the following provisions are recommended for incorporation into the infrastructure servicing strategy:

- Provision of dedicated off-road bicycle paths along arterial routes, separated from pedestrian facilities.
- Provision of alternate cycling and shared path facilities for recreation along waterways and reserves. At the time of writing, these features are not yet identified.
- Retention of the Ballarat-Skipton Rail Trail and improvement as an active transport connection.
- Priority crossings for shared paths and bicycle paths at uncontrolled side-road intersections.
- Signalised pedestrian crossings where signalised intersections are otherwise not provided near major destinations.

Refer Figure 44 for details of the proposed active transport network within the study area.

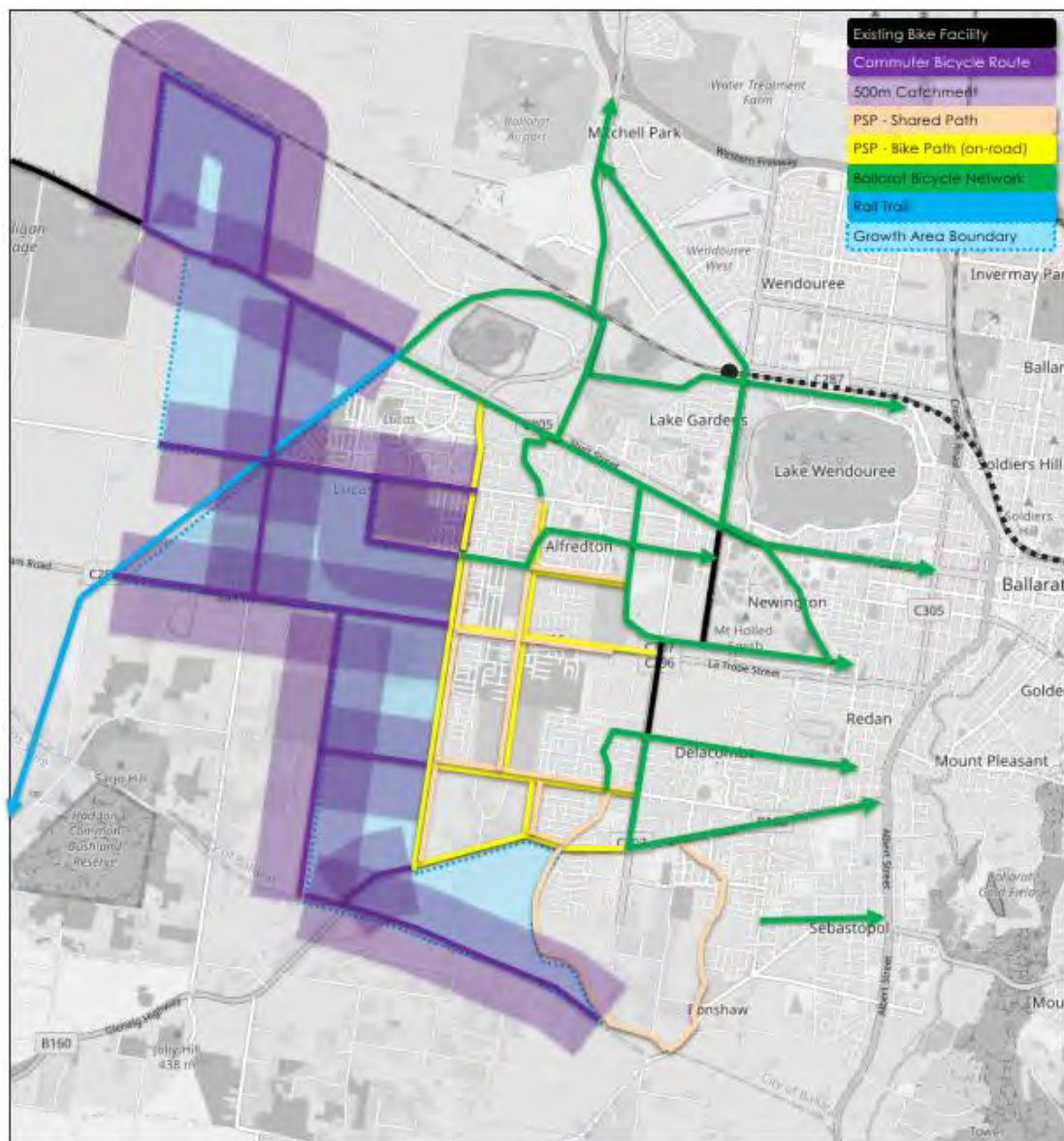


Figure 44: Proposed Active Transport Network.

In relation to Active Transport relevance to sequencing, having Precinct 4 connect first leverages the existing Skipton Rail Trail and Remembrance Drive path. Precinct 3 is otherwise likely to have the best access, given that the Ballarat West PSP area immediately east will include a few shared and bike path facilities when complete. Then Precinct 2 and 1 due to Ballarat West PSP and then Precinct 5 last.

Traffic modelling was completed for both low and high growth scenarios. For analysis purposes, the following assumptions were relied on:

- The growth areas will incorporate largely residential land uses; and
- Daily traffic generation rate of 7 trips per dwelling per day.

It is noted that the default rate commonly utilised in evaluation of growth areas transport infrastructure is 9 trips per dwelling per day, which is considered a conservatively high estimate of traffic generation. This is likely to result in an oversupply of traffic infrastructure. Should the growth areas achieve targets of high mode share for walking, cycling and public transport trips, it is anticipated this reduced rate will be readily achievable. It is noted, however, that car trips will remain a significant portion of households trips into the future and the reduction is in-part contingent on provision of suitable sustainable transport options at the time of occupation of these growth areas.

When combined with existing flows, future traffic volumes are likely to exceed the existing capacity of many roads within and adjacent to the growth areas. Refer Table 22 for estimated traffic volumes on the future road network and Figure 45 and Figure 46 for illustrated maps showing the network required to service low and high yield respectively.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Table 22: Future Road Network – Estimated Traffic Volumes.

Road Name	Location	Low Yield				High Yield			
		Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition	Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition
Remembrance Drive	West of Draffins Rd	2,000	Arterial – 2 lane	No	None	2,500	Arterial – 2 lane	No	None
Remembrance Drive	Draffins Rd & Finchs Rd	12,000	Arterial – 2 lane	No	None	15,000	Arterial – 2 lane	No	None
Remembrance Drive	Finchs Rd & Dyson Dr	18,500	Arterial – 2 lane	Yes	None	23,000	Arterial – 4 lane	Yes	None
Remembrance Drive	East of Dyson Dr	34,500	Arterial – 4 lane	Yes	None	42,000	Arterial – 6 lane	Yes	None
Finchs Road	Cuthberts Rd & Remembrance Dr	9,000	Link Road	Yes	Yes	12,000	Link Road	Yes	Yes
Finchs Road	Ballarat-Carngham Rd & Cuthberts Rd	6,500	Link Road	Yes	Yes	8,500	Link Road	Yes	Yes
Cuthberts Road	West of Finchs	1,000	Collector Street	Yes	None	1,000	Collector Street	Yes	None
Cuthberts Road	East of Finchs	9,000	Link Road	Yes	None	11,000	Link Road	Yes	None
Ballarat-Carngham Road	West of Finchs Rd	1,500	Arterial – 2 lane	No	None	1,500	Arterial – 2 lane	No	None
Ballarat-Carngham Road	Finchs Rd & Dyson Dr	23,000	Arterial – 4 lane	Yes	Yes (PAO)	29,000	Arterial – 4 lane	Yes	Yes (PAO)
Ballarat-Carngham Road	Dyson Dr & Wiltshire Ln	11,500	Arterial – 2 lane	Yes	Yes (PAO)	14,000	Arterial – 2 lane	Yes	Yes (PAO)
Latrobe Street	East of Wiltshire Ln	21,500	Arterial – 4 lane	Yes	None	25,000	Arterial – 4 lane	Yes	None
Learmonth Street	North of Ballarat-Carngham Rd	16,500	Arterial – 2 lane	No	None	17,000	Arterial – 2 lane	No	None
Wiltshire Lane	South of Ballarat-Carngham Rd	18,000	Arterial – 2 lane	No	None	19,500	Arterial – 2 lane	No	None
Link Road	North of Blind Creek Rd	16,000	Arterial – 2 lane	No	None	20,000			
Link Road (Dyson Drive)	Remembrance Dr & Blind Creek Rd	18,000	Arterial – 2 lane	No	None	22,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	R'brance Dr & Ballarat-Carngham Rd	28,000	Arterial – 4 lane	Yes	None	34,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	Ballarat-Carngham Rd & Greenhalghs Rd	14,500	Arterial – 2 lane	No	None	19,000	Arterial – 2 lane	Yes	None
Link Road (Dyson Drive)	Greenhalghs Rd & Glenelg Hwy	18,000	Arterial – 2 lane	No	None	24,000	Arterial – 4 lane	Yes	None
Greenhalghs Road	West of Hayes Dr	500	Rural Access	No	None	500	Rural Access	No	None
Greenhalghs Road	Hayes Dr & Link Rd	4,000	Collector Street	Yes	None	5,000	Collector Street	Yes	None
Greenhalghs Road	East of Link Rd	8,500	Link Road	Yes*	None	11,000	Link Road	Yes*	None
Bells Road	West of Glenelg Hwy	2,000	Link Road	Yes	None	2,000	Link Road	Yes	None
Bells Road	Glenelg Hwy & Link Rd	1,000	Link Road	Yes	None	1,000	Link Road	Yes	None
Bells Road	Link Road & Doble Rd	5,500	Arterial – 2 lane	No	None	7,000	Arterial – 2 lane	No	None
Bells Road	Doble Rd & Ross Creek Rd	11,000	Arterial – 2 lane	No	None	14,500	Arterial – 2 lane	No	None
Bells Road	East of Ross Creek Rd	10,000	Arterial – 2 lane	No	None	13,000	Arterial – 2 lane	No	None
Glenelg Highway	Southwest of Bells Rd	8,000	Arterial – 2 lane	No	None	9,000	Arterial – 2 lane	No	None
Glenelg Highway	Bells Rd to Link Rd	9,000	Arterial – 2 lane	No	None	10,000	Arterial – 2 lane	No	None
Glenelg Highway	Link Rd to Masada Blvd	9,500	Arterial – 2 lane	No	None	10,500	Arterial – 2 lane	No	None
Glenelg Highway	East of Masada Blvd	8,500	Arterial – 2 lane	No	None	9,500	Arterial – 2 lane	No	None
Ross Creek Road	North of Bells Rd	5,500	Link Road	No	None	7,500	Link Road	No	None
Blind Creek Road	West of Link Road	10,000	Link Road	Yes	None	13,000	Link Road	Yes	None

* To be upgraded within Ballarat West PSP area

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

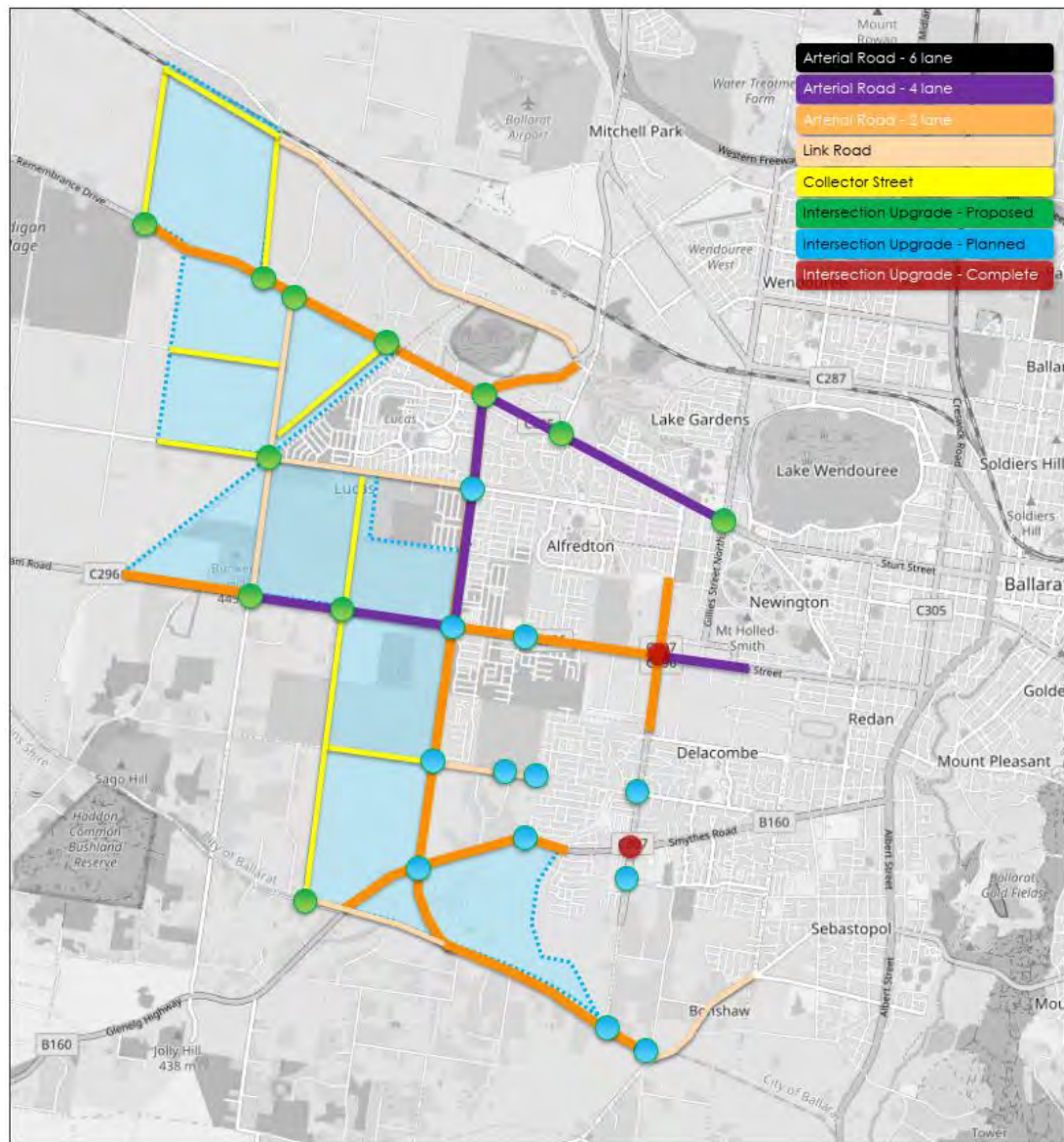


Figure 45: Future Traffic Network - Low Yield.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

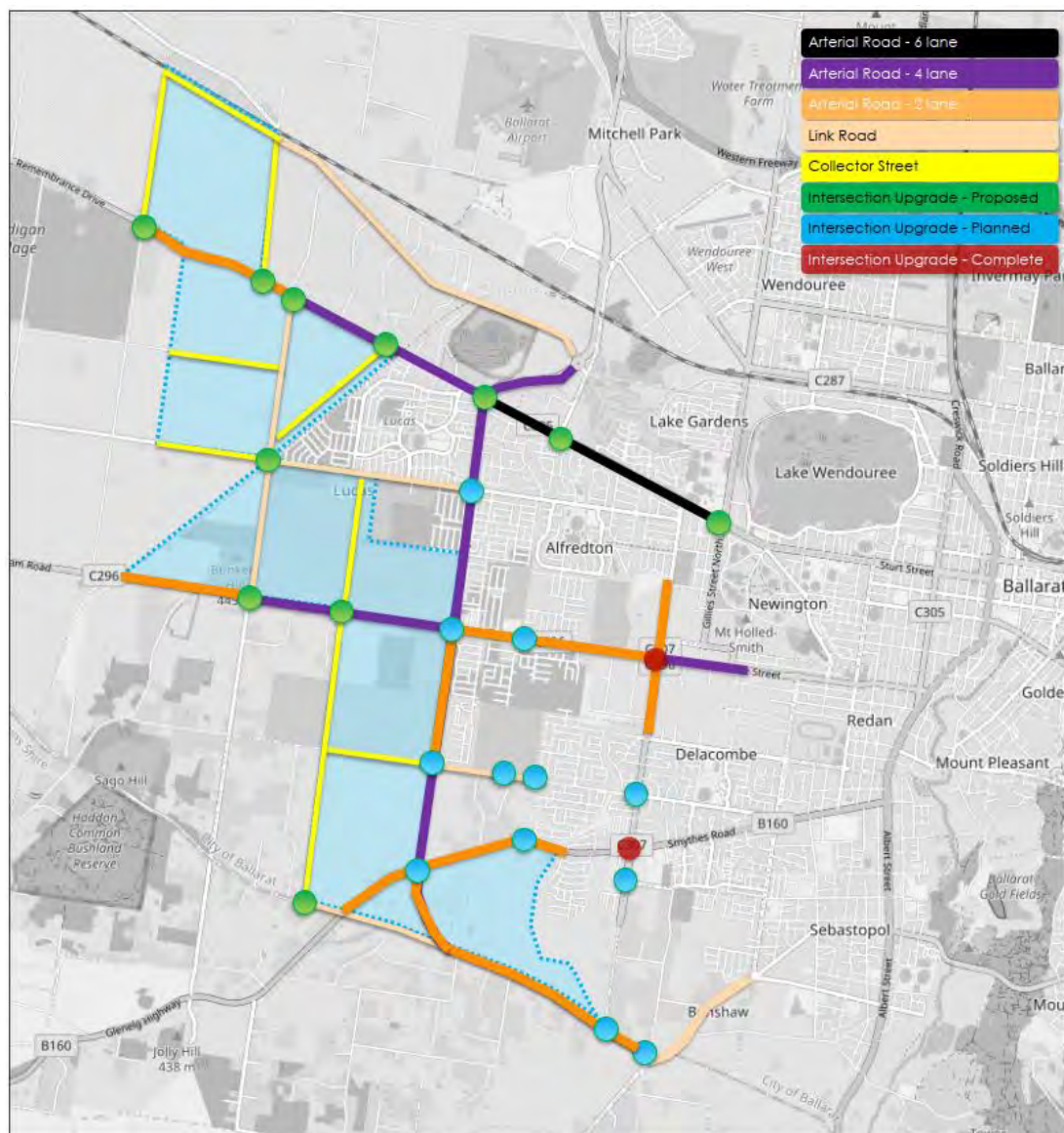


Figure 46: Future Traffic Network - High Yield.

The upgrade requirements of Remembrance Drive, particularly east of the Link Road, will remain a major challenge because of the heritage significance of the Avenue of Honour. It is recommended that when going into further detail in preparation of the Framework Plan traffic diversion / incentive measures are considered as an alternate.

In broad terms, the traffic modelling estimates indicate that the planned level of development can be catered for, subject to the provision of supporting transport infrastructure. The impacts of continuing development within the Ballarat West PSP area, yet to be developed, should also be confirmed.

It should be noted that the traffic analysis and conclusions are drawn from a conventional “predict and provide” approach to modelling. The development of these growth areas is a long-term prospect, and likely represents a land supply in excess of 30 years. This long-term development horizon suggests likely changes in household trip generation, and ongoing reductions in car trips. Should the growth areas succeed in achieving many of

Council's aspirations for increased active and public transport use, there will naturally be reduced reliance on private vehicle trips, and reduced requirements for supporting road infrastructure.

Additionally, there are both "push" and "pull" factors that influence travel mode choice. Introduction of improved sustainable transport services and facilities "pull" more trips by improving the relative attractiveness of these modes. "Push" factors include elements like traffic congestion or parking pricing that offer a disincentive to private vehicle trips and are an important travel demand management tool. There is presently limited congestion in Ballarat during commuter peak periods, but with ongoing development from the PSP and growth areas, this is expected to increase.

OMG also evaluated the development capacity and traffic impacts to the growth areas if the Link Road extension to Bells Road cannot be delivered. This assessment considers both the fully developed growth areas, and an evaluation of development capacity up to typical capacity thresholds for key road links.

The modelling results assume the completion of the following pieces of road infrastructure:

- Duplication of Ballarat-Carngham Road (as a four-lane arterial) and
- Completion of all roads and intersections within the Ballarat West PSP.

The additional daily traffic volumes within and surrounding the growth areas are listed below in Table 23 and upgrades required if the Link Road is not extended are illustrated in Figure 47 and Figure 48.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Table 23: Future Road Network - Estimated Traffic Volumes (Without Link Road).

Road Name	Location	Low Yield				High Yield			
		Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition	Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition
Remembrance Drive	West of Draffins Rd	2,000	Arterial – 2 lane	No	None	2,500	Arterial – 2 lane	No	None
Remembrance Drive	Draffins Rd & Finchs Rd	12,500	Arterial – 2 lane	No	None	15,500	Arterial – 2 lane	No	None
Remembrance Drive	Finchs Rd & Dyson Dr	17,500	Arterial – 2 lane	No	None	22,000	Arterial – 4 lane	Yes	None
Remembrance Drive	East of Dyson Dr	30,000	Arterial – 4 lane	Yes	None	36,000	Arterial – 4 lane	Yes	Yes
Finchs Road	Cuthberts Rd & Remembrance Dr	9,500	Link Road	Yes	Yes	12,500	Link Road	Yes	Yes
Finchs Road	Ballarat-Camgham Rd & Cuthberts Rd	7,000	Link Road	Yes	Yes	9,000	Link Road	Yes	Yes
Cuthberts Road	West of Finchs	1,000	Collector Street	Yes	None	1,000	Collector Street	Yes	None
Cuthberts Road	East of Finchs	8,500	Link Road	Yes	None	10,500	Link Road	Yes	None
Ballarat-Camgham Road	West of Finchs Rd	1,500	Arterial – 2 lane	No	None	1,500	Arterial – 2 lane	No	None
Ballarat-Camgham Road	Finchs Rd & Dyson Dr	21,000	Arterial – 4 lane	Yes	Yes (PAO)	26,500	Arterial – 4 lane	Yes	Yes (PAO)
Ballarat-Camgham Road	Dyson Dr & Wiltshire Ln	16,000	Arterial – 2 lane	No	Yes (PAO)	20,500	Arterial – 4 lane	Yes	Yes (PAO)
Latrobe Street	East of Wiltshire Ln	26,000	Arterial – 4 lane	Yes	None	30,500	Arterial – 4 lane	Yes	None
Learmonth Street	North of Ballarat-Camgham Rd	17,500	Arterial – 2 lane	No	None	18,500	Arterial – 2 lane	No	None
Wiltshire Lane	South of Ballarat-Camgham Rd	28,000	Arterial – 4 lane	Yes	None	33,500	Arterial – 4 lane	Yes	None
Link Road	North of Blind Creek Rd	15,500	Arterial – 2 lane	No	None	19,000	Arterial – 2 lane	No	None
Link Road (Dyson Drive)	Remembrance Dr & Blind Creek Rd	17,000	Arterial – 2 lane	No	None	21,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	R'brance Dr & Ballarat-Camgham Rd	21,500	Arterial – 4 lane	Yes	None	25,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	Ballarat-Camgham Rd & Greenhalghs Rd	-	-	-	-	-	-	-	-
Link Road (Dyson Drive)	Greenhalghs Rd & Glenelg Hwy	-	-	-	-	-	-	-	-
Greenhalghs Road	West of Hayes Dr	500	Rural Access	No	None	500	Rural Access	No	None
Greenhalghs Road	Hayes Dr & Link Rd	10,000	Link Road	Yes	Yes	13,000	Link Road	Yes	Yes
Greenhalghs Road	East of Link Rd	10,500	Link Road	Yes*	No	13,500	Link Road	Yes*	No
Bells Road	West of Glenelg Hwy	2,000	Link Road	Yes	None	2,000	Link Road	Yes	None
Bells Road	Glenelg Hwy & Link Rd	1,500	Link Road	Yes	None	2,000	Link Road	Yes	None
Bells Road	Link Road & Doble Rd	3,000	Link Road	No	None	4,000	Link Road	No	None
Bells Road	Doble Rd & Ross Creek Rd	8,500	Link Road	No	None	11,500	Link Road	No	None
Bells Road	East of Ross Creek Rd	10,000	Link Road	No	None	13,000	Link Road	No	None
Glenelg Highway	Southwest of Bells Rd	8,000	Arterial – 2 lane	No	None	9,000	Arterial – 2 lane	No	None
Glenelg Highway	Bells Rd to Link Rd	10,000	Arterial – 2 lane	No	None	11,000	Arterial – 2 lane	No	None
Glenelg Highway	Link Rd to Masada Blvd	12,500	Arterial – 2 lane	No	None	15,000	Arterial – 2 lane	No	None
Glenelg Highway	East of Masada Blvd	8,500	Arterial – 2 lane	No	None	9,500	Arterial – 2 lane	No	None
Ross Creek Road	North of Bells Rd	5,500	Link Road	No	None	7,500	Link Road	No	None
Blind Creek Road	West of Link Road	10,000	Link Road	Yes	None	12,500	Link Road	Yes	None
N/S Collector	Ballarat-Camgham Rd & Greenhalghs Rd	4,500	Collector Street	Yes	Yes	6,000	Collector Street	Yes	Yes
N/S Collector	Greenhalghs Rd & Glenelg Hwy	5,000	Collector Street	Yes	Yes	7,000	Collector Street	Yes	Yes
Innsbruck Road	Greenhalghs Rd & Glenelg Hwy	1,000	Link Road	Yes*	No	1,000	Link Road	Yes*	No

* To be upgraded within Ballarat West PSP area

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

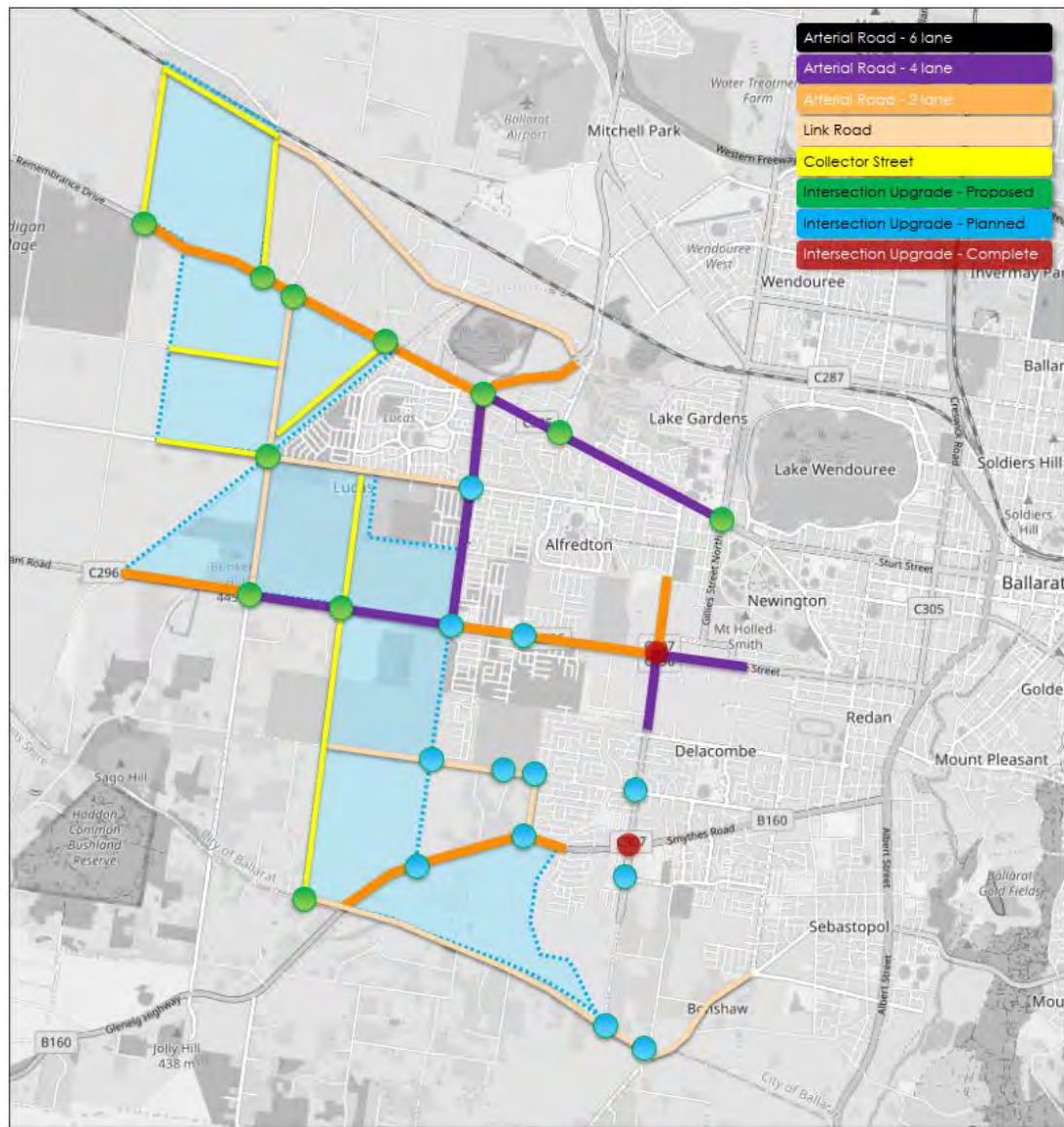


Figure 47: Future Traffic Network - Low Yield (No Link Road).

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

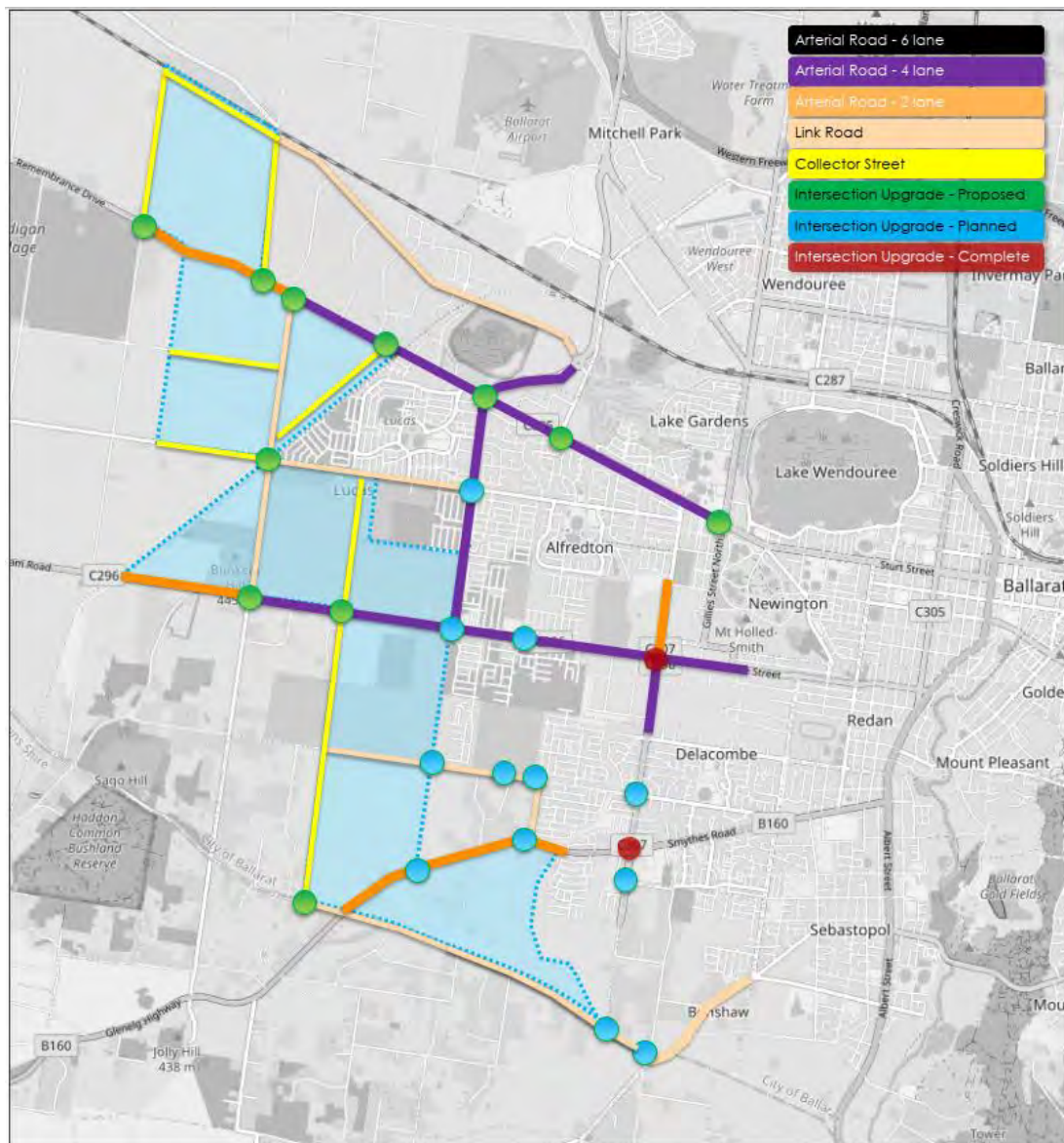


Figure 48: Future Traffic Network - High Yield (No Link Road).

Notable observations from the modelling include:

- The removal of the southern portion of the Link Road places a greater reliance on alternative north-south road connections and linking routes. Ballarat-Carngham Road, Wiltshire Lane and Greenhalghs Road in particular are required to accommodate higher traffic volumes relative to the equivalent Link Road scenario, and
- Catering for traffic volumes along Remembrance Drive will still be challenging.

Development thresholds (number of developed lots) at which point critical roads must be upgraded to provide additional mid-block capacity was calculated and is listed in

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Table 24 below.

Table 24: Road Upgrade Thresholds

		<i>Road Upgrade</i>	<i>Threshold</i>
Remembrance Drive	Finchs Rd & Dyson Dr	2 lanes > 4 lanes	15,600 lots
Remembrance Drive	East of Dyson Dr	2 lanes > 4 lanes	9,400 lots
Ballarat-Carngham Road	Finchs Rd & Dyson Dr	2 lanes > 4 lanes	18,700 lots
Ballarat-Carngham Road	Dyson Dr & Wiltshire Ln	2 lanes > 4 lanes	25,400 lots
Latrobe Street	East of Wiltshire Ln	2 lanes > 4 lanes	12,000 lots
Wiltshire Lane	South of B-C Rd	2 lanes > 4 lanes	9,400 lots
Link Road (Dyson Drive)	R'brance Dr & Blind Creek Rd	2 lanes > 4 lanes	25,400 lots
Link Road (Dyson Drive)	R'brance Dr & B-C Rd	2 lanes > 4 lanes	17,400 lots

OMG also undertook a review of potential sequencing of development, to understand how this may impact on the timing and need for transport infrastructure.

Assuming that the Link Road is not completed prior to any land development occurring within the study area, OMG established that any half of the southern or northern portions of the Western and North-Western Growth Areas may be fully developed without requiring road upgrades external to the study area. Noting this sequencing is only considering traffic and there are many other servicing factors and impacts that need to be taken into account.

Should the Western Growth Area develop first in its entirety (approximately 17,200 lots), then upgrade thresholds to Latrobe Street (east of Wiltshire Lane) and Wiltshire Lane (south of Ballarat-Carngham Road) would be met, exceeding capacity by approximately 3,500-4,000 vehicles per day.

If the Link Road is constructed at the time of development, development thresholds and upgrades are generally the same, with the exception of the Western Growth Area. Should the northern portion of this area develop first (7,700 lots), warrants would be met for Latrobe Street duplication, and Ballarat-Carngham Road (between Finchs Road and Link Road) due to increased reliance on Link Road for north-south connections. Should the southern portion develop first (9,500 lots), there are no requirements for transport upgrades at all across the study area and surrounds (except for direct connections and internal roads).

8.8.2 Expected Funding Arrangements

Traffic and Transport infrastructure in areas such as the Western and North-Western Growth Areas is provided through a number of mechanisms, including:

- Subdivision construction works by developers,
- Development contributions (development infrastructure levy), and
- Capital works projects by City of Ballarat and state government agencies.

The relevant Ministerial Direction stipulates the traffic and transport infrastructure that can be funded through a development contributions levy, including:

- Acquisition of land for roads, public transport corridors,
- Construction of roads, including bicycle and foot paths, and traffic management and control devices, and
- Construction of public transport infrastructure, including fixed rail infrastructure, railway stations, bus stops and tram stops.

For infrastructure to be covered in the DCP, or partly covered, there must be a demonstrated need for the asset created by the development, the levy imposed must be an equitable, fair and reasonable apportionment of the cost and there must be a reasonable nexus between the development and the need satisfaction measures.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



As part of the preparation of this report all key transport and traffic infrastructure that could be identified in each phase of the project has been listed and estimated. Refer Appendix E for Traffic and Transport Infrastructure list and estimates. This list was considered when establishing the recommended sequencing of precincts. The list also includes suggestions for potential funding source for the assets.

In relation to OMG's discussion of cost apportionment of the link road, further investigations are recommended to establish a sound nexus between demand for use of the link road by the Western & North-Western Growth Areas and provision in the DCP for partial funding of the land and infrastructure required for its delivery.

9 SEQUENCING

Due to the size of the Ballarat North-Western and Western Growth Areas, development areas will need to be rolled out in a logical order or sequence. The anticipated sequencing of the precincts within the Ballarat North-Western and Western Growth Areas has been assessed based on the following criteria:

- Estimate Infrastructure Project Costs,
- Infrastructure Project Complexity,
- Infrastructure Project Benefit to the wider Ballarat Community,
- Estimated Yield, and
- Estimate Cost per ha.

The estimated infrastructure project costs, yield and cost per ha metrics are based on engineering principles. The infrastructure project complexity and benefit to the wider community, while still founded on engineering principles, cannot be confirmed until further design can be undertaken. The anticipated sequencing therefore could be changed based on several factors including appropriate interim strategies, infrastructure contribution plan project funding, and landowner / developer cooperation. Refer to Table 25 to Table 29 for each breakdown. Refer Figure 49: Locality Plan & Proposed Precincts.

for Locality Plan & Proposed Precincts. The ranking for estimated cost was based on lowest cost to highest cost.

**Table 25: Estimated Infrastructure Project Costs Matrix.
Precincts**

	1	2	3	4	5
Roads & Transport	\$ 49.52	\$ 107.54	\$ 116.04	\$ 99.65	\$ 116.95
Drainage	\$ 55.54	\$ 51.17	\$ 57.17	\$ 51.29	\$ 33.95
Water	\$ 16.36	\$ 15.95	\$ 12.30	\$ 12.77	\$ 10.84
Sewer	\$ 20.09	\$ 38.36	\$ 45.31	\$ 63.15	\$ 62.83
Elec	n/a	n/a	n/a	n/a	n/a
Comms	n/a	n/a	n/a	n/a	n/a
Gas	n/a	n/a	n/a	n/a	n/a
Total	\$ 141.51	\$ 213.03	\$ 230.83	\$ 226.85	\$ 224.56
Ranking	1	2	5	4	3

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas

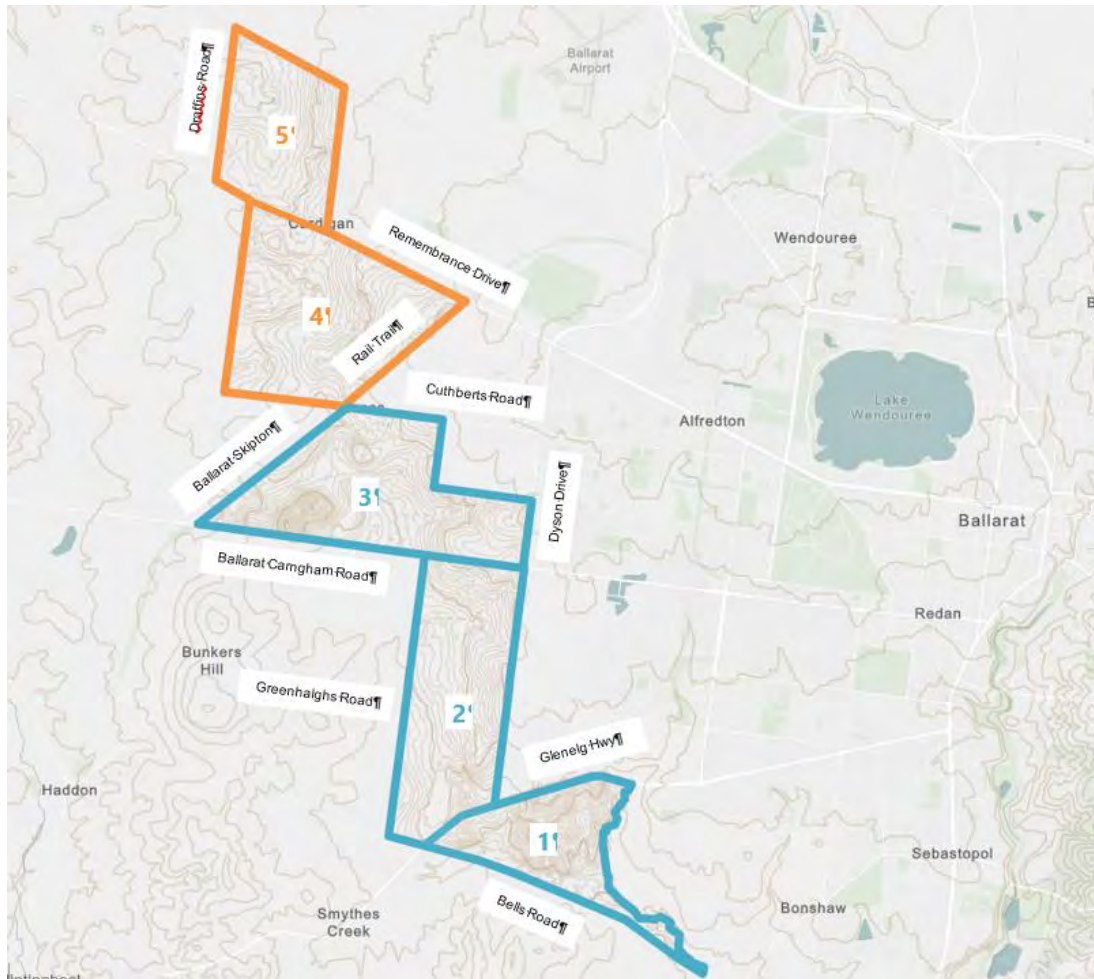


Figure 49: Locality Plan & Proposed Precincts.

Table 26: Infrastructure Project Complexity.
Precincts

	1	2	3	4	5
Roads & Transport	1	5	4	2	3
Drainage	3	4	5	2	1
Water	1	2	5	3	4
Sewer	1	2	3	4	5
Elec	n/a	n/a	n/a	n/a	n/a
Comms	n/a	n/a	n/a	n/a	n/a
Gas	n/a	n/a	n/a	n/a	n/a
Total	6	13	17	11	13
Ranking	1	Eq.3	5	2	Eq.3

**Table 27: Infrastructure Project Benefit to Wider Community.
Precincts**

	1	2	3	4	5
Roads & Transport	5	1	2	3	4
Drainage	2	3	1	4	5
Water	5	4	3	1	2
Sewer	1	2	3	4	5
Elec	n/a	n/a	n/a	n/a	n/a
Comms	n/a	n/a	n/a	n/a	n/a
Gas	n/a	n/a	n/a	n/a	n/a
Total	13	10	9	12	16
Ranking	4	2	1	3	5

**Table 28: Estimated Yield (20 dwellings / ha).
Precincts**

	1	2	3	4	5
Yield	3,820	6,400	6,980	6,160	3,440
Ranking	4	2	1	3	5

**Table 29: Estimated Cost per ha (20 dwellings / ha).
Precincts**

	1	2	3	4	5
Cost / ha	\$741k	\$666k	\$661k	\$737k	\$1,306k
Ranking	4	2	1	3	5

The rankings for each criterion have then been given a weighting, based on the apparent importance, as follows:

- Estimate Infrastructure Project Costs (25%)
- Infrastructure Project Complexity (25%)
- Infrastructure Project Benefit to the wider community (30%)
- Estimated Yield (10%)
- Estimate Cost per Lot (10%)

Therefore, the final precinct sequencing (weighted) is shown in Table 30.

**Table 30: Final Precinct Sequencing (Weighted).
Precincts**

	1	2	3	4	5
Ranking	2	1	Eq.3	Eq.3	5

10 SERVICING INNOVATION & SUSTAINABILITY OPPORTUNITIES

10.1 Non-Drinking Water & Urban Cooling

As outlined in Alluvium's Integrated Water Management Strategy in Appendix B, there are issues that are driving the need for an Integrated Water Management (IWM) approach such as population growth, climate change, water supply reliability and the urban heat island effect. Issues for IWM planning and implementation that must be considered include, but are not limited to:

- Adequate space is necessary across all scales - lot, street, and precinct - to accommodate additional IWM related assets. It is important that this is considered early in the planning process and that this need can be translated to the masterplan. Examples include:
 - On-lot to accommodate assets like rainwater tanks, and
 - Streetscape widths to accommodate greening and canopy cover initiatives e.g. passive irrigation.
- Open spaces need to accommodate tanks or treatment infrastructure prior to irrigation. Note that an AFL sized oval would typically require 100 kL of onsite storage. Aesthetically, however, it is undesirable to have tanks on every open space.
- If a stormwater network is planned for, then alignments and easements for pipelines will also be required as well as space for pump stations near wetland outlets.
- Responsibility for, and cost of, operation and maintenance is a common issue for all scales of IWM intervention. As this IWM plan progresses minimising the maintenance burden will be critical and could be achieved by implementation of measures such as:
 - Low maintenance passive irrigation assets,
 - Smart networks for things like networked rainwater and stormwater harvesting schemes to improve operability and support feasibility, and
 - Planning streetscapes from the start to maximise passive heating and cooling benefits e.g. ensuring suitable orientation.

10.2 Carbon Storage

Increased tree planting to improve canopy coverage has an important secondary feature - carbon sequestration. Carbon sequestration is the capture and long-term storage of carbon dioxide. Release of carbon dioxide into the atmosphere through burning of fossil fuels is the leading cause of climate change. Carbon sequestration seeks to remove carbon dioxide from the atmosphere by enhancing storage capabilities of soils, trees and vegetation. Carbon sequestration from revegetation and mass plantings can provide a significant short-term contribution to climate change mitigation. Longer-term, however, additional strategies are required to reduce reliance on fossil fuels and over-use of natural resources. The PSP can support carbon sequestration by increasing density of planting in landscaped areas and in public and active open spaces.

10.3 Resource Management

One strategy to reduce the over-use of natural resources, that has been adopted by many Victorian councils, including Ballarat City Council, is climate change adaptation. Climate change adaptation seeks to increase resilience to climate change impacts.

On 26 October 2022 Ballarat City Council also adopted The Ballarat Net Zero Emissions Plan. The Plan outlines an aspirational community-wide target of reaching net zero emissions by 2030 and the actions required to achieve this target. It comprises of five Net Zero Outcomes on Business, Homes, New Developments, Transport and Waste. Emissions in Ballarat were estimated to total 1.5 million tonnes in 2020. The Plan includes a series of actions relevant to this report, including:

- Transition towards all-electric houses,
- Advocate for higher Environmentally Sustainable Design Standards,
- Implement actions in Victoria's Gas Substitution Roadmap to support electrification,

- Integrate net zero design standards within the construction of new developments,
- Ensure the construction and development process eliminates waste to landfill,
- Design includes resilience to extreme weather and climate-related events,
- Increase use of public and active transport modes to reduce the need to drive,
- Improving the design of community spaces and key activity areas to improve walkability, accessibility, safety and social inclusion, and
- Coordinate city planning of electric vehicle charging.

The City of Ballarat is also conducting a voluntary trial of the Sustainable Subdivisions Framework (SSF). The framework can be used to integrate sustainability interventions in subdivision design to create fundamental conditions for a sustainable and resilient community. It is hoped that the seven categories underpinning the SSF, including ecology and urban heat, site layout and liveability and integrated water management, will ultimately form part of a future amendment to update the Ballarat Planning Scheme.

Another strategy that could be implemented within the PSPs is the use of recycled products in road pavement construction. Studies supported by Sustainability Victoria have shown the use of recycled road pavement materials reduces impact on the environment through efficient use of extractive industries, reduces waste to landfill (and increased life of local landfill facilities) and reduces energy required to produce pavement construction materials as recycled products are less energy intensive to produce than quarry materials.

11 FURTHER INVESTIGATION

As discussed in the One Mile Grid Traffic & Transport Report upgrade requirements of Remembrance Drive, particularly east of the Link Road, will remain a major challenge because of the heritage significance of the Avenue of Honour. It is recommended that when preparing the Framework Plan, traffic diversion / incentive measures are considered as an alternate.

The sequencing outlined in this report does not suggest that alternate arrangements could not be considered, subject to, but not limited to, developer's provision of supportable interim measures like temporary alternate stormwater and water quality management measures, and / or limiting the growth in precincts to density that would not trigger the requirements for major external road upgrades. Any early development that would not trigger works such as external road upgrades would still need to provide a proportional contribution for the ultimate upgrade the development will require to ensure appropriate, sustainable provisions for the new and broader community.

In addition, further engagement with the traditional owners of the land, the Wadawurrung and Dja Dja Wurrung People, will be required to better understand the cultural and environmental values that Alluvium highlighted in their Integrated Water Management Strategy (e.g. Mulawalla Wetland management plan). Engagement had not been undertaken at the time of preparation on Alluvium's IWMS.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



12 APPENDIX A – STORMWATER MANAGEMENT STRATEGY



SURFACE/STORMWATER MANAGEMENT STRATEGY

Ballarat Western and North-Western Growth Areas

Ballarat City Council

April 2024

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Contents

1	Introduction	5
1.1	References	5
1.2	Location	5
2	Site Analysis	7
2.1	Current land use	7
2.2	Topography	10
2.3	Designated waterways	12
2.4	Catchments	13
2.5	Existing flood modelling	16
3	Site visit	17
4	Waterway and Geomorphic Assessment	18
	North waterways	19
	Middle waterways	19
	South waterways	20
	Conclusion	20
4.1	Flora and Fauna assessment	20
4.2	Cultural Heritage Desktop Assessment	21
5	Existing conditions flood modelling	25
5.1	Hydrology	25
	Hydrologic modelling	25
	Input parameters	25
	Catchment modelling	26
	Model Development	31
6	Post development objectives and conditions	38
6.1	Aim	38
6.2	Objectives and approach	38
	1. Stormwater quantity management	38
	2. Stormwater conveyance	38
	3. Stormwater quality treatment	38
	4. Waterway corridors	38
7	Stormwater Quantity management	40
7.1	Hydrologic modelling	40
7.2	Storage design	42
8	Stormwater conveyance	48
8.1	Waterway corridor	48
8.2	Longitudinal profile	52
8.3	Cross section geometry	53
8.4	Considerations for future waterway continuity	55
9	Stormwater quality treatment	57
9.1	Sediment Basin	60



9.2 Velocities	60
10 Concept design layout	61
10.1 Alternative outfall arrangement	61
11 Conclusion	62
Appendix A	63
Flood mapping	63
Appendix B	78
Sediment Basin Fair and Geyer Calculations	78
Appendix C	95
Wetlands/Retarding Basins Conceptual Layout	95
Figures	
Figure 1. <i>Ballarat northwest and west growth areas context map</i>	6
Figure 2. <i>Existing land use – Ballarat North-western Growth Area</i>	7
Figure 3. <i>Existing land use – Ballarat Western Growth Area</i>	8
Figure 4. <i>Historic PSP's within the previous Ballarat West Growth Area (source: Ballarat City Council) – subject areas shown in red</i>	9
Figure 5. <i>Topography of the Ballarat North-western Growth Area</i>	10
Figure 6. <i>Topography of the Ballarat Western Growth Area</i>	11
Figure 7. <i>CMA boundaries within the Ballarat growth areas</i>	12
Figure 8. <i>Designated waterways within the Ballarat growth areas</i>	13
Figure 9. <i>Major catchments 1 and 2 and flow directions through the Ballarat north-western growth area</i>	14
Figure 10. <i>Major catchment 3 and flow directions through the Ballarat western growth area</i>	15
Figure 11. <i>Catchments covered by the Watertech flood mapping (Source: Watertech, 2019)</i>	16
Figure 12. Photo of a typical road crossing of the waterway in the North-west growth area	17
Figure 13. <i>The study area showing waterways, elevation and the north, middle and south waterway areas used in this section.</i>	19
Figure 14. <i>Examples of waterway form typical of the north, middle and south sections of the study area.</i>	20
Figure 15. <i>Native vegetation identified within the Ballarat growth areas (Source: Nature Advisory 2022)</i>	21
Figure 16. <i>Identified Aboriginal places within the Ballarat growth areas (source: Archaeological Excavations 2021)</i>	23
Figure 17. <i>Cultural sensitive locations within the Ballarat growth areas (source: Archaeological Excavations 2021)</i>	24
Figure 18. <i>RORB model for the Ballarat north-western growth area</i>	27
Figure 19. <i>RORB model for the Ballarat north-western growth area</i>	28
Figure 20. <i>Location of key flow rates within the Ballarat growth areas</i>	29
Figure 21. <i>Ballarat Northwest and West Precinct TUFLOW model extents</i>	32
Figure 22. <i>Ballarat Northwest and West Precinct TUFLOW boundary conditions</i>	33
Figure 23. <i>Ballarat Northwest and West Precinct TUFLOW culvert crossings</i>	35
Figure 24. <i>Existing conditions 1% AEP flood extents – North Western growth area</i>	36
Figure 25. <i>Existing conditions 1% AEP flood extents – Western growth area</i>	37
Figure 26. <i>RORB model for the Ballarat north-western growth area – developed conditions</i>	41
Figure 27. <i>RORB model for the Ballarat western growth area – developed conditions</i>	42
Figure 28. <i>Retarding basin locations and modelling results in Ballarat north-western growth area</i>	45
Figure 29. <i>Retarding basin locations and modelling results in Ballarat western growth area - plan 1</i>	46
Figure 30. <i>Retarding basin locations and modelling results in Ballarat western growth area – plan 2</i>	47
Figure 31. <i>Waterway corridor (Melbourne Water's Waterway Corridor Guidelines)</i>	48
Figure 32. <i>Constructed Waterway corridor requirements (Melbourne Water's Waterway Corridor Guidelines)</i>	49
Figure 33. <i>Waterway corridors within the Ballarat NW growth area</i>	50

Figure 34. <i>Waterway corridors within the Ballarat W growth area – plan 1</i>	51
Figure 35. <i>Waterway corridors within the Ballarat W growth area – plan 2</i>	52
Figure 36. <i>Conceptual arrangement of a typical cross section for a 40m wide waterway corridor</i>	54
Figure 37. <i>Conceptual arrangement of a typical cross section for a 45m wide waterway corridor</i>	54
Figure 38. <i>Conceptual arrangement of a typical cross section for a 50m wide waterway corridor</i>	55
Figure 39. <i>Conceptual arrangement of a typical cross section for a 55m wide waterway corridor</i>	55
Figure 40. <i>Conceptual arrangement of a typical cross section for a 60m wide waterway corridor</i>	55
Figure 41. Suggested growth area changes to provide waterway continuity	56
Figure 42. MUSIC model for the Ballarat growth areas	57
Figure 43. <i>Treatment asset locations overview</i>	59
Figure 44. Existing conditions 1% AEP velocity – North Western growth area	64
Figure 45. Existing conditions 1% AEP flood extents – Western growth area	65
Figure 46. Existing conditions 1% AEP flood depth – North Western growth area	66
Figure 47. Existing conditions 1% AEP flood depth – Western growth area	67
Figure 48. Existing conditions 0.5% AEP flood extents – North Western growth area	68
Figure 49. Existing conditions 0.5% AEP flood extents – Western growth area	69
Figure 50. Existing conditions 2% AEP flood extents – North Western growth area	70
Figure 51. Existing conditions 2% AEP flood extents – Western growth area	71
Figure 52. Existing conditions 5% AEP flood extents – North Western growth area	72
Figure 53. Existing conditions 5% AEP flood extents – Western growth area	73
Figure 54. Existing conditions 10% AEP flood extents – North Western growth area	74
Figure 55. Existing conditions 10% AEP flood extents – Western growth area	75
Figure 56. Existing conditions 20% AEP flood extents – North Western growth area	76
Figure 57. Existing conditions 20% AEP flood extents – Western growth area	77
Figure 58. <i>Asset details of WLRB 1 to WLRB 4B</i>	96
Figure 59. <i>Asset details of WLRB 5 to WLRB 10</i>	97
Figure 60. <i>Asset details of WLRB 11 to WLRB 19</i>	98
Figure 61. <i>Asset details of WLRB 20 to WLRB 24</i>	99
Figure 62. <i>Asset details of WLRB 25 to WLRB 27 (including SB 31)</i>	100
Figure 63. <i>Asset details of WLRB 28 to WLRB 30</i>	101

Tables

Table 1. Major Catchments of Ballarat North-western and Western growth areas	15
Table 2. Directly and indirectly connected impervious fractions for lots and roads	25
Table 3. Summary of Kc calibration flows	26
Table 4. RORB modelling results for major catchments of Ballarat north-western and western growth areas	30
Table 5. Summary of LiDAR data	32
Table 6. Material roughness	34
Table 7. Key culvert crossings within the Ballarat TUFLOW model	34
Table 8. TUFLOW duration summary	35
Table 9. Summary of Kc calibration flows – developed conditions	40
Table 10. 1% AEP event RORB modelling results for the growth	43
Table 11. Retarding basin requirements (1% AEP event)	44
Table 12. waterway corridor widths for the proposed growth areas	49
Table 13. Longitudinal slope along waterway reaches	53
Table 14. Channel cross-section geometry and design parameters	53
Table 15. Treatment asset parameters	58
Table 16. Overall treatment performance of the system in Major Catchment 1 (Burrumbeet Creek)	60
Table 17. Overall treatment performance of the system in Major Catchment 2 (Woody Yaloak River)	60
Table 18. Overall treatment performance of the system in Major Catchment 3 (Yarrowee River)	60
Table 19. WLRB 1: Sediment Pond design parameters and checks	79
Table 20. WLRB 2: Sediment Pond design parameters and checks	79

Table 21. WLRB 3: Sediment Pond design parameters and checks	80
Table 22. WLRB 4A: Sediment Pond design parameters and checks	80
Table 23. WLRB 4B: Sediment Pond design parameters and checks	81
Table 24. WLRB 5: Sediment Pond design parameters and checks	81
Table 25. WLRB 6: Sediment Pond design parameters and checks	82
Table 26. WLRB 7: Sediment Pond design parameters and checks	82
Table 27. WLRB 8: Sediment Pond design parameters and checks	83
Table 28. WLRB 9: Sediment Pond design parameters and checks	83
Table 29. WLRB 10: Sediment Pond design parameters and checks	84
Table 30. WLRB 11: Sediment Pond design parameters and checks	84
Table 31. WLRB 12: Sediment Pond design parameters and checks	85
Table 32. WLRB 13: Sediment Pond design parameters and checks	85
Table 33. WLRB 14: Sediment Pond design parameters and checks	86
Table 34. WLRB 15: Sediment Pond design parameters and checks	86
Table 35. WLRB 16: Sediment Pond design parameters and checks	87
Table 36. WLRB 17: Sediment Pond design parameters and checks	87
Table 37. WLRB 18: Sediment Pond design parameters and checks	88
Table 38. WLRB 19: Sediment Pond design parameters and checks	88
Table 39. WLRB 20: Sediment Pond design parameters and checks	89
Table 40. WLRB 21: Sediment Pond design parameters and checks	89
Table 41. WLRB 22: Sediment Pond design parameters and checks	90
Table 42. WLRB 23: Sediment Pond design parameters and checks	90
Table 43. WLRB 24: Sediment Pond design parameters and checks	91
Table 44. WLRB 25: Sediment Pond design parameters and checks	91
Table 45. WLRB 26: Sediment Pond design parameters and checks	92
Table 46. WLRB 27: Sediment Pond design parameters and checks	92
Table 47. WLRB 28: Sediment Pond design parameters and checks	93
Table 48. WLRB 29: Sediment Pond design parameters and checks	93
Table 49. WLRB 30: Sediment Pond design parameters and checks	94
Table 50. Sediment Basin SB31: Sediment Pond design parameters and checks	94



1 Introduction

Alluvium Consulting (Alluvium) has been engaged by Taylors to undertake a surface/storm water management strategy (SWMS) for Ballarat City Council's future North-Western and Western growth areas. The surface water and geomorphology assessments of the existing conditions have been previously completed by Alluvium (Aug, 2013) to inform the future drainage strategy of the growth areas. This document consolidates the findings from the existing situational analysis report (Alluvium, Aug 2013) with the proposed approach to manage urban stormwater runoff generated from development within the growth areas.

This SWMS acts as critical component in defining the future stormwater management requirements for the growth area Framework Plan, in particular defining management strategies for:

- Stormwater quantity management
- Stormwater quality management
- Stormwater conveyance

Through meeting these objectives, this SWMS ensures stormwater is managed in accordance with Council's requirements. The strategy will directly inform the local drainage design for the growth areas. Information with respect to ultimate assets are provided at a concept design level.

1.1 References

The following documents and guidelines were used as reference in the producing this report:

- Urban Stormwater Best Practice Environmental Management Guidelines (1999)
- Australian Rainfall & Runoff (2016) – Engineers Australia
- Flood Mapping Technical Specifications (2018) – Melbourne Water
- Waterway Corridors Greenfield Development Guidelines (2013) – Melbourne Water
- Constructed Waterways design guidelines (2019) – Melbourne Water
- Urban Stormwater Management Guidance (2021) – EPA Victoria
- Ballarat West Growth Area (2016) – SMEC
- Summary Report: Ballarat Mapping Updates (2019) – Water Technology
- Current Drainage Assets Status and Existing RORB Modelling (2023) – Engeny
- North West Growth Area Ballarat Biodiversity Assessment (2022) – Nature Advisory
- Cultural Heritage Assessment West Ballarat (2021) – Archaeological Excavations
- Existing Conditions/Situational Analysis Stormwater and Waterway Assessment for the Ballarat Western and North-Western Growth Areas (Aug, 2023) – Alluvium
- Integrated Water Management Strategy (2023) – Alluvium

1.2 Location

The Ballarat north-western and western growth areas are located 110 km north-west of Melbourne's CBD and covers an area of 1,769 ha. The north-western growth area is generally bounded by Draffins Road to the west, the railway line and Blind Creek Road to the north, Cuthberts Road to the south, and Ballarat-Skipton Rail Trail to east.

The Ballarat west growth area is generally bounded by Ballarat-Skipton Rail Trail to the west, Cuthberts Road to the north, Bells Road to the south, and Cherry Flat Road to the east. The areas consist of privately-owned landholdings for farm use and open paddocks. For the detailed growth areas boundaries, a site context map is provided in Figure 1.

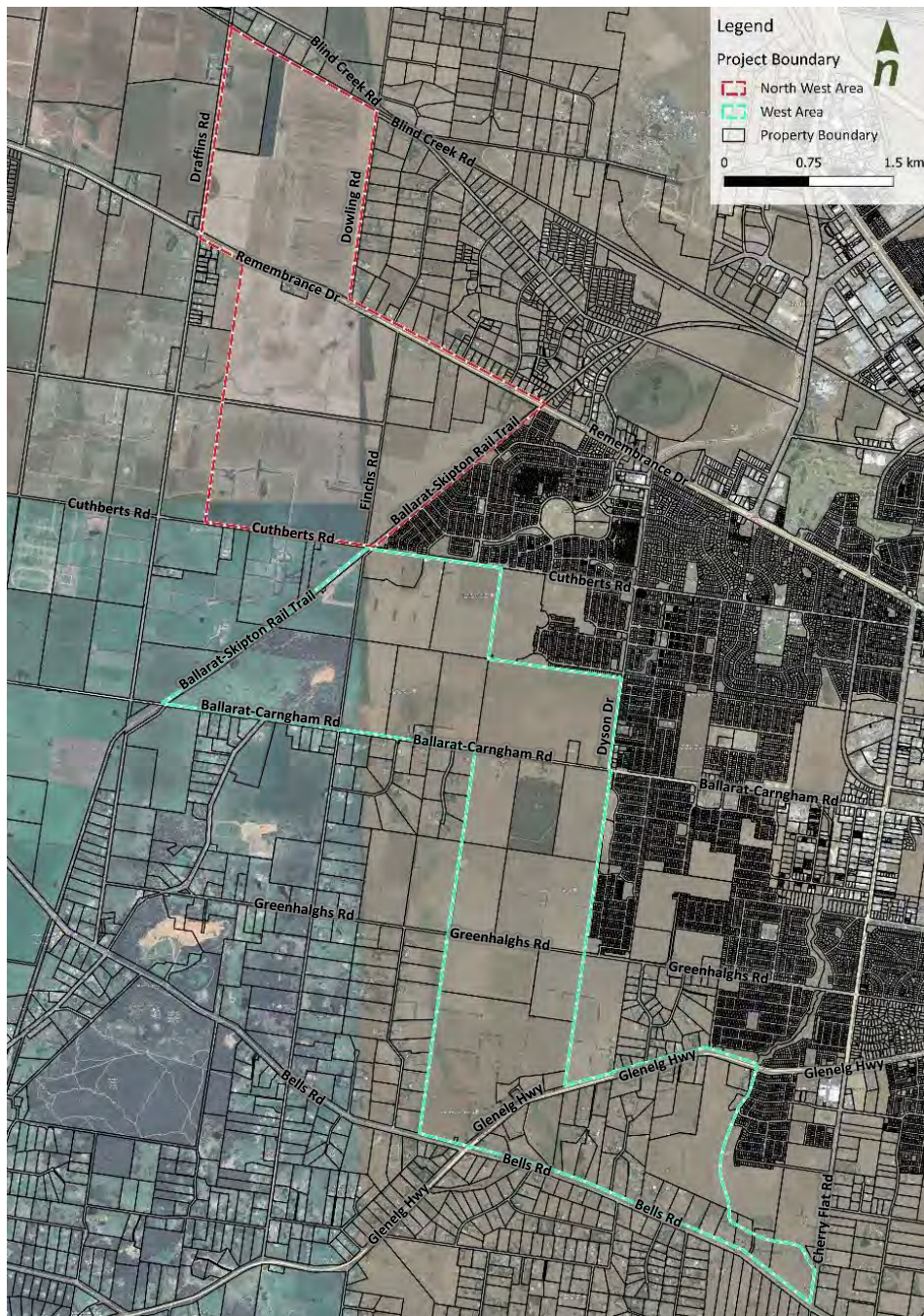


Figure 1. Ballarat northwest and west growth areas context map

2 Site Analysis

2.1 Current land use

The existing areas are zoned for farm use, which is typically associated with agricultural practice. The current areas mainly consist of privately-owned farms and open paddocks.

The North Western growth area consists of major roads along the boundaries of the growth area referred to as Draffins Road, Dowling Road and Cuthberts Road, the railway line and the walking track known as Ballarat-Skipton Rail Trail. Remembrance Drive and Finchs Road intersect the growth area running east-west and north-south respectively.



Figure 2. Existing land use – Ballarat North-western Growth Area

The Western growth area consists of major roads along the boundaries of the growth area referred to as Ballarat-Carngham Road, Dyson Drive, Bells Road, Cherry Flat Road and the walking track known as Ballarat-Skipton Rail Trail. Greenhalgs Road and Glenelg Highway intersect the growth area running east-west.

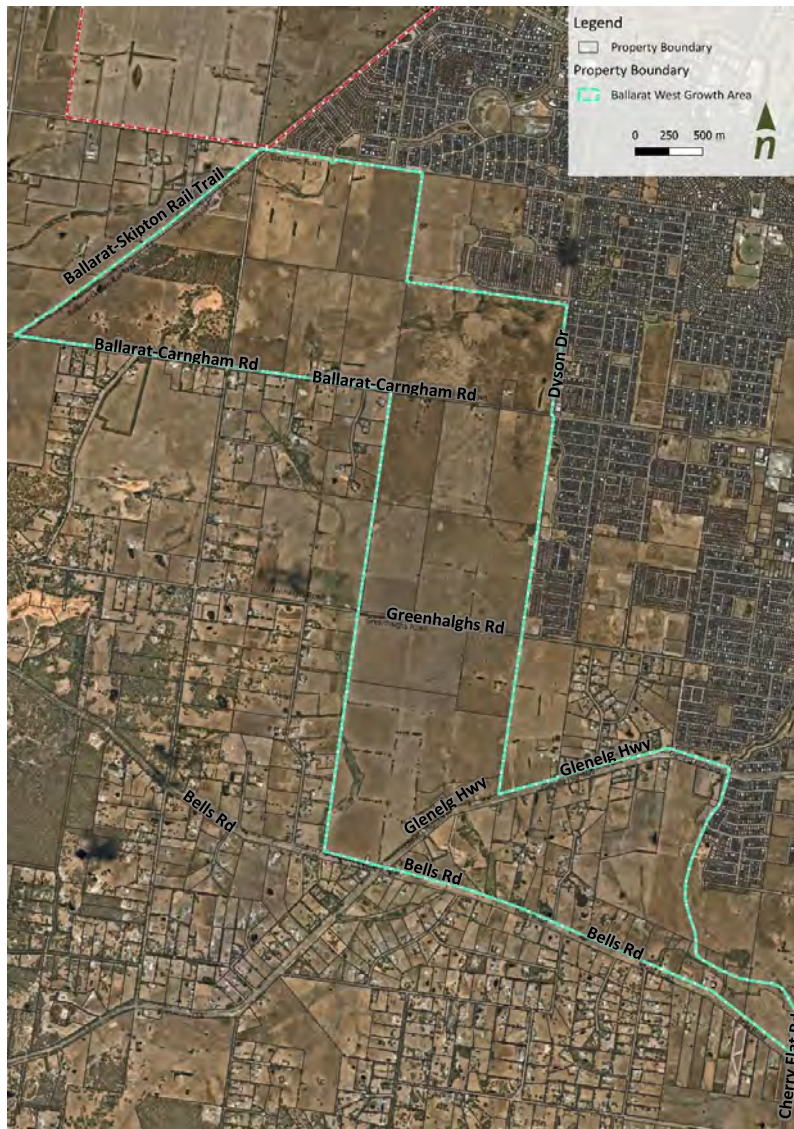


Figure 3. Existing land use – Ballarat Western Growth Area

Significant development has occurred to the east of the growth areas in recent years, with the majority being residential development (i.e. Lucas township). The majority of the land within the growth areas is currently used for agricultural purposes. A large bushland reserve is located to the west of the growth areas (i.e. Haddon Common Bushland Reserve).



The area east of the North Western and Western growth areas was historically rezoned for development under the previous Ballarat West Growth Area Plan by Ballarat City Council in 2016. The growth area provides for around 18,000 new homes to accommodate a population of 40,000 people. The growth area consisted of four Precincts, known as:

- Bonshaw Creek (Precinct 1)
- Greenhalghs Road (Precinct 2)
- Alfredton West (Precinct 3)
- Carngham road (Precinct 4).

Figure 4 below provides an overview of the previous Precinct structure Plans (PSP's) located east of the proposed North Western and Western growth areas.

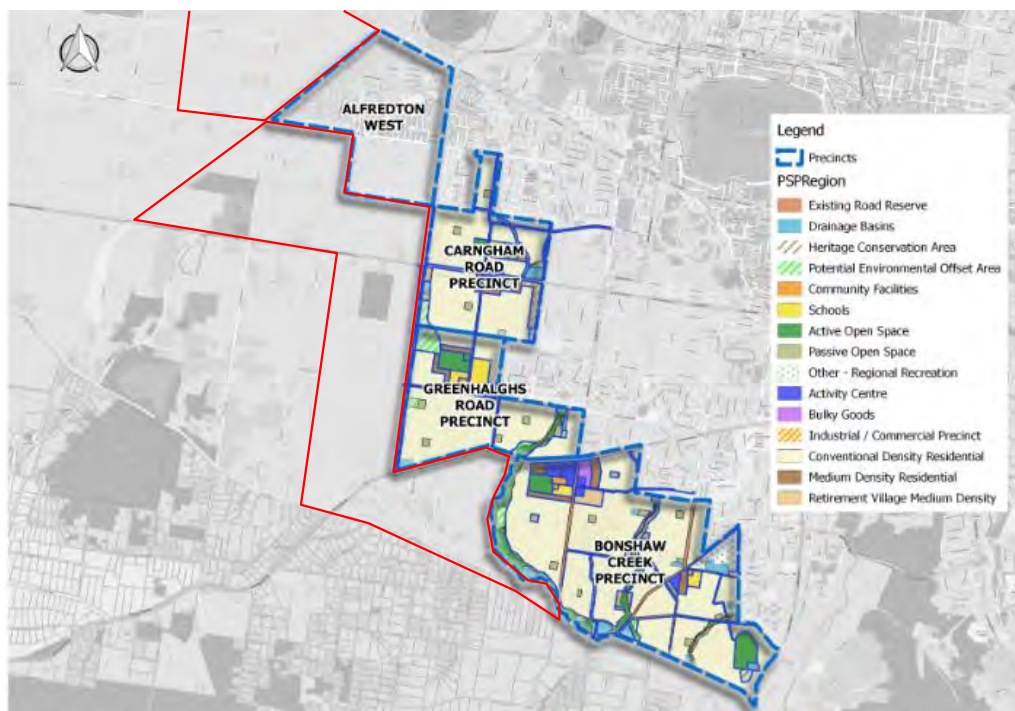


Figure 4. Historic PSP's within the previous Ballarat West Growth Area (source: Ballarat City Council) – the new proposed growth areas (subject of this report) are shown in red



2.2 Topography

Ballarat North-Western Growth Area

Figure 5 shows the topography across the Ballarat North-western growth area. Elevation ranges from 448 m AHD along the south-eastern boundary of the site, to 409 m AHD at the north-western boundary along the Draffins Road. The site generally falls in a north-western direction.

The site topography is generally gentle, with grades varying from 0.5% to 2.5%. The topography to the south of Remembrance Drive is more complicated than the north. Rather than continuously falling in the western direction, the topography at the south of Remembrance Drive is further separated and guided by ridge and trough lines which results in the land falling in south-western and north-western directions.

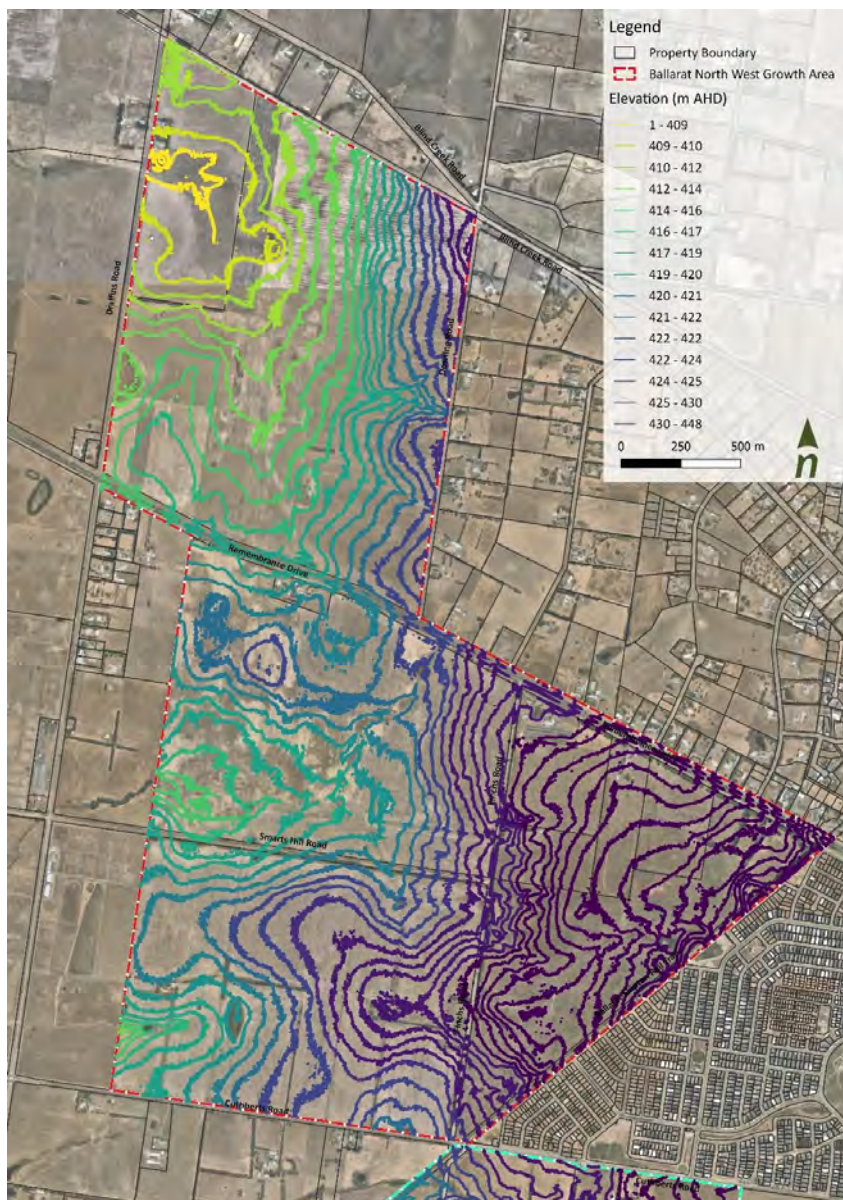


Figure 5. Topography of the Ballarat North-western Growth Area



Ballarat Western Growth Area

Figure 6 shows the topography across the Ballarat Western growth area. The elevation in the Western growth area ranges from 440 m AHD at the north, to 386 m AHD at the southeastern end of the area boundary.

The overall topography within the Western growth area falls in a southern direction. A higher elevation area at the north results in the topography falling mainly in a southern direction towards the low point around Bells Road. From this location the land continues to fall towards the east along Bells Road.

Overall, the Western growth area is steeper compared to the North-western growth area, with grades varying from 1% to 4.5%.

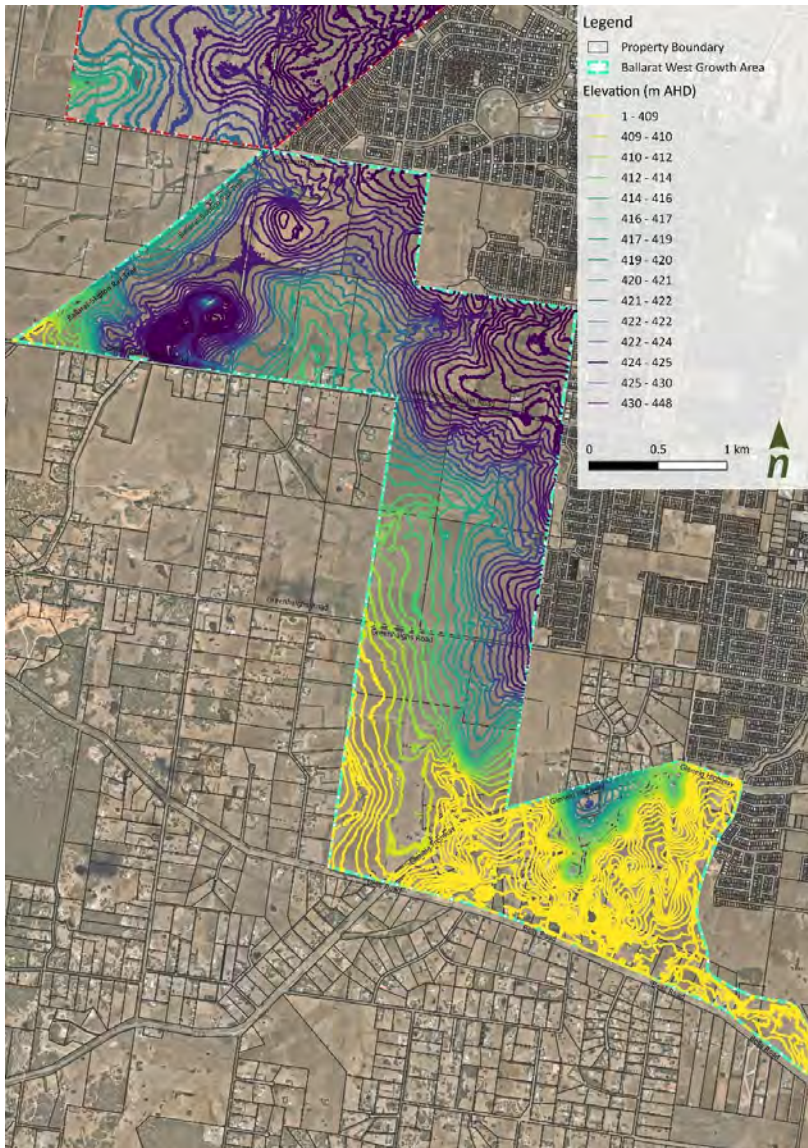


Figure 6. Topography of the Ballarat Western Growth Area



2.3 Designated waterways

The existing waterways within the Ballarat growth areas are under management of two Catchment Management Authorities, the Corangamite Catchment Management Authority (CCMA) and the Glenelg Hopkins Catchment Management Authority (GHCMA). Figure 7 below provides a layout of the two Catchment Management Authority (CMA) boundaries.

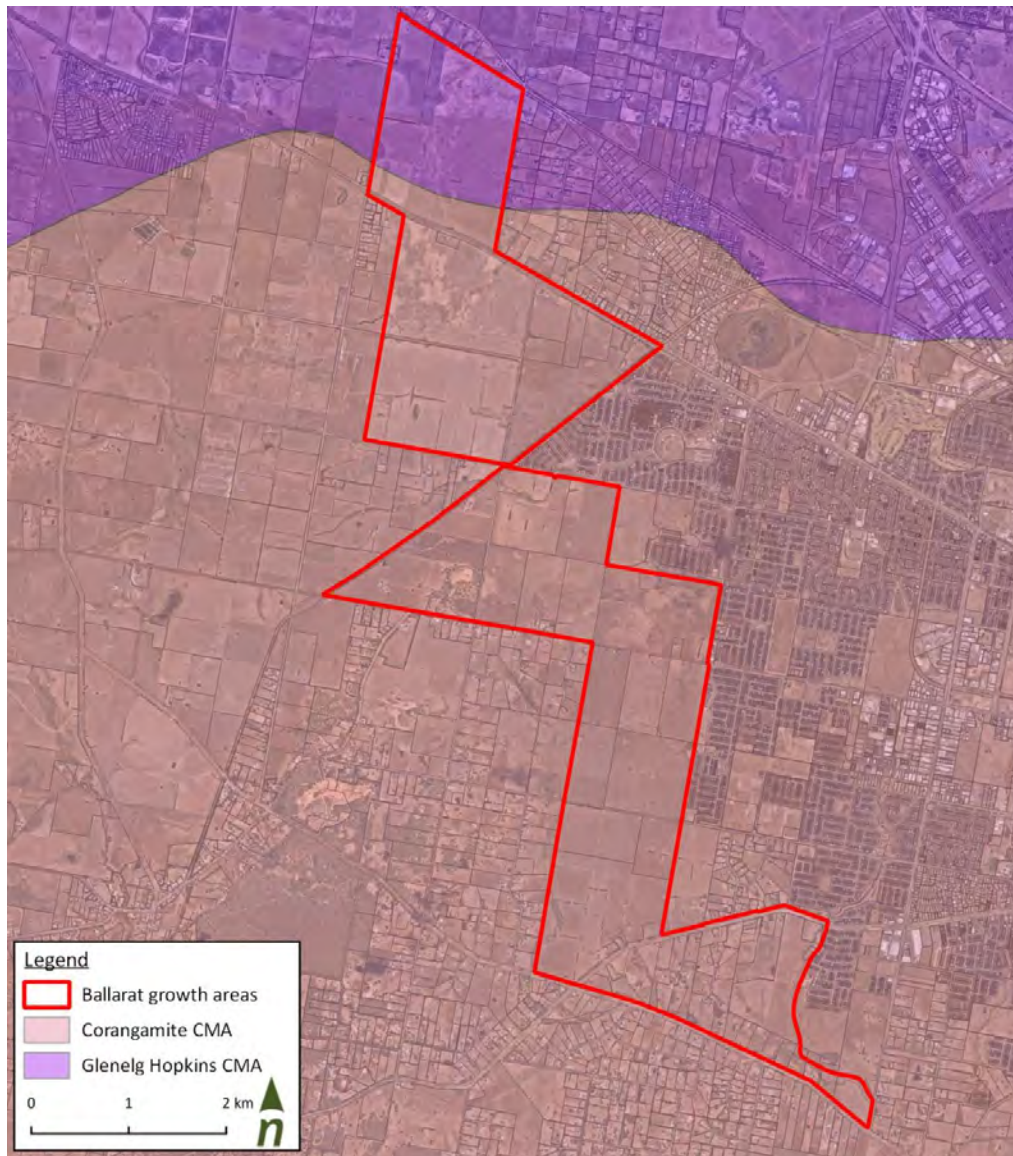


Figure 7. CMA boundaries within the Ballarat growth areas

Following discussions with Council, the Corangamite CMA and the Glenelg Hopkins CMA, it was agreed that in lieu of any local waterway corridor guidelines, Melbourne Water's Waterway Corridor Guidelines are to be used when determining appropriate waterway corridor widths.



As provided by the Corangamite CMA, there are several designated waterways that have been previously defined. These waterways have been investigated as part of the geomorphic assessment (Section 4). Figure 8 below provides a layout of the designated waterways within the Ballarat growth areas.

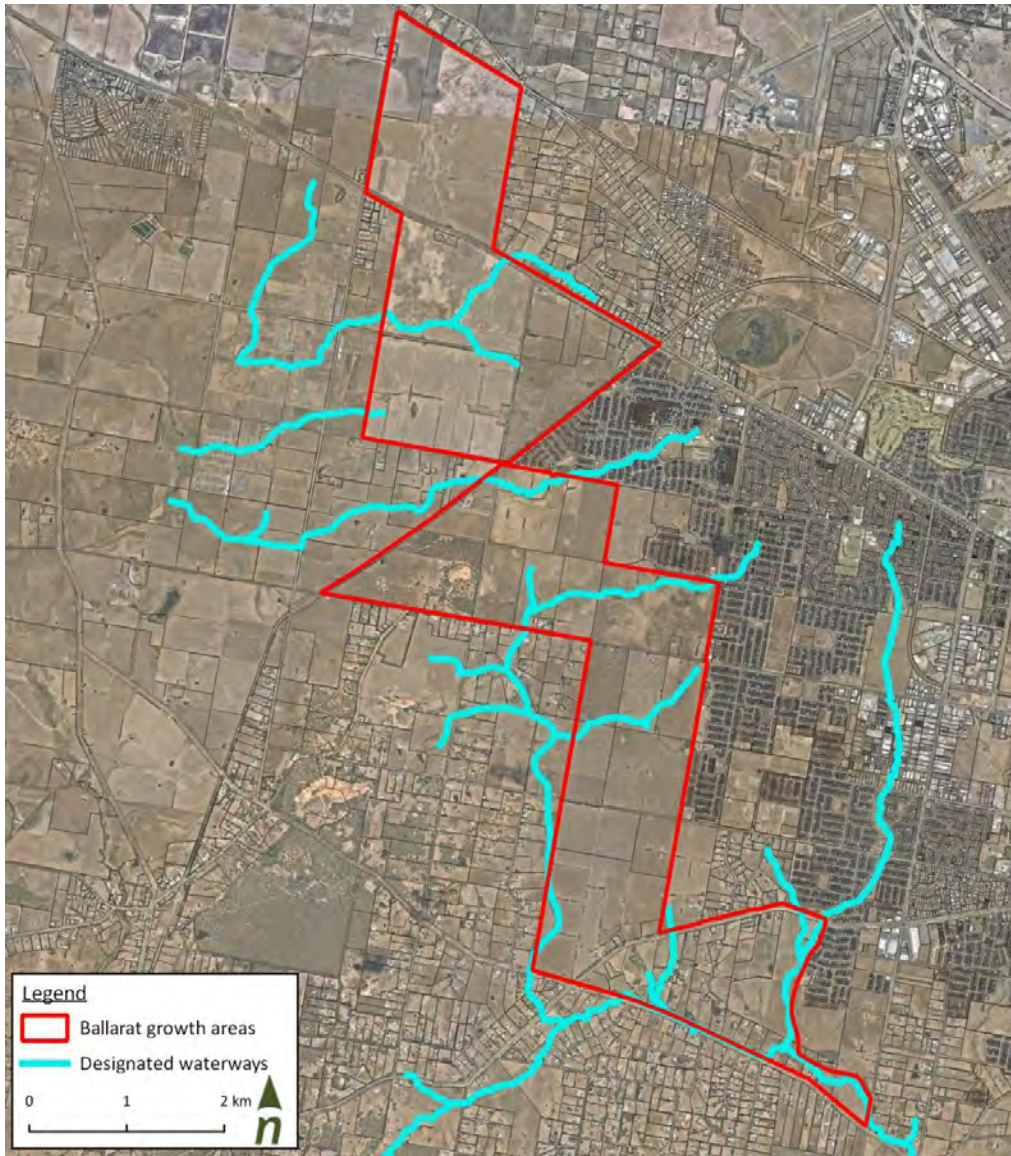


Figure 8. Designated waterways within the Ballarat growth areas (source: adapted from CCMA supplied information)

2.4 Catchments

The major catchments within the growth areas contribute to three different major watercourses, which are Burrumbeet Creek north-west of the site, Woody Yaloak River south-west of the site, and Yarrowee River south-east of the site.

The catchments covering the growth areas are separated into three major catchments based on the contributing mainstreams. Catchment 1 covers a portion of the north-western growth area and flows in a

westerly direction outfalling towards Burrumbeet Creek. Catchment 2 covers a portion of the north-western growth area and outfalls in a westerly direction to Woody Yaloak River. Catchment 3 covers the total western growth area and outfalls in an easterly direction towards the tributary of Yarrowee River. The land use within the three major catchments is generally rural, with some urbanised areas to the east upstream.

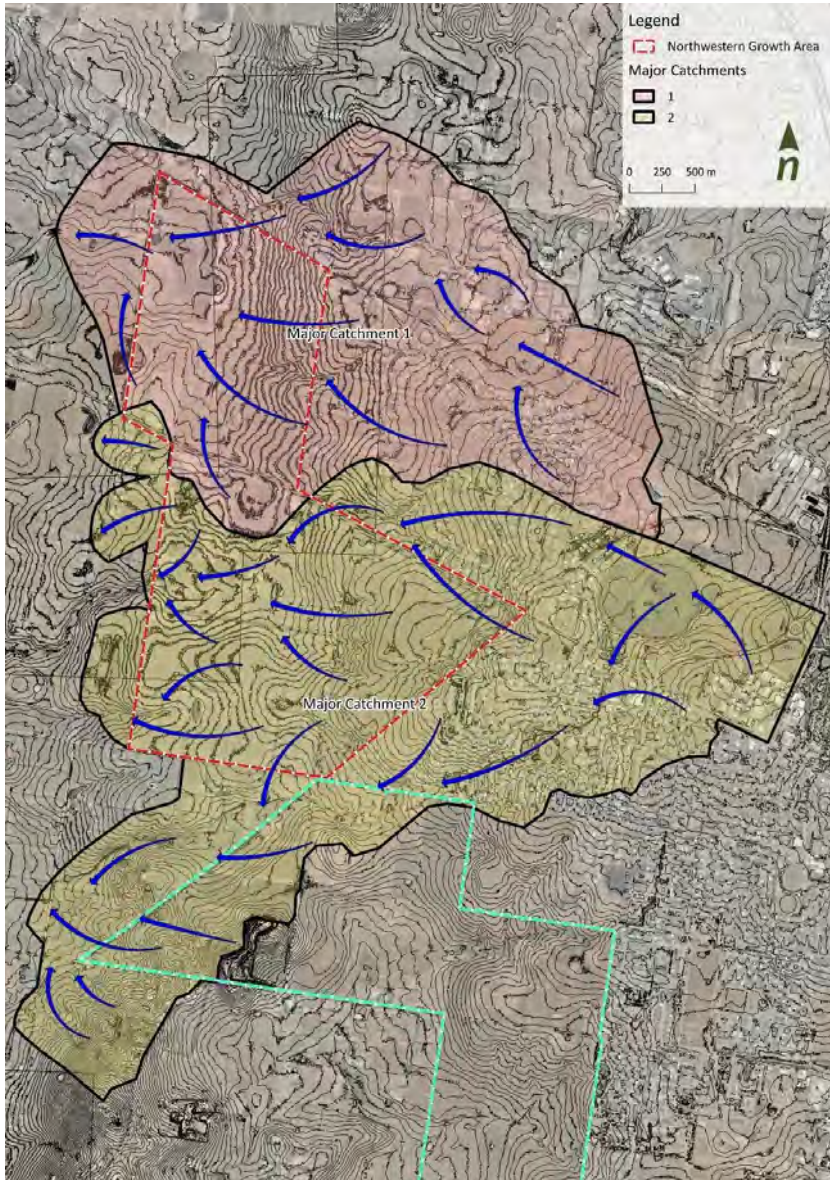


Figure 9. Major catchments 1 and 2 and flow directions through the Ballarat north-western growth area



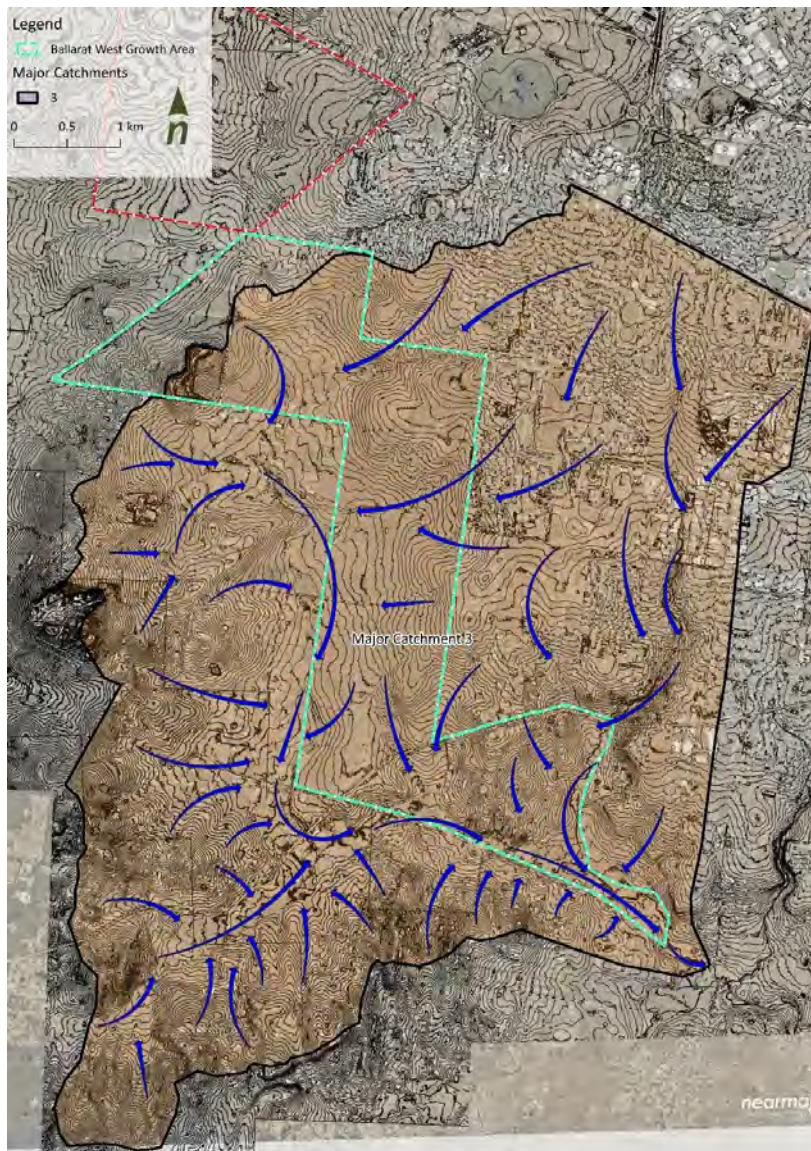


Figure 10. Major catchment 3 and flow directions through the Ballarat western growth area

Table 1. Major Catchments of Ballarat North-western and Western growth areas

Catchment	Area (km ²)	Catchment within NW&W growth areas	Comment
1	9.35	NW: 2.82 km ²	Major Catchment 1 outfalls west towards the tributary of Burrumbeet Creek.
2	14.50	NW: 4.27 km ² W: 1.37 km ²	Major Catchment 2 outfalls west towards the tributaries of Woody Yaloak River.
3	42.43	W: 9.23 km ²	Major Catchment 3 outfalls south-east towards the tributary of Yarrowee River.

2.5 Existing flood modelling

Previous flood modelling work has been completed for the Ballarat growth areas by Watertech in 2019 in a report referred to as “Summary Report: Ballarat Mapping Updates” – September 2019 (Water Technology). The report presents an update of previous flood modelling to the ARR 2019 standards, for the Ballarat growth areas outlined. The flood modelling has been used to inform the Land Subject to Inundation Overlay (LSIO) and Flood Overlay (FO) for a future planning scheme amendment.

The Watertech modelling project covered a number of catchments as outlined in Figure 11 below.

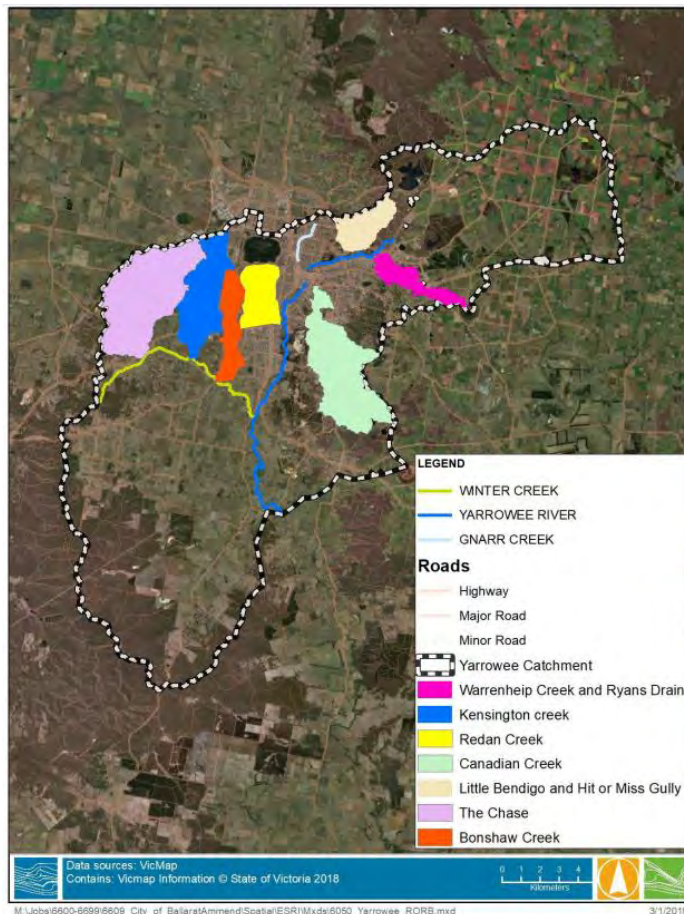


Figure 11. Catchments covered by the Watertech flood mapping (Source: Watertech, 2019)

The Watertech hydrologic modelling was undertaken using RORB, and was calibrated to the Mount Mercer streamflow gauge. Data from the streamflow gauge extends from 1957 to current day. Given the gauge flow data was available, kc, Initial Loss and Continuing loss parameters were modified to match the available data at the gauge.

The Watertech flood modelling covered areas of the proposed Ballarat growth areas, and will provide a point of calibration for Alluvium’s hydrologic model (RORB) and the hydraulic model (TUFLOW). Subsequent investigations have been undertaken by Engeny (2023) for Council, calibrating loss values and kc variables in line with the previous Watertech RORB modelling.



3 Site visit

A site visit was conducted on Thursday, 4th May 2023 to gain a better understanding of the local terrain, site constraints and opportunities.

A number of road culvert and bridge crossings of the waterways were inspected around the growth areas. The crossings (where accessible) were inspected by Alluvium during the site visit where the culvert size, configuration and depth were measured to provide information on existing waterway obstructions for the hydraulic modelling of the site and to determine upstream and downstream boundary conditions of the model. All measurements and inspections were completed from the road, as landowner access was not permitted at the time of the site visit. As a result, any internal property characteristics have been assumed based upon the drone footage and latest aerial imagery (nearmap). The most recent aerial imagery was taken on 6th April 2023 for the Ballarat area.

A drone flight of the growth area and the surround was undertaken by Alluvium during the field visit to provide enough information for the geomorphic assessment that was conducted. The geomorphic assessment is further discussed in Section 4 below.



Figure 12. Photo of a typical road crossing of the waterway in the North-west growth area

4 Waterway and Geomorphic Assessment

A geomorphic assessment of the waterways within the study area was undertaken in May 2023. Site access limitations meant that the geomorphic assessment was undertaken from the road and where possible, using a small UAV (a drone) to capture imagery. The geomorphic assessment focused on the existing form and processes in the waterways and had two aims:

- To identify whether any of the waterways that flow through the study area support geomorphic values that warrant protection (i.e whether any of the waterway were of an especially rare or sensitive form).
- To identify, at a high level, the likely impact of development on the waterways so that necessary mitigation measures can be identified.

The waterways within the study area are ephemeral headwater streams that convey runoff across the low-gradient landscape towards larger waterways downstream. For the purposes of description, the waterways have been separated into a North, Middle and South section as shown in Figure 13.

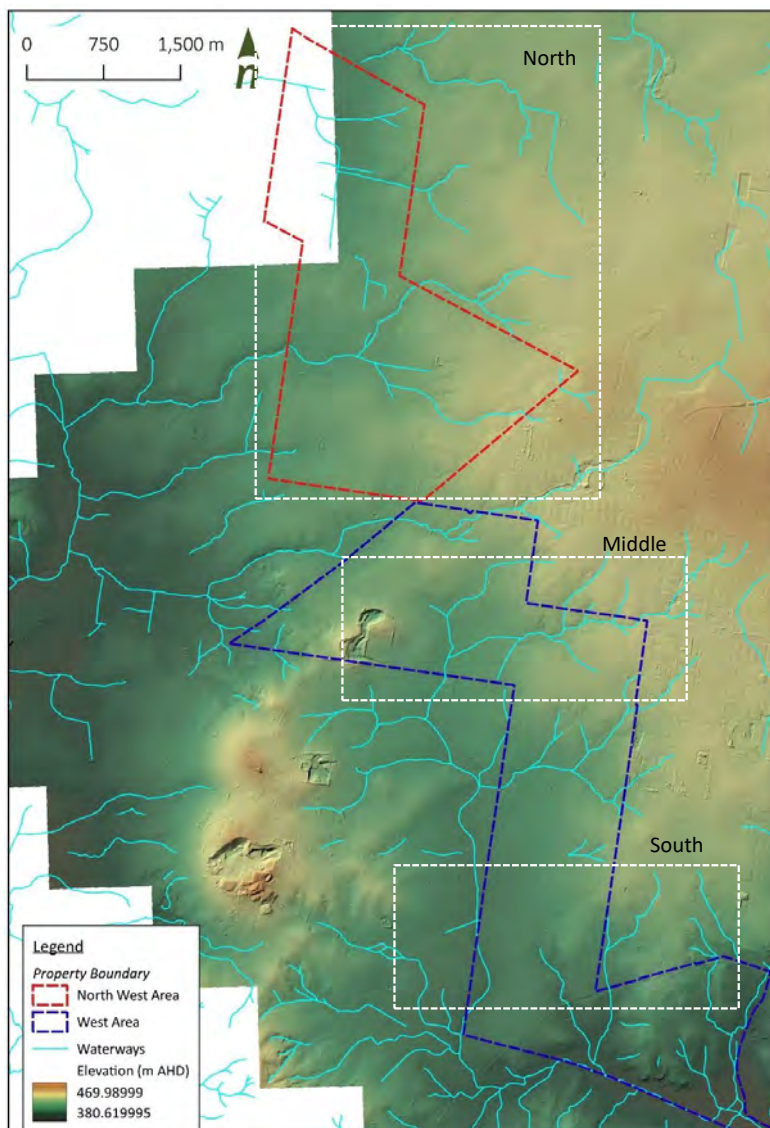


Figure 13. The study area showing waterways, elevation and the north, middle and south waterway areas used in this section.

North waterways

Waterways in the northern section of the study area have been extensively modified by cropping activities and by the presence of roads that dissect the flow paths. In many places the waterways do not have a clear and continuous channel and are instead wide, flat swampy areas. Many of the wet areas have had linear drainage structures excavated to promote drainage for agriculture (Figure 14A). These drains occur throughout the study area and provide no environmental value. Swampy backwater zones have formed upstream, and in some cases immediately downstream, of the culverts that allow flow to pass beneath the roads (Figure 14B).

Middle waterways

The waterways in the middle section of the study area are more defined than those in the north. The ephemeral, meandering waterways are slightly deeper and include occasional 'pools'. These channels have the broad planform of a chain of ponds type waterway (which are a rare waterway type that is often protected



and enhanced), but in reality are too degraded to be considered of geomorphic value (Figure 14C). These floodplain channels are not functioning as a chain of ponds, are devoid of vegetation and have been extensively modified in several areas.

South waterways

Waterways in the south alternate between artificial and very straight drains and open, flat and swamps areas, usually upstream of constrictions such as road culverts (Figure 14D).

Conclusion

Overall, the headwater streams that line the study area have been extensively modified by agriculture, either by excavation of linear drainage lines, disconnection via road culverts or a complete change in form due to cropping. This history of land use and modification means that none of the waterways can be considered locally rare or threatened and for this reason have low geomorphic value.

Addition of stormwater flows from development is likely to exacerbate backwater ponding upstream of the existing culverts, and has the potential to cause some incision (deepening) of the waterways that are well defined. Overall, establishing appropriately designed constructed waterways that convey the runoff from the developed areas is an appropriate management of these waterways from a purely geomorphic form perspective. In the upper reaches of the catchment where safe flow conveyance capacity allows, the existing drainage lines could potentially be modified to a pipe and road reserve as part of the urbanisation process.



Figure 14. Examples of waterway form typical of the north, middle and south sections of the study area.

4.1 Flora and Fauna assessment

A biodiversity assessment was undertaken by Nature Advisory in 2022 to inform the flora and fauna species existing or potentially existing within the Ballarat north-western growth area and the north of Ballarat western growth area. The areas identified with flora and fauna species are to provide the information relating to the



future local development and potential engineering designs. The identified flora and fauna habitats act as the guide for development planners to avoid or minimise the impacts of development on the areas with the purpose of enhancing biodiversity values. The identified species are presented in Figure 15 below.

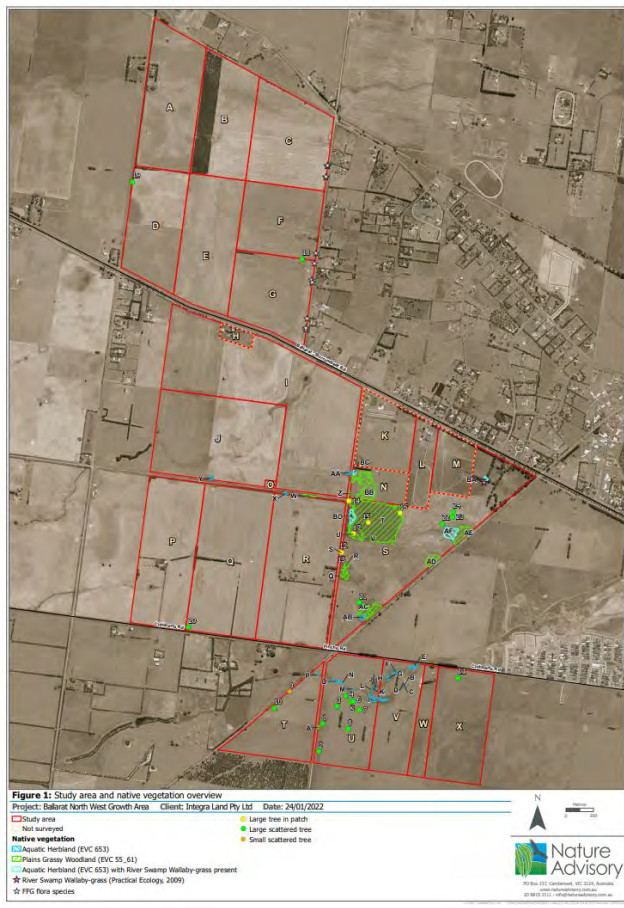


Figure 15. Native vegetation identified within the Ballarat growth areas (Source: Nature Advisory 2022)

Figure 15 shows that patches of Plains Grassy Woodlands and River Swamp Wallaby-grass exist within the southeast of the Ballarat north-western growth area, which are all located close to Finchs Road and Ballarat-Skipton Rail Trail. Moreover, several Flora and Fauna Guarantee species were identified along the Dowling Road. For the north of the Ballarat western growth area, 11 scattered trees were observed within the patches. The Aquatic Hermland are located close to the existing watercourse with few large scatter trees being around. Figure 13 indicates that when the local development happens around the identified species, it is suggested either avoid the development in these areas or apply the low-impact techniques of drainage design, such as constructed wetlands, to deal with the objectives set up in the drainage strategy.

4.2 Cultural Heritage Desktop Assessment

The cultural heritage assessment at the Ballarat North-western growth area was completed by Archaeological Excavations in 2021. The assessment was conducted to inform the Aboriginal and historical heritage values of the Ballarat North-western growth area and further develop the potential locations that needs to be prevented from the development or obtain the corresponding approval for development. Notably, referring to the report, no areas were identified within the Ballarat north-western growth area; only 11 places were identified within 200 m away from the eastern boundary of the growth area. Specifically, these 11 locations of

the Aboriginal places and relevant cultural sensitive areas are located in the Lucas Township, which is the eastern side of Ballarat-Skipton Rail Trail and the northern side of Cuthberts Road.

Figure 16 and Figure 17 below show the identified Aboriginal places and corresponding cultural sensitive locations.

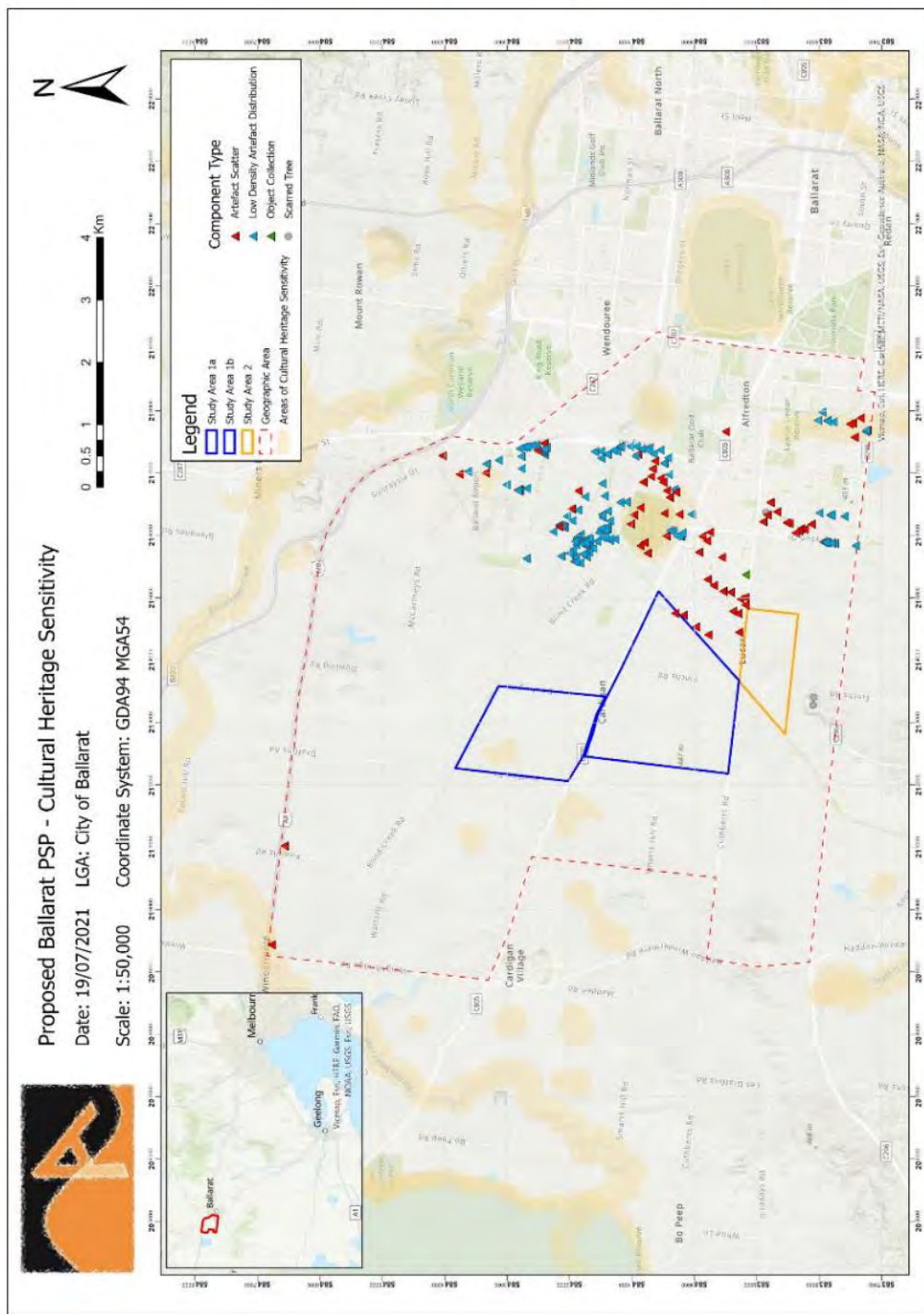


Figure 17. Cultural sensitive locations within the Ballarat growth areas (source: Archaeological Excavations 2021)

5 Existing conditions flood modelling

5.1 Hydrology

The hydrologic analysis of the Ballarat north-western and western growth areas was undertaken to determine the existing peak runoff flow rate (m³/s) for various flood events throughout the catchment. The hydrologic analysis is used to inform the existing peak flow rates flowing into and out of the catchment. The peak flow rates at the points of interest were determined for further use in the flood modelling.

Hydrologic modelling

The hydrologic analysis was undertaken using RORB (v6.31), which is a runoff-routing software designed to simulate attenuation and time of concentrations to produce flood estimates at specified catchment locations.

A RORB model was created for the Ballarat north-western and western areas to determine:

- Existing peak flows
- Flood hydrographs for the existing peak flows

The RORB model was built by delineating the major catchments into sub-areas based on topography, potential and existing roads alignments, and lot layouts. The major catchments include the undeveloped areas proposed for future residential use and the existing residential areas. The fraction impervious values adopted for the existing conditions model are specified in Table 2. These areas are further divided into directly and indirectly connected impervious areas.

Table 2. Directly and indirectly connected impervious fractions for lots and roads

Type	Impervious fraction assigned	Area (existing conditions)	
Existing residential	0.75	Major Catchment 1:	0.163 km ²
		Major Catchment 2:	1.460 km ²
		Major Catchment 3:	5.448 km ²
Roads	0.70	Major Catchment 1:	0.045 km ²
		Major Catchment 2:	0.825 km ²
		Major Catchment 3:	2.537 km ²
Undeveloped/open space	0.10	Major Catchment 1:	9.142 km ²
		Major Catchment 2:	12.215 km ²
		Major Catchment 3:	34.445 km ²

Input parameters

In line with the Australian Rainfall & Runoff (2019), calibration of the hydrologic model (i.e. RORB model) is required in order to determine the estimation of rainfall intensities for a specific site.

In line with the flood mapping project completed by Watertech in 2019, the kc parameter was calibrated to the Mount Mercer streamflow gauge. To be consistent with the routing parameter kc calibration, the initial and continual losses for undeveloped areas were adopted from the Ballarat Mapping updates undertaken by Water Technology (2022). These parameters were also adopted for the Yarrowee River RORB model for design flood modelling.

Similarly, the initial loss and continuing loss values were modified to match the gauge data. Subsequent RORB modelling updates have been completed by Engeny (2023) for Council, providing further data such as kc/dav ratios, pervious area initial loss and continuing loss values and also effective impervious area and indirectly connected area initial loss and continuing loss values.

A summary of the adopted routing parameters are shown below for the Ballarat North-western and Western growth areas (existing conditions) RORB model (Table 3).

Table 3. Summary of Kc calibration flows

Parameter	Value
kc/dav calibration ratio	2.04
Routing parameter kc (adopted)	6.08 (Major catchment 1)
	5.60 (Major catchment 2)
	14.00 (Major catchment 3)
m	0.80
Initial Loss for undeveloped areas	25 mm
Continuing Loss for undeveloped areas	2.0 mm/hr
Initial loss for Effective Impervious Areas (EIA)	1.0 mm
Continuing loss for Effective Impervious Areas (EIA)	0 mm/hr
Initial loss for Indirectly Connected Areas (ICA)	16.8 mm
Continuing loss for Indirectly Connected Areas (ICA)	2.0 mm/hr

Catchment modelling

The aim of the RORB modelling is to establish critical peak flows flowing into and out of the Ballarat North-western and Western growth areas, in particular the points of interest used as the inputs into the flood modelling.

The RORB model setup for major catchments is provided in Figure 18 and Figure 19.



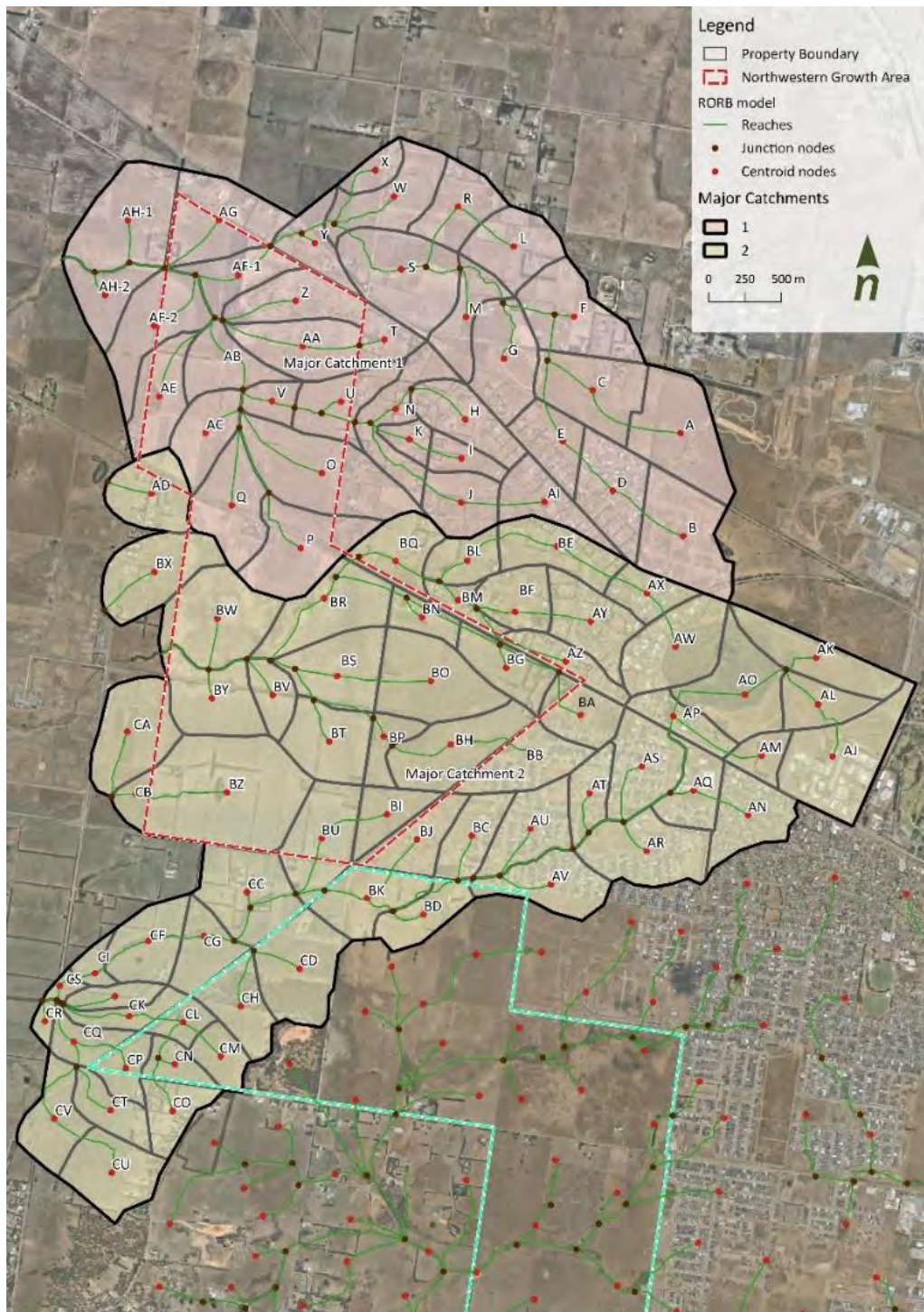


Figure 18. RORB model for the Ballarat north-western growth area (Major catchment 1 & Major Catchment 2)

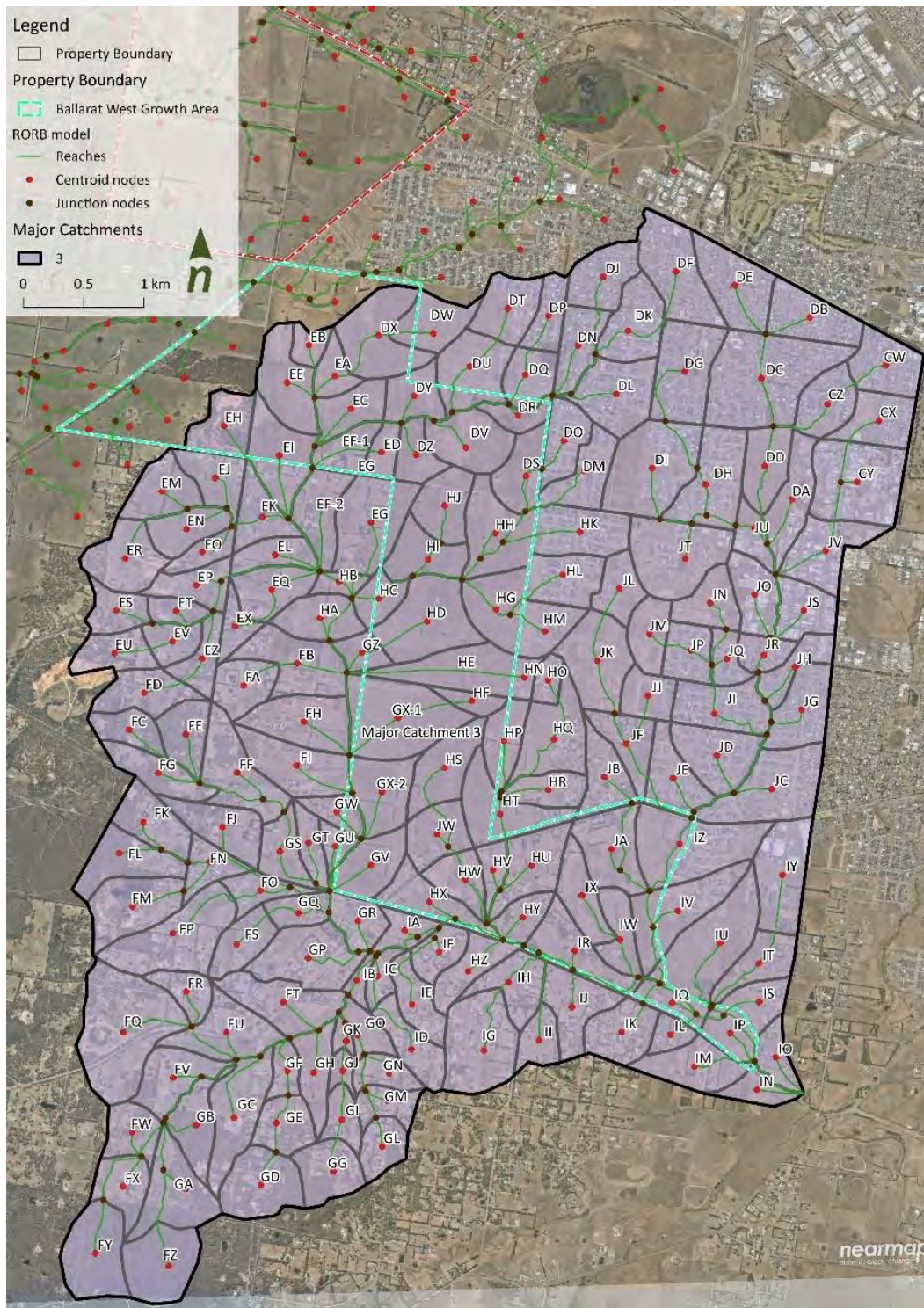


Figure 19. RORB model for the Ballarat north-western growth area (Major Catchment 3)

The RORB model has been run for the 0.5%, 1%, 2%, 5%, 10% and 20% AEP events. A number of flow outputs were determined at key locations within the growth areas as identified in Figure 20 below. Details of these peak flow rates are provided in Table 4.

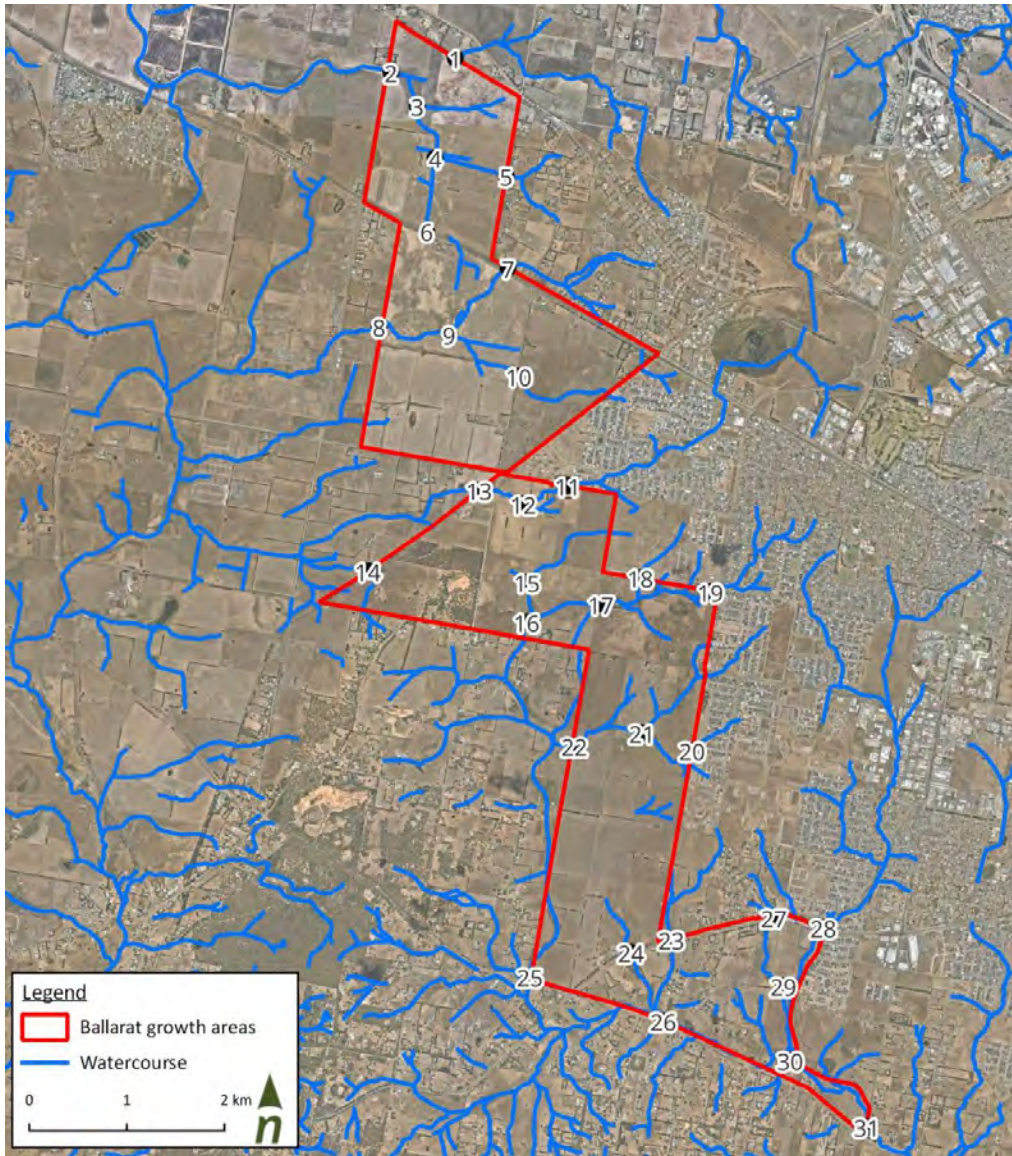


Figure 20. Location of key flow rates within the Ballarat growth areas



Table 4. RORB modelling results for major catchments of Ballarat north-western and western growth areas

Flow location	0.5%AEP (m³/s)	1%AEP (m³/s)	2%AEP (m³/s)	5%AEP (m³/s)	10%AEP (m³/s)	20%AEP (m³/s)
1	10.65	8.77	7.35	5.73	4.34	2.97
2	26.16	21.24	17.59	13.74	10.34	7.09
3	18.29	14.83	12.08	8.58	6.54	4.59
4	17.15	14.02	11.07	8.36	6.10	4.07
5	5.29	4.29	3.37	2.52	1.83	1.26
6	3.30	2.70	2.14	1.51	1.15	0.79
7	9.07	7.59	6.00	4.26	3.36	2.39
8	16.04	13.23	11.01	8.81	6.89	4.71
9	15.27	12.61	10.66	8.11	6.44	4.59
10	4.68	3.95	3.27	2.41	1.81	1.22
11	19.42	16.68	14.24	11.04	8.99	7.21
12	15.97	13.54	11.20	8.56	6.76	5.21
13	15.43	12.98	10.59	7.88	6.13	4.69
14	2.77	2.24	1.78	1.26	0.94	0.63
15	6.38	5.25	4.24	3.26	2.31	1.46
16	17.01	14.17	11.72	9.07	7.08	5.17
17	16.21	13.62	11.08	8.01	6.41	4.86
18	6.92	5.81	4.94	3.83	3.12	2.19
19	11.45	9.84	8.47	6.56	5.28	4.23
20	4.17	3.42	2.86	2.43	1.96	1.60
21	13.12	11.09	9.20	7.05	5.45	3.88
22	35.55	29.47	24.57	19.37	15.24	10.51
23	4.35	3.48	2.84	2.04	1.56	1.09
24	2.60	2.11	1.64	1.18	0.89	0.59
25	36.55	29.78	24.82	19.45	14.96	10.36
26	57.61	47.36	38.96	29.83	22.33	15.47
27	1.89	1.59	1.31	1.00	0.73	0.46
28	46.14	39.25	32.50	24.75	19.14	14.25
29	2.78	2.25	1.76	1.25	0.95	0.63
30	62.72	51.04	41.68	31.39	23.25	16.14
31	84.33	69.44	57.05	40.05	29.83	19.73



5.2 Hydraulic Modelling

A 1D/2D hydraulic model was created for the Ballarat Northwest and West Precincts and the surrounding catchments using TUFLOW version 2020-10-AF. The TUFLOW model is used to estimate peak flood levels, flood extents, flows and velocities for a range of storm events and durations. The model was run using HPC (heavily Parallelised Compute). The TUFLOW model was computed for the existing conditions scenario.

The TUFLOW model was created based on the following data:

- LiDAR information used to generate a Digital Elevation Model (DEM),
- Inflow boundary conditions to produce runoff within the model, hydrographs were generated from the RORB model from section 3,
- Surface roughness values based on the existing site conditions,
- 1D network data for pipes, pits & culvert crossings,
- Downstream 1D & 2D boundary conditions where required.

Based on the above, the TUFLOW model was run for the 0.5%, 1%, 2%, 5%, 10% and 20% AEP events.

Model Development

Model Extent

The TUFLOW model extent was determined based on the key topographic features of the Precinct Boundary's (Northwest and West), and the surrounding area. Where it isn't necessary to model the entire upstream catchment areas, key locations are required to be modelled in order to determine how runoff enters the Northwest and West Precincts. This model extent has been determined based on the LiDAR information and professional judgement. The model extent (or 'Code Boundary') is shown in Figure 21 below.

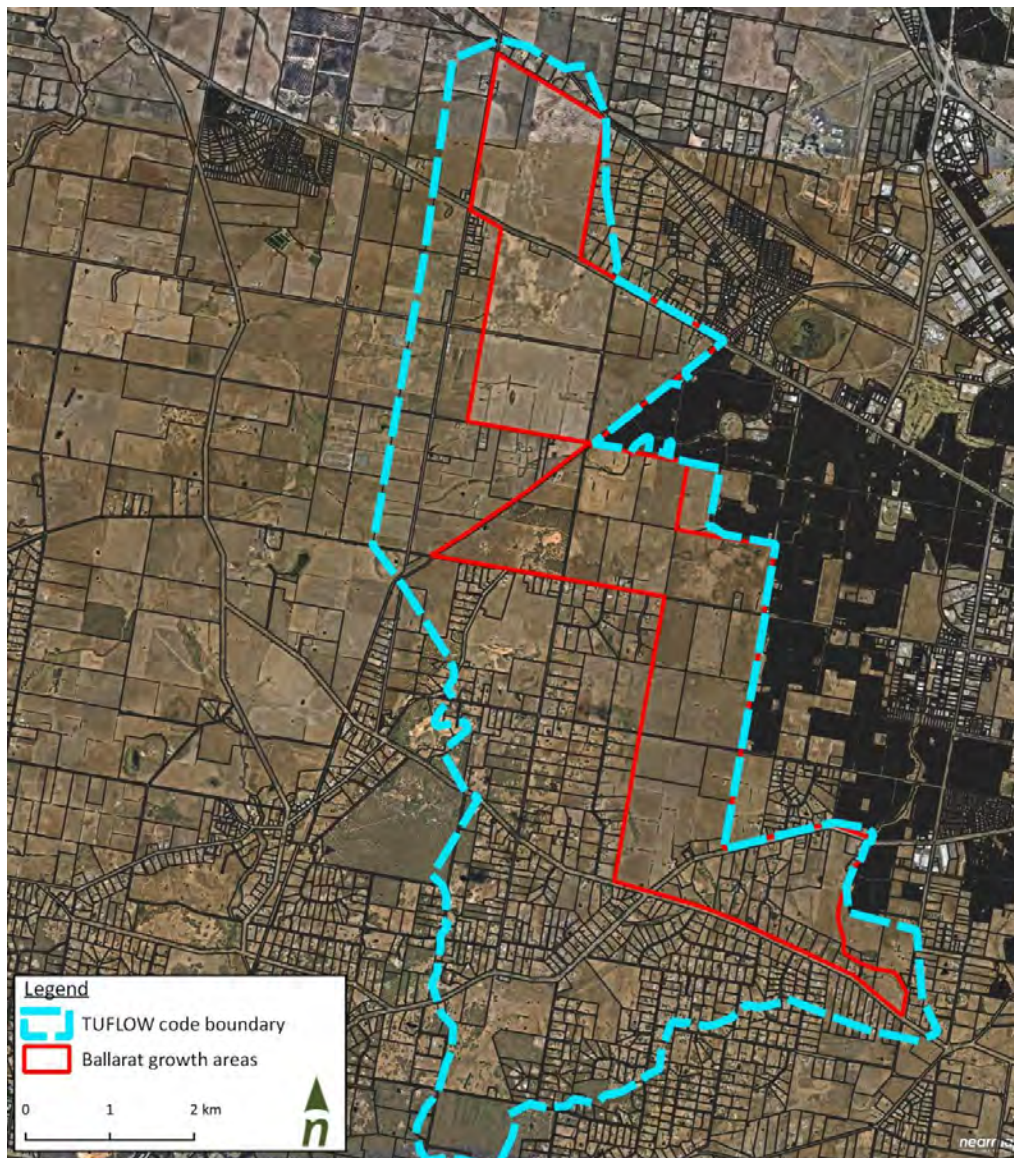


Figure 21. Ballarat Northwest and West Precinct TUFLOW model extents

Topography

The DEM used for the TUFLOW model was created by merging LiDAR tiles in GIS. The LiDAR tiles were obtained from the Elvis website (Elevation and Depth Spatial Data). The model was run using a 5 metre grid size. A summary of the LiDAR data sets obtained are summarised below.

Table 5. Summary of LiDAR data

Data set	Resolution	Year captured
Ballarat LiDAR	1 metre	2019
Golden Plains	50 centimetre	2021

Boundary Conditions

Boundary conditions have been determined at the upstream and downstream areas of the TUFLOW model. A number of QT (flow vs time) boundary conditions were defined at the upstream end of the model extents, where runoff outfalls along major overland flow paths. Within the model extents, 2D source areas were determined, the source areas are represented by subcatchments from the RORB model, and rainfall excess hydrographs applied.

The downstream boundary conditions consisted of 2D HQ (Head vs flow) conditions, where overland flow exits the model extents, to prevent pooling at the downstream boundary of the model.

An overview of the boundary conditions applied is provided below.

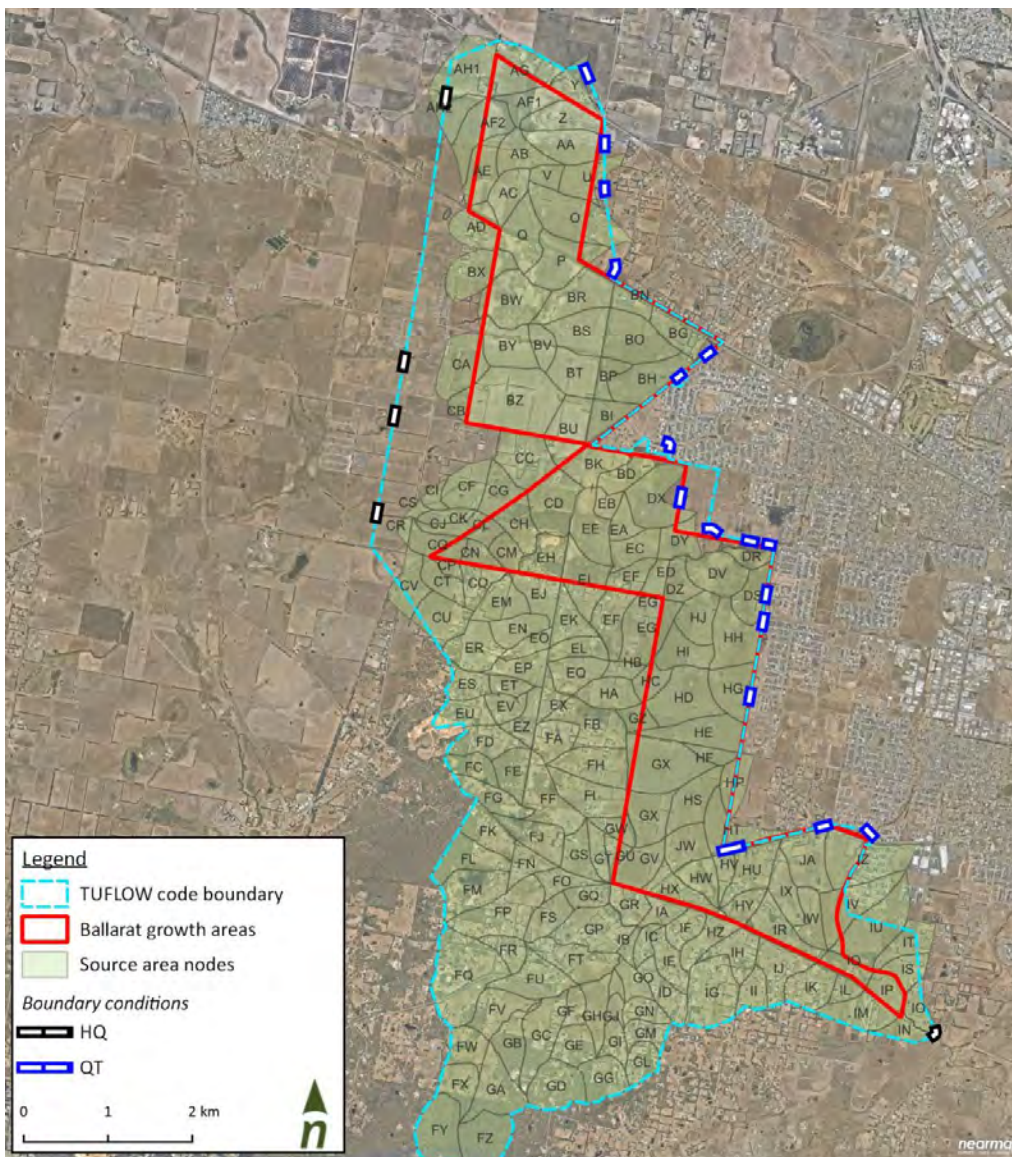


Figure 22. Ballarat Northwest and West Precinct TUFLOW boundary conditions

Surface Roughness

Land use types were defined based on the existing site conditions using aerial imagery. The land use types were determined in order to reflect the appropriate Manning's 'n' roughness value. The Manning's 'n' values adopted are shown in Table 6.

Table 6. Material roughness

Material Type	Manning's 'n' Roughness
Residential footprints	0.50
Rural Residential footprints	0.15
Open space area, minimal vegetation cover (grass)	0.05
Open space area, moderate vegetation cover (shrub)	0.06
Open space area, thick vegetation cover (tree)	0.09
Waterways, minimal vegetation	0.04
Waterways, thick vegetation	0.07
Concrete channels	0.017
Paved roads	0.025
Unpaved roads	0.030
Open waterbody (no vegetation)	0.08
Open waterbody (emergent vegetation)	0.065
Railway line	0.125
Industrial / commercial	0.35

Culvert Structures

Existing culvert data was added to the TUFLOW model as 1D pipes along major road crossings within the model extent. The size and description of these culvert crossings is shown in Table 7 below. An overview of the culvert crossings is shown in Figure 23 below.

Table 7. Key culvert crossings within the Ballarat TUFLOW model

Location	Description	Size
1	Blind Creek Road crossing upstream of the NW growth area boundary.	2 x 1.10 m (W) x 1.00 m (H)
2	Railway line crossing upstream of the NW growth area boundary	2 x 1.10 m (W) x 1.00 m (H)
3	Draffins Road crossing downstream of the NW growth area boundary	5 x 1.20 m (W) x 0.750 m (H)
4	Dowling Road crossing upstream of the NW growth area boundary	1 x 0.60 m Dia.
5	Remembrance Drive crossing within the NW growth area	1 x 0.75 m (W) x 0.60 m (H)
6	Remembrance Drive crossing within the NW growth area	1 x 1.20 m (W) x 0.60 m (H)
7	Remembrance Drive path crossing within the NW growth area	1 x 1.20 m (W) x 0.60 m (H)
8	Finchs Road crossing within the NW growth area	1 x 0.15 m Dia.
9	Finchs Road crossing within the NW growth area	1 x 0.15 m Dia.
10	Cuthberts Road crossing upstream of the W growth area boundary (outfall from existing Retarding Basin)	3 x 1.20 m (W) x 0.90 m (H)
11	Ballarat-Carngham Road crossing downstream of the W growth area boundary	1 x 3.50 m (W) x 1.20 m (H)
12	Greenhalgs Road crossing west of the W growth area boundary	1 x 1.20 m Dia.
13	Bells Road crossing west of the W growth area boundary	2 x 3.00 m (W) x 1.80 m (H)
14	Bells Road crossing west of the W growth area boundary	2 x 3.00 m (W) x 1.80 m (H)
15	Bells Road crossing downstream of the W growth area boundary	1 x 3.00 m (W) x 1.80 m (H)
16	Glenhelg Highway crossing within the W growth area	1 x 3.00 m (W) x 1.80 m (H)
17	Ballarat-Skipton Rail Trail at the downstream boundary of the W growth area	1 x 1.20 m (W) x 0.90 m (H)
18	Finchs Road crossing within the W growth area	1 x 1.20 m (W) x 0.90 m (H)

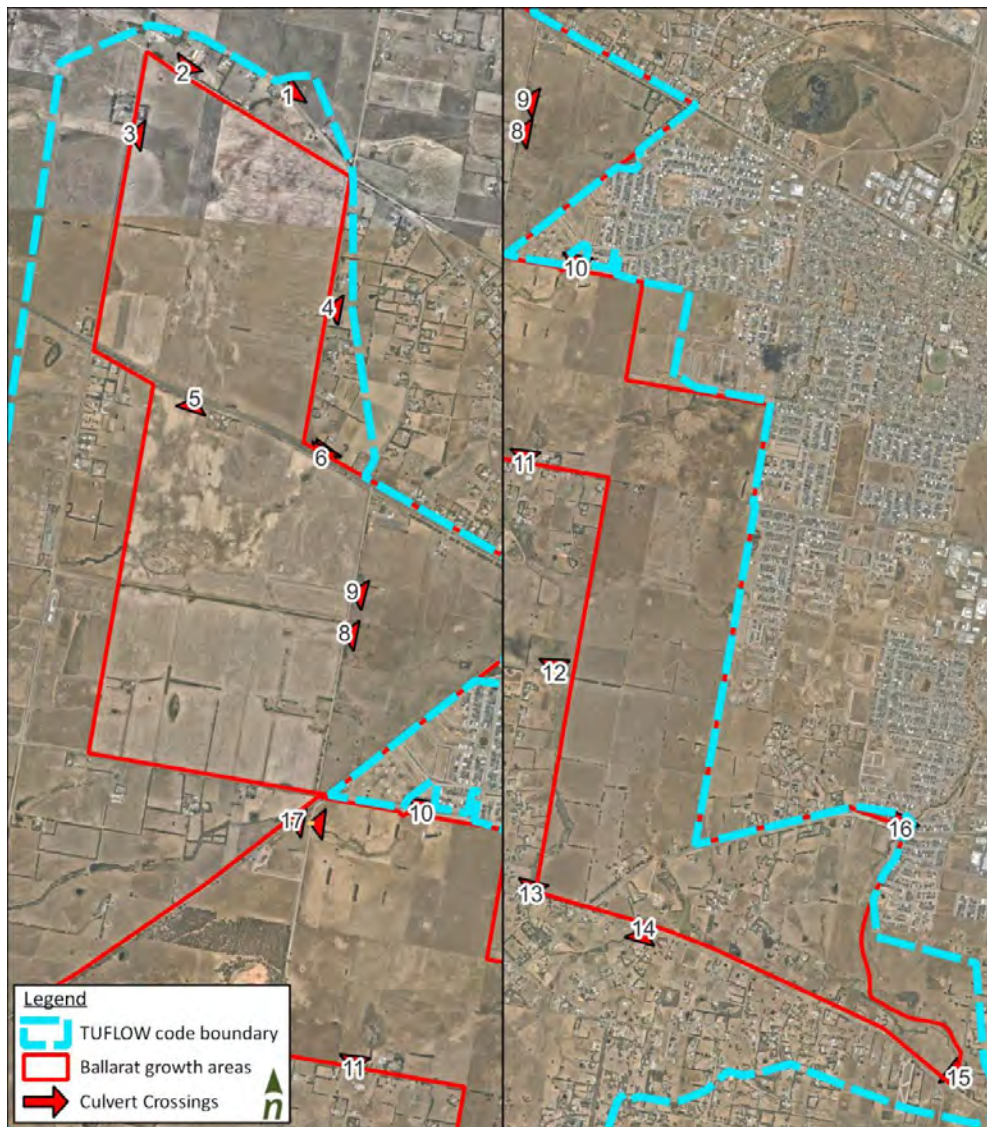


Figure 23. Ballarat Northwest and West Precinct TUFLOW culvert crossings

Results

Peak flow rates determined from the hydrologic modelling have been used to determine selection of modelling runs used in the TUFLOW model. Table 4 provides a summary of peak flow rates at locations of interest within the model. The TUFLOW model was run for the following events and durations specified in Table 8.

Table 8. TUFLOW duration summary

Event	Duration (hr)	Temporal Pattern
1% AEP	4.5	27
1% AEP	6	29
1% AEP	12	21



An overview of the flood extents from the results of the TUFLOW model are provided below for the 1% AEP event (ie Figure 24 and Figure 25). This will be used to inform the future surface/storm management strategy for the North Western and Western growth areas.

Flood depth and velocity mapping for all design AEP events computed are provided in Appendix A.

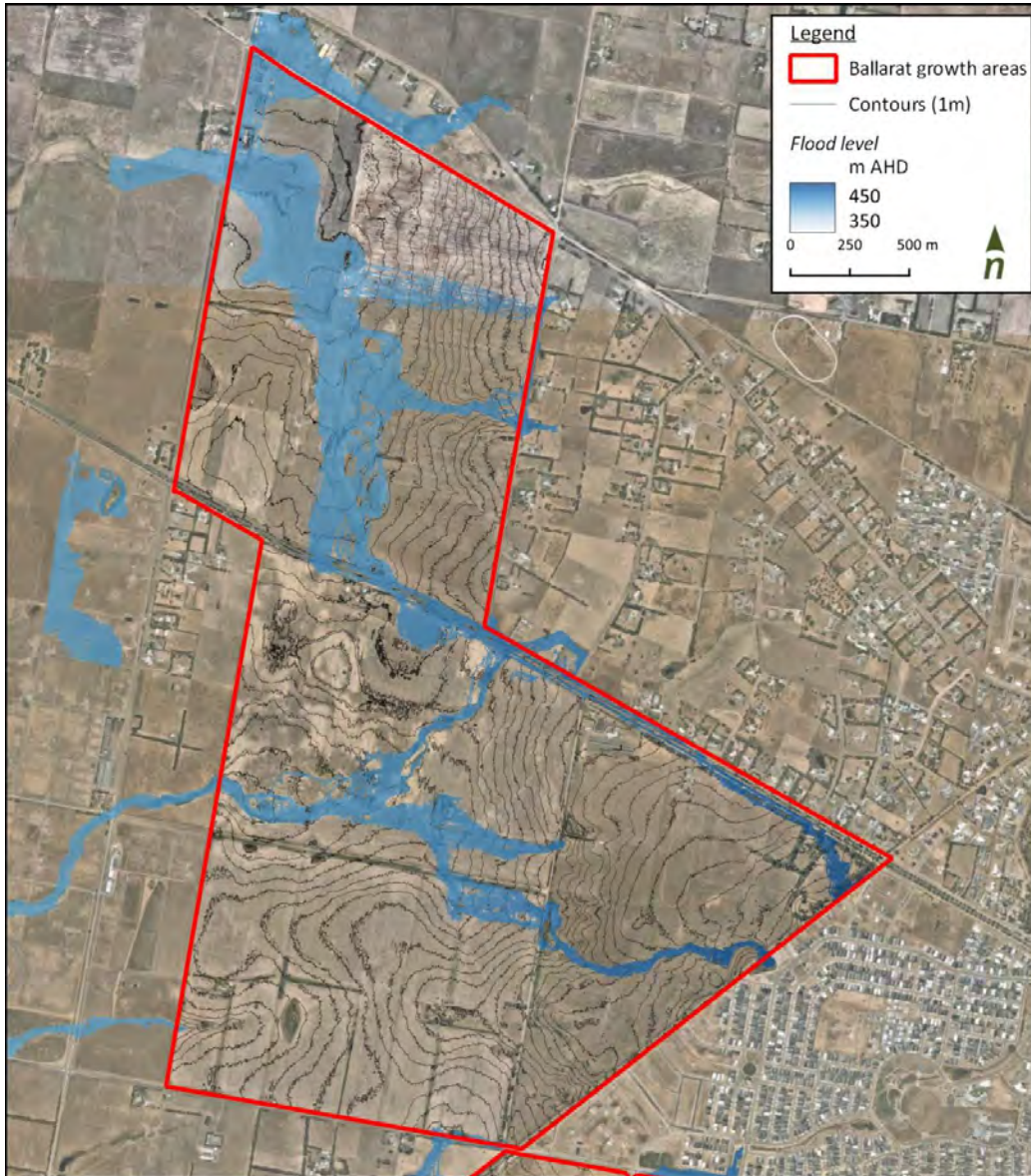


Figure 24. Existing conditions 1% AEP flood extents – North Western growth area



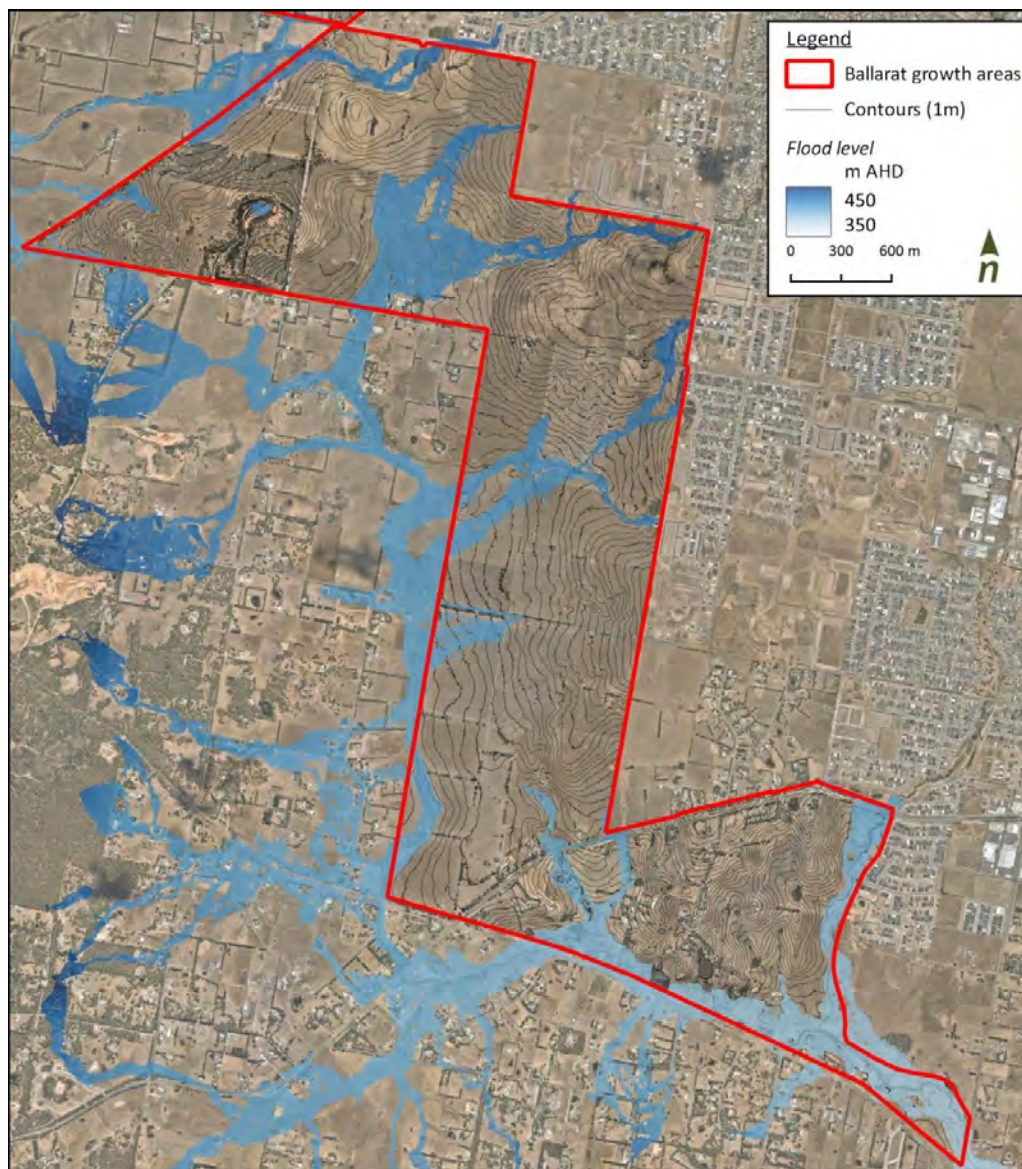


Figure 25. Existing conditions 1% AEP flood extents – Western growth area

6 Post development objectives and conditions

The following sets out the aim, objectives and approach of the surface water analysis aspect of the post-development conditions strategy.

6.1 Aim

The aim is to define the flood mitigation and stormwater quality management requirements for the post development conditions of the Ballarat North western and Western growth areas based on the future land use of the site. In doing so the work will define the stormwater quantity and stormwater quality assets required to control the impact of development downstream and comment upon the optimal layout of those assets to support complimentary water cycle objectives. The design and layout of the proposed assets will be provided at a conceptual level.

6.2 Objectives and approach

There are four main objectives of the surface water management plan which are in line with the strategic context:

1. Stormwater quantity management

Fully developed 1% AEP stormwater runoff rates are to be retarded back to the equivalent 1% AEP pre-development peak flow rates before discharging downstream. This is typically achieved through the implementation of stormwater retardation (or detention) systems within the catchment.

2. Stormwater conveyance

Stormwater conveyance is typically designed according to a major and minor flow regime where:

- Minor flows i.e. up to and including the 20% AEP storm event (approximately the 1 in 5-year ARI event), are conveyed via the sub-surface stormwater network.
- Major flows i.e. between the 20% AEP and 1% AEP event are conveyed on the surface via roadways and waterways.

In line with the findings from the Geomorphic Assessment, existing drainage lines could be modified to a pipe and road reserve as part of the urbanisation process where safe conveyance allows.

3. Stormwater quality treatment

Stormwater treatment concepts are required to meet the State Environmental Protection Policy (SEPP) best practice environmental management (BPEM) pollution reduction targets before being discharged into drainage networks and into receiving waters. These targets are defined as:

- 80% reduction in the annual load of Total Suspended Solids (TSS)
- 45% reduction in the annual load of Total Phosphorus (TP)
- 45% reduction in the annual load of Total Nitrogen (TN)
- 70% reduction in the annual load of Gross Pollutants (GP)

A key requirement as part of the BPEM targets is flow reduction, which is defined in Objective 5 below.

4. Waterway corridors

Constructed waterway corridors are required to convey major flows through the growth area. In line with the Geomorphic Assessment, establishing well designed constructed waterways to convey runoff is an appropriate way to manage the catchment from a geomorphic point of view. The process to define the waterway corridor widths was discussed with the CMA, of which was agreed to be based on the guidance set out in Melbourne Water's Constructed Waterway Design Guidelines and the Waterway Corridor Guidelines.

5. Stormwater flow volume management

The Environment Protection Act has been amended to include a “general environmental duty (GED)” provision. With respect to urban growth, consideration needs to be given to options that minimise the risk (as far as reasonably practical) on public health and the environment by managing the impacts from stormwater runoff that arises from land development. The risks associated with urban runoff stem from stormwater quality impacts and stormwater volume impacts.

A guidance document on this matter has been released by EPA Victoria (Urban Stormwater Management Guidance, June 2021). The guidance document identifies performance objectives for stormwater management. The objectives associated with stormwater quality (see item three above) are well known and have been in place for a long time, however guidance around volumetric objectives and volume reduction are relatively new. It should be noted that the volume reduction performance objectives themselves are not mandatory, and that performance is based on what is reasonably practicable at the development site to eliminate or reduce risk.

Table 1 in the “Urban Stormwater Management Guidance” document includes a water volume performance objective based on rainfall bands and waterway priority areas. The water volume objective has two key elements around:

- Harvest/evapotranspire (% mean annual impervious run-off)
- Infiltrate/filter (% mean annual impervious run-off)

For the Ballarat growth areas, specific or targeted waterway priority areas have not been established therefore the relevant volumetric objective is defined by the “other areas” column associated with the 600mm rainfall band. That is:

- an annual stormwater volume reduction (stormwater harvest/evapotranspire) target of 29%
- an annual infiltration/filter target of 7%

Therefore the future planning of the Ballarat growth areas will need to consider the GED impacts associated with urban stormwater. Refer to the Integrated Water Management Strategy (IWMS – Alluvium 2023) which considers the options and opportunities (eg stormwater harvesting for open space, rainwater tanks, passive irrigation, leaky wetlands) and balances that assessment with the criteria of “as far as reasonably practical”. The IWMS links together the stormwater targets with the other broader urban water cycle objectives such as potable water reduction and resilience.

7 Stormwater Quantity management

The hydrologic analysis of the Ballarat growth areas was undertaken in order to determine the post development peak runoff flow rates for various flood events throughout the catchment. The hydrologic analysis was used in order to determine the storage capacity requirements of future proposed retarding basins. Retarding basins are required in order to control the post developed peak stormwater runoff rates back to equivalent predeveloped peak flowrate conditions.

7.1 Hydrologic modelling

The hydrologic model determined for the existing conditions assessment (Section 5.1) was modified to reflect the proposed developed conditions of the growth areas. The layout of each developed conditions catchment is shown in Figure 26 & Figure 27 below. The developed conditions RORB model sub areas were delineated based on the future drainage conditions, ensuring a minimum of 4 subareas are located upstream of each proposed retarding basin.

The RORB model was run in order to determine the following:

- Existing peak flows
- The impact of development on peak flows
- The reduction in peak flows using retarding basin storages
- The impact of climate change on peak storage.

The kc values for the developed conditions models were calibrated using a kc/dav ratio. Initial loss and continuing loss parameters remain consistent with the existing conditions hydrologic model. A summary of the input parameters is provided in Table 9 below.

Note, for the purposes of defining the sizing of retarding basin for developed and predeveloped conditions, a single fraction impervious input was used (ie fraction impervious of 0.75). This represents a conservative approach to designing future stormwater management infrastructure, given there is no proposed future urban structure layout.

Table 9. Summary of Kc calibration flows – developed conditions

Parameter	Value
kc/dav calibration ratio	2.04
Routing parameter kc (adopted)	6.08 (Major catchment 1)
	5.60 (Major catchment 2)
	14.00 (Major catchment 3)
m	0.80
Initial Loss for undeveloped areas	25 mm
Continuing Loss for undeveloped areas	2.0 mm/hr



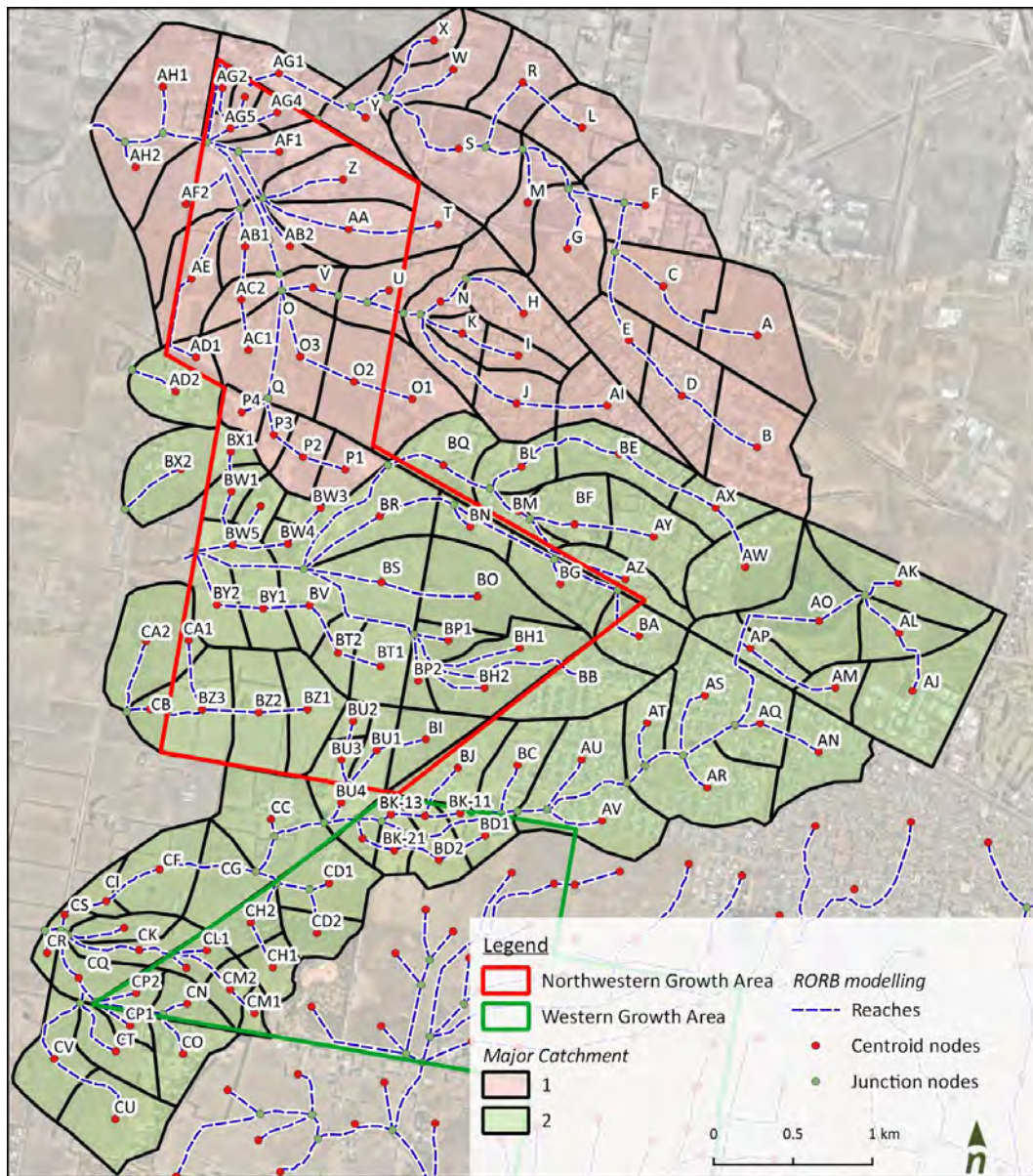


Figure 26. RORB model for the Ballarat north-western growth area – developed conditions

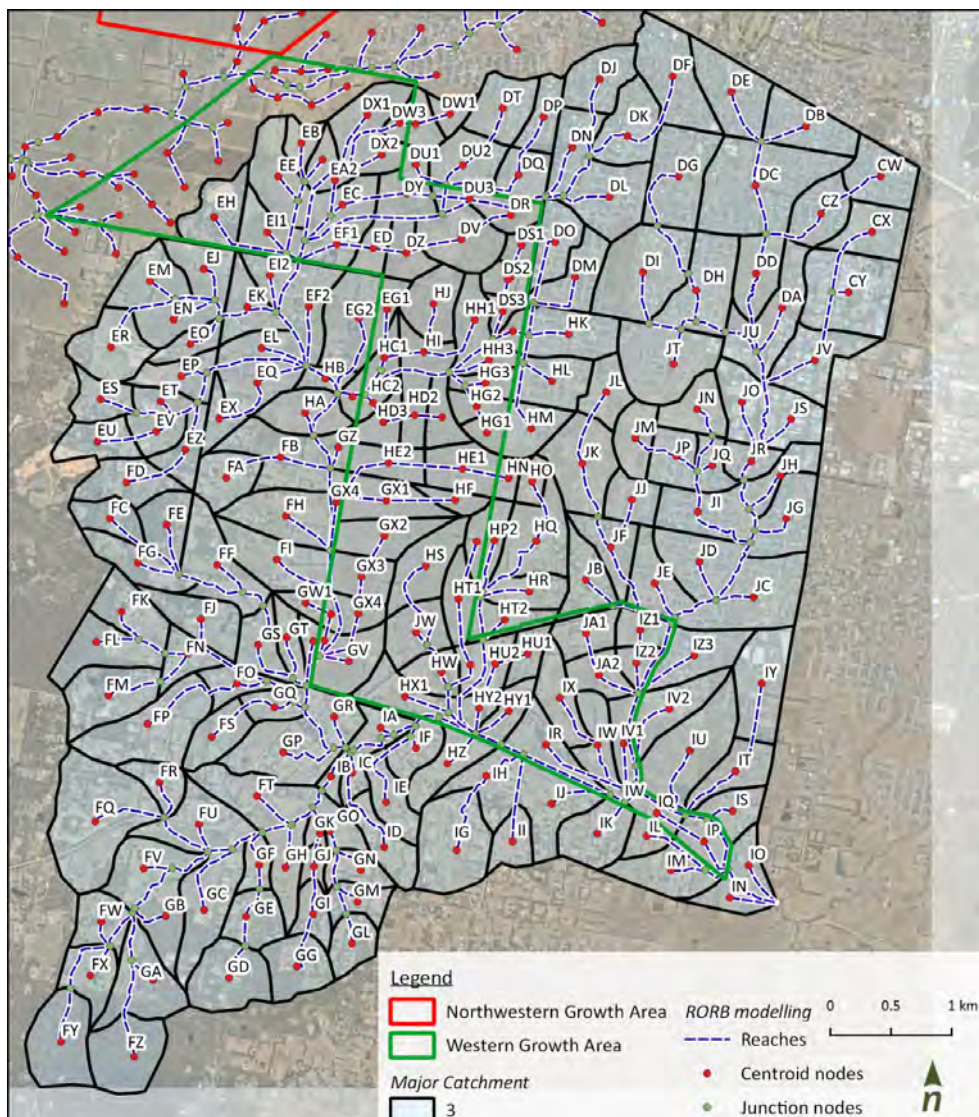


Figure 27. RORB model for the Ballarat western growth area – developed conditions

7.2 Storage design

The aim of the RORB modelling is to establish critical peak flows and the storage requirements within the growth areas. The proposed stormwater management strategy proposes to provide retarding basin storage systems within the catchment. The location of the basins are influenced by:

- the need to attenuate the peak flow rates to pre-development conditions at any outfall downstream of the growth framework plan boundary.
- Where future developed catchments discharge into a receiving waterway (either existing or constructed).

The hydrologic modelling was based upon ARR 2019, which recognises the temporal variability in potential rainfall events and its influence on the conversion of rainfall to peak flows. An ensemble of 10 temporal patterns were run, which allows the model to produce a range of peak flows for each rainfall duration of a



storm event. The median (or 60th percentile) peak flow for a given duration is recorded as the 'critical flow'. The hydrologic modelling considered a range of design storms, from 10 minutes duration through to 72 hours.

The RORB model was computed for the pre and post developed conditions under the 1% AEP flood event. The results are shown in Table 10. The results show the peak flows for the existing and developed conditions flowing into and out of the site.

Table 10. 1% AEP event RORB modelling results for the growth

Retarding Basin location	Predeveloped flow rate (m ³ /s)	Predeveloped critical duration	Developed flow rate (no mitigation) (m ³ /s)	Developed critical duration (no mitigation)
WLRB 1	1.24	2 hr, TP27	2.83	25 min, TP 26
WLRB 2	3.03	2 hr, TP27	7.89	1 hr, TP 28
WLRB 3	3.80	2 hr, TP28	9.43	1 hr, TP 27
WLRB 4A	6.57	2 hr, TP25	12.84	30 min, TP 26
WLRB 4B	2.11	2 hr, TP22	4.77	25 min, TP 28
WLRB 5	2.15	2 hr, TP22	5.59	45 min, TP 26
WLRB 6	4.56	2 hr, TP28	13.24	45 min, TP 26
WLRB 7	2.61	2 hr, TP28	6.22	45 min, TP 26
WLRB 8	2.31	2 hr, TP28	6.57	1 hr, TP 27
WLRB 9	3.96	2 hr, TP22	10.31	25 min, TP 28
WLRB 10	2.15	2 hr, TP22	5.58	25 min, TP 26
WLRB 11	1.51	2 hr, TP27	2.16	45 min, TP 26
WLRB 12	1.30	2 hr, TP24	3.44	45 min, TP 26
WLRB 13	3.31	2 hr, TP27	8.56	20 min, TP 27
WLRB 14	1.23	2 hr, TP28	3.44	20 min, TP 28
WLRB 15	1.82	2 hr, TP22	4.08	2 hr, TP 21
WLRB 16	2.49	2 hr, TP24	5.53	20 min, TP 29
WLRB 17	1.72	2 hr, TP24	4.78	45 min, TP 26
WLRB 18	3.68	2 hr, TP28	9.82	45 min, TP 26
WLRB 19	2.61	3 hr, TP27	7.87	1 hr, TP 28
WLRB 20	6.37	2 hr, TP29	7.26	2 hr, TP 29
WLRB 21	2.78	2 hr, TP27	7.97	45 min, TP 27
WLRB 22	2.21	2 hr, TP27	5.62	25 min, TP 21
WLRB 23	2.63	2 hr, TP22	6.61	25 min, TP 28
WLRB 24	3.20	2 hr, TP24	8.41	45 min, TP 26
WLRB 25	3.00	2 hr, TP24	7.74	45 min, TP 26
WLRB 26	4.36	2 hr, TP27	12.74	1 hr, TP 28
WLRB 27	2.09	2 hr, TP24	5.77	25 min, TP 28
WLRB 28	2.78	2 hr, TP22	7.39	25 min, TP 27
WLRB 29	2.97	2 hr, TP22	7.74	45 min, TP 26
WLRB 30	0.97	2 hr, TP22	2.28	45 min, TP 26

Following the establishment of required peak flow rates, a retarding basin has been modelled and sized to control the flow back to this rate. A stormwater treatment wetland asset is proposed to be located within the base of each retarding basin asset to optimise land use and achieve multi-purpose outcomes for encumbered reserves.

Table 11. Retarding basin requirements (1% AEP event)

Retarding basin	Critical storm	Peak RB outflow (m ³ /s)	Peak RB storage (m ³)	Peak RB flood depth (m)	Outlet size	Footprint* (ha)
WLRB 1	2hr, TP21	1.14	4,880	1.46	1 x 675mm	1.19
WLRB 2	2hr, TP28	2.71	29,900	1.49	1 x 1500mm	3.33
WLRB 3	2hr, TP21	3.72	30,200	1.49	2 x 900mm	3.06
WLRB 4A	2hr, TP28	6.26	43,000	1.43	2 x 1650mm	2.95
WLRB 4B	2hr, TP21	2.02	10,300	1.41	1 x 1050mm	1.80
WLRB 5	2hr, TP27	2.06	15,500	1.43	1 x 1050mm	2.47
WLRB 6	3hr, TP27	4.30	50,000	1.47	2 x 1050mm	4.58
WLRB 7	2hr, TP22	2.59	17,700	1.40	1 x 1500mm	2.48
WLRB 8	2hr, TP21	2.14	24,400	1.47	1 x 1050mm	3.13
WLRB 9	2hr, TP27	3.64	23,400	1.46	2 x 900mm	2.98
WLRB 10	1.5hr, TP27	2.07	10,500	1.43	1 x 1050mm	1.97
WLRB 11	2hr, TP27	1.37	4,090	1.47	1 x 750mm	0.83
WLRB 12	2hr, TP21	1.30	9,050	1.39	1 x 750mm	1.56
WLRB 13	1.5hr, TP27	3.23	14,800	1.47	1 x 1650mm	2.77
WLRB 14	2hr, TP21	1.12	5,770	1.44	1 x 675mm	1.51
WLRB 15	2hr, TP27	1.72	10,300	1.41	1 x 900mm	1.06
WLRB 16	2hr, TP27	2.46	14,200	1.42	1 x 1200mm	2.10
WLRB 17	2hr, TP21	1.69	15,700	1.39	1 x 900mm	2.72
WLRB 18	2hr, TP28	3.37	30,500	1.39	2 x 900mm	3.27
WLRB 19	2hr, TP28	2.57	28,000	1.40	1 x 1350mm	2.92
WLRB 20	2hr, TP24	6.00	18,500	1.39	2 x 1650mm	1.54
WLRB 21	2hr, TP27	2.63	25,200	1.43	1 x 1500mm	3.27
WLRB 22	2hr, TP23	2.19	9,420	1.49	1 x 1050mm	1.90
WLRB 23	2hr, TP27	2.53	12,900	1.38	1 x 1350mm	2.14
WLRB 24	2hr, TP27	3.20	24,300	1.46	1 x 1650mm	2.70
WLRB 25	2hr, TP21	2.71	23,900	1.49	1 x 1500mm	3.19
WLRB 26	2hr, TP28	4.17	43,200	1.44	2 x 1050mm	4.20
WLRB 27	2hr, TP27	2.02	13,200	1.41	1 x 1050mm	1.76
WLRB 28	2hr, TP27	2.51	16,500	1.38	1 x 1350mm	2.67
WLRB 29	2hr, TP27	2.70	24,100	1.45	1 x 1350mm	3.14
WLRB 30	2hr, TP21	0.92	5,040	1.48	1 x 600mm	1.21

* includes batters, access, drying area etc.. (see Section 9)

The results show that the flows are being retarded to below the pre-developed conditions peak flow rates. An overview of the RB location and modelling results is provided in Figure 28, Figure 29, Figure 30.



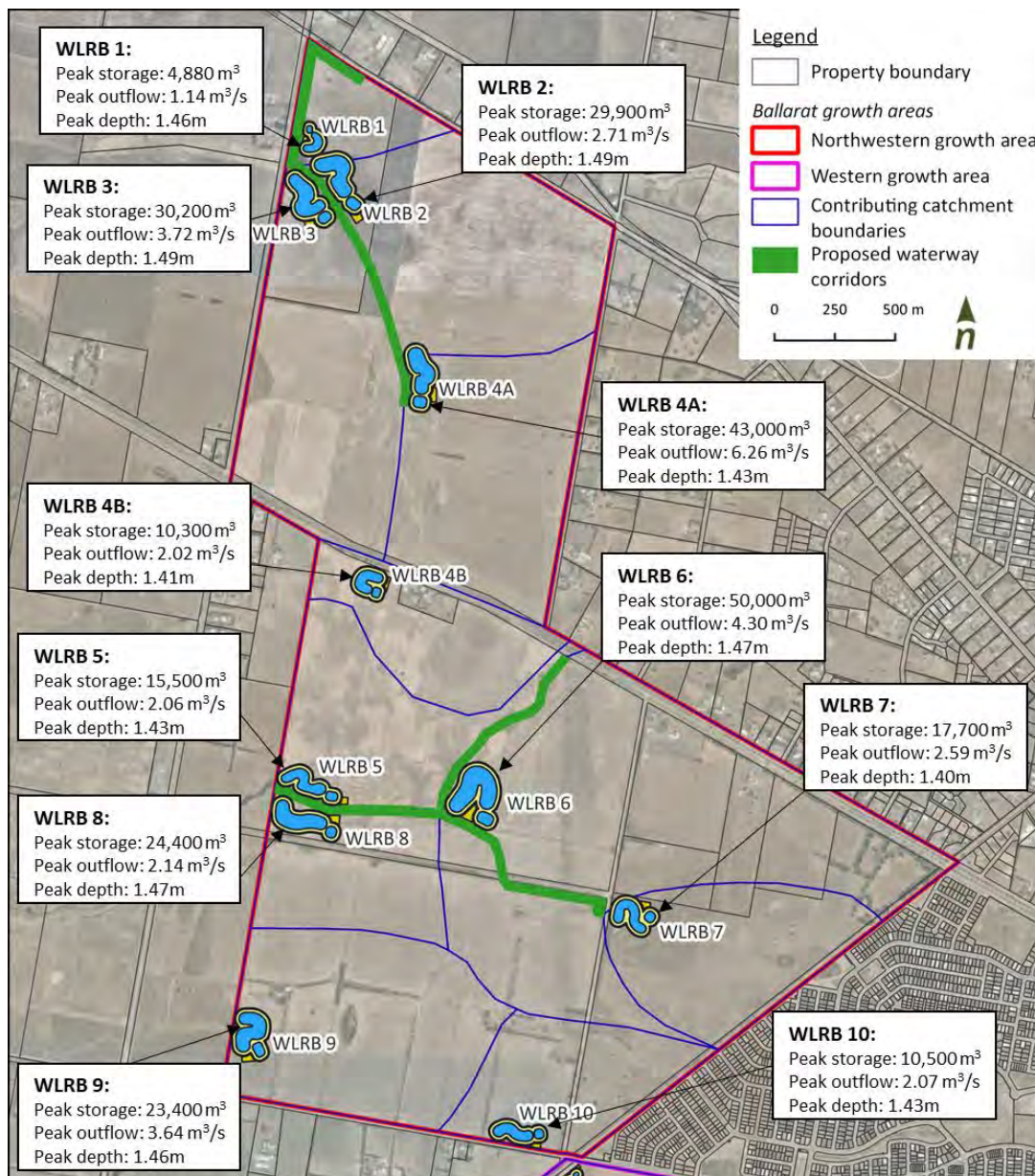


Figure 28. Retarding basin locations and modelling results in Ballarat north-western growth area

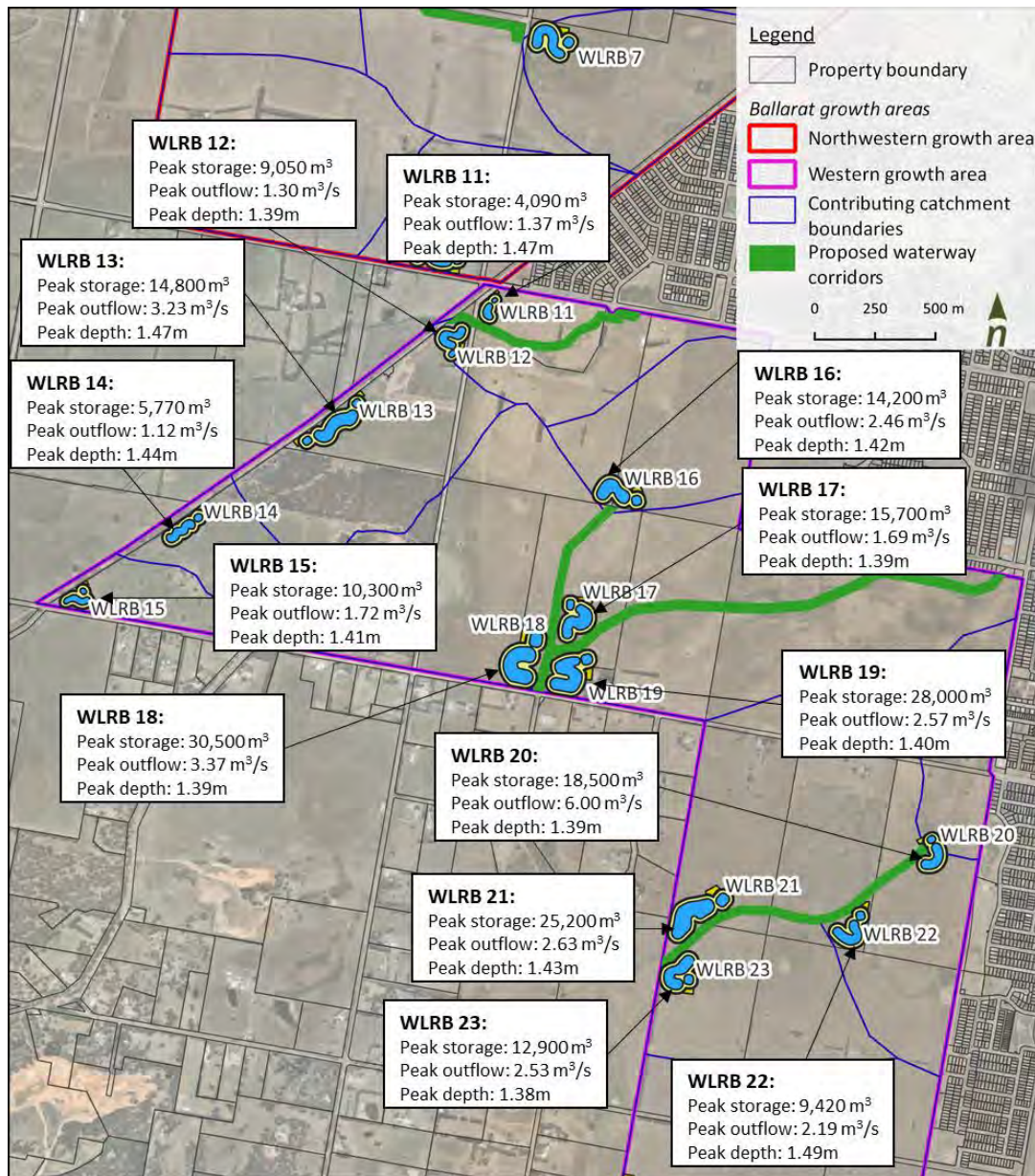


Figure 29. Retarding basin locations and modelling results in Ballarat western growth area - plan 1

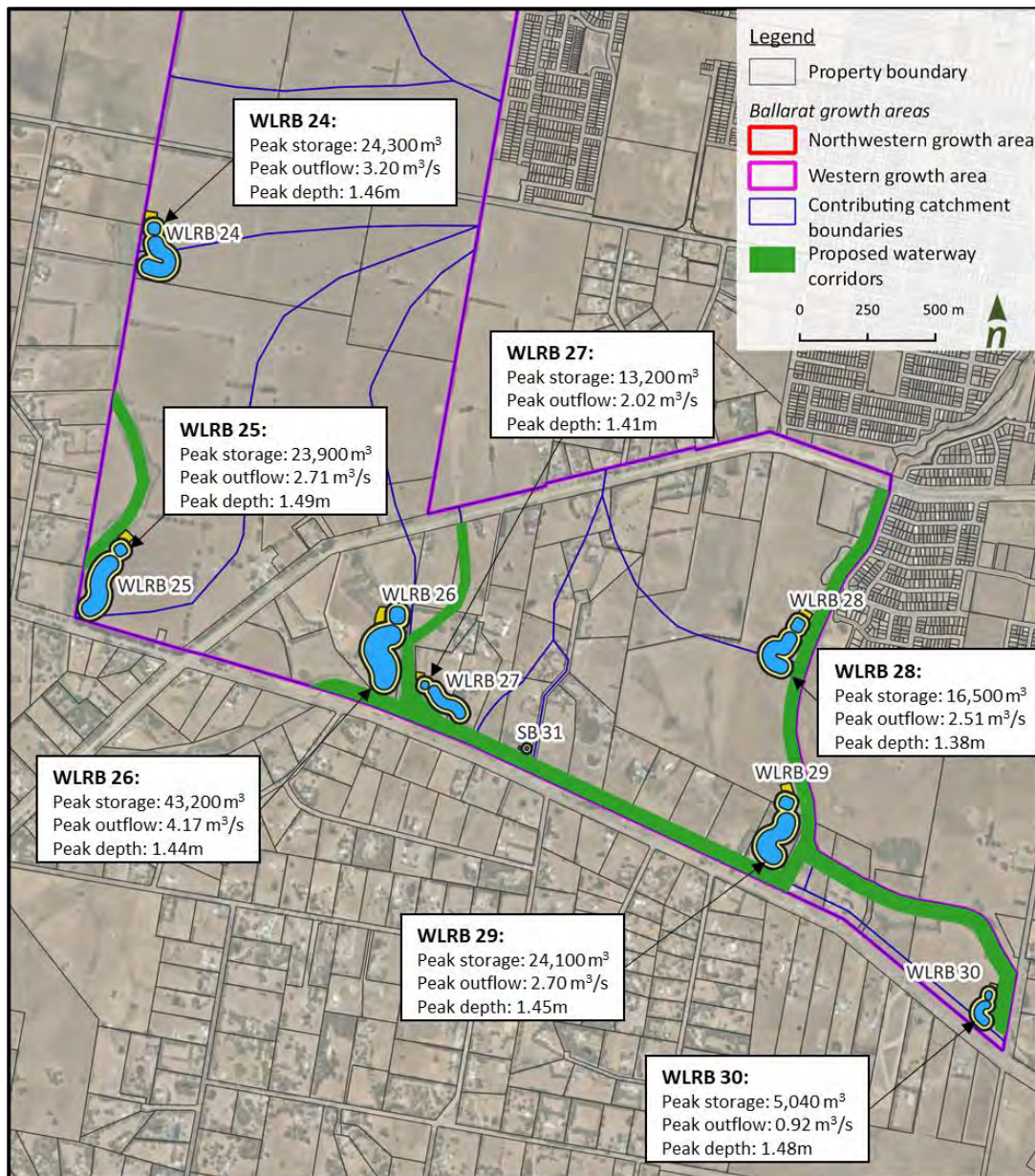


Figure 30. Retarding basin locations and modelling results in Ballarat western growth area – plan 2

8 Stormwater conveyance

The stormwater conveyance component of the SWMS provides management of stormwater runoff through existing or proposed constructed waterways. The main considerations for waterways adjacent to and within a development site are the waterway corridor, constructed waterway design (including waterway crossings), and flood levels. Proposed waterway corridors are designed to be sufficient in terms of flow conveyance and providing for river health and amenity opportunities in a future urbanised landscape.

Following discussions with Council, the Corangamite CMA and the Glenelg Hopkins CMA, it was agreed that in lieu of any local waterway corridor guidelines, Melbourne Water’s Waterway Corridor Guidelines are to be used when determining appropriate waterway corridor widths.

8.1 Waterway corridor

Waterways, whether natural or constructed, need to have an appropriate waterway corridor or reserve provided adjacent to development in order to accommodate objectives for flood protection, river health, biodiversity and amenity.

A waterway corridor is defined as the waterway channel and its associated riparian zones. The riparian zones consist of two parts:

- the vegetated buffer
- the core riparian zone

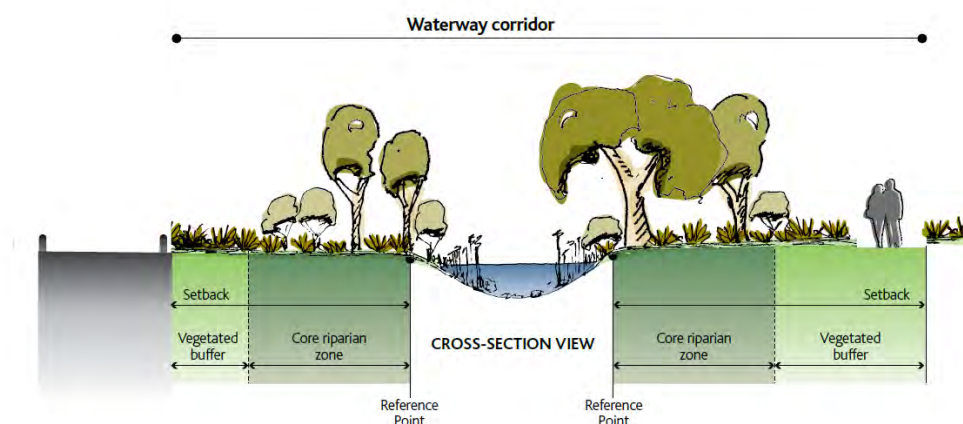


Figure 31. Waterway corridor (Melbourne Water’s Waterway Corridor Guidelines)

According to Melbourne Water’s Waterway Corridor Guidelines “assigning a waterway corridor preserves areas of the riparian zone that protect or enhance native vegetation, river health and biodiversity, and provide space for recreational infrastructure and activities (e.g. shared paths and (in some cases) stormwater treatment systems)”.

A fundamental principle is to provide continuity along the core riparian zone, therefore the strong preference is to locate shared paths and other infrastructure outside of the core riparian zone. However “in some instances, stormwater treatment systems such as constructed wetlands and bio-retention systems may be located within the core riparian zone but should form a relatively small proportion of the area of the core riparian zone so as not to degrade its ecological function”.



Table 3. Sliding scale for calculating constructed waterway corridor widths – assumes active edges (roads) that allow vehicle access along entire corridor length, on both sides of the corridor.

HYDRAULIC WIDTH (M)	CRZ WIDTH (M)	VB WIDTH (M)	CORRIDOR WIDTH (M)
5	20	10	30
10	20	10	30
15	25	15	40
20	25	15	40
25	30	15	45
30	30	15	45
35	30	15	45
40	30	20	50
45	35	20	55
50	35	20	55
55	40	20	60
60	40	20	60
65	40	25	65
70	45	25	70

Table 4. Sliding scale for calculating constructed waterway corridor widths – addition of shared trail/maintenance track either side of channel (within vegetated buffer)

HYDRAULIC WIDTH (M)	CRZ WIDTH (M)	VB WIDTH (M)	CORRIDOR WIDTH (M)
5	20	20	40
10	20	20	40
15	20	25	45
20	25	25	50
25	30	25	55
30	30	25	55
35	30	25	55
40	35	25	60
45	35	25	60
50	35	25	60
55	40	25	65
60	40	25	65
65	40	25	65
70	45	25	70

Figure 32. Constructed Waterway corridor requirements (Melbourne Water’s Waterway Corridor Guidelines)

Waterway corridor alignments were determined based on the existing conditions modelling provided in section 5 and the natural waterway alignment data provided by the CMA. From the determination of general locations of each waterway, the developed conditions RORB model was used to determine 1% AEP flows contributing to each proposed reach of waterway. Based on the contributing 1% AEP flow, hydraulic widths were determined for each reach of the waterway, and the calculated Core Riparian Zones (CRZ), Vegetated Buffers (VB) and overall corridor widths were determined from Figure 32 above. The corridor widths have assumed active edges (i.e. roads) on both sides of the waterway. Table 12 below provides details on each reach of the proposed waterways.

Table 12. waterway corridor widths for the proposed growth areas

Waterway Reach	1% AEP Flow (m³/s)	Hydraulic Width (m)	Core Riparian Zone (CRZ) (m)	Vegetated Buffer (VB) (m)	Waterway Corridor (m)
A – B	9.28	21.7	30	15	45
C – B	7.82	16.8	25	15	40
D – E	6.95	16.1	25	15	40
F – E	2.43	11.3	25	15	40
E – G	13.07	23.8	30	15	45
H – I	7.55	16.6	25	15	40
J – K1	2.30	11.1	25	15	40
K1 – K2	17.94	25.8	30	15	45
L – K1	14.08	24.3	30	15	45
M – N1	5.93	15.3	25	15	40
N1 – N2	7.2	16.3	25	15	40
O – P	36.59	31.9	30	15	45
S – R	3.06	12.2	25	15	40
Q – R	56.18	44.3	35	20	55
R – T	61.36	45.1	35	20	55
U – V	49.71	39.4	30	20	50
V – T	51.39	39.8	30	20	50
T – W	85.66	52.4	40	20	60



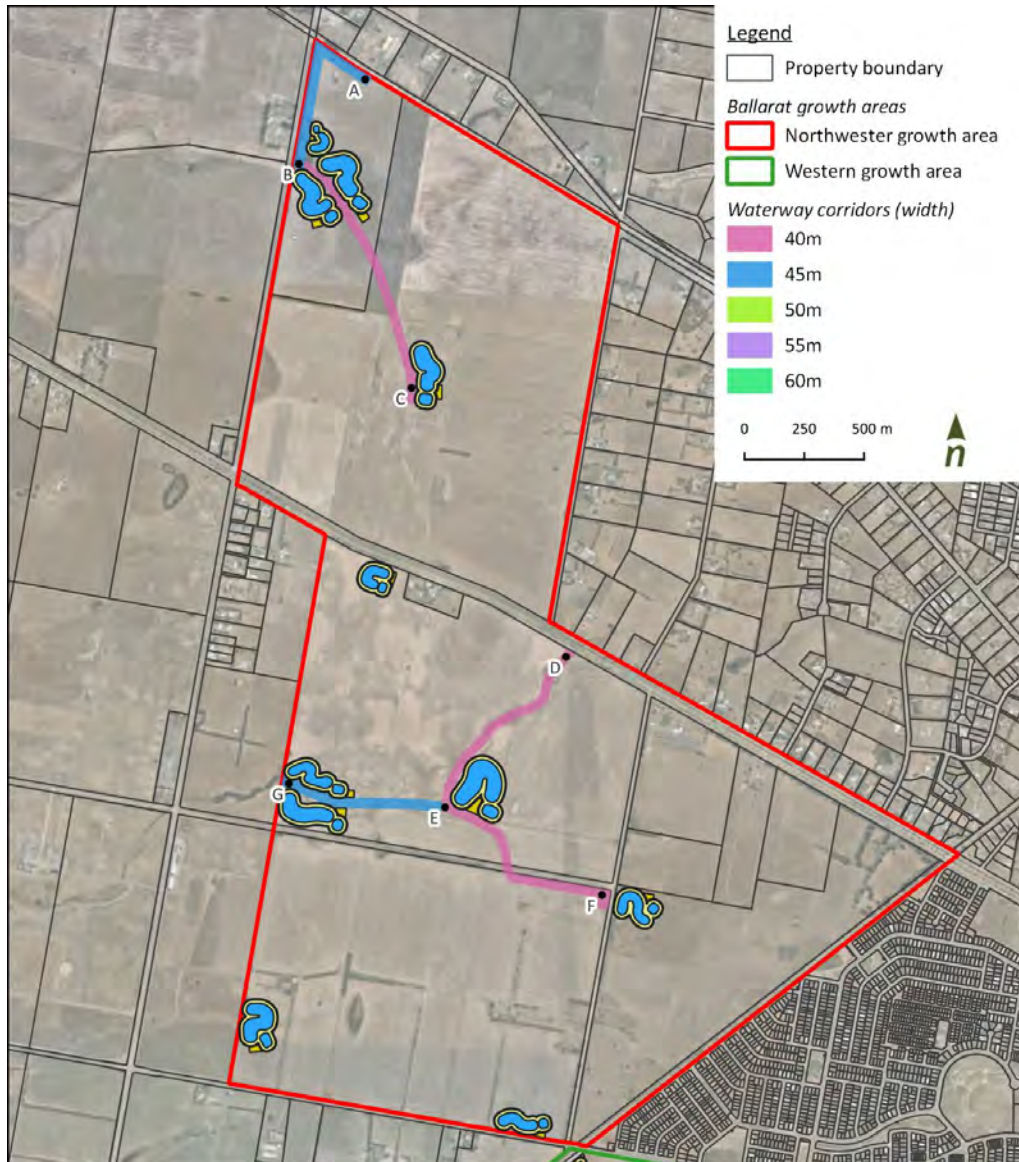


Figure 33. Waterway corridors within the Ballarat NW growth area



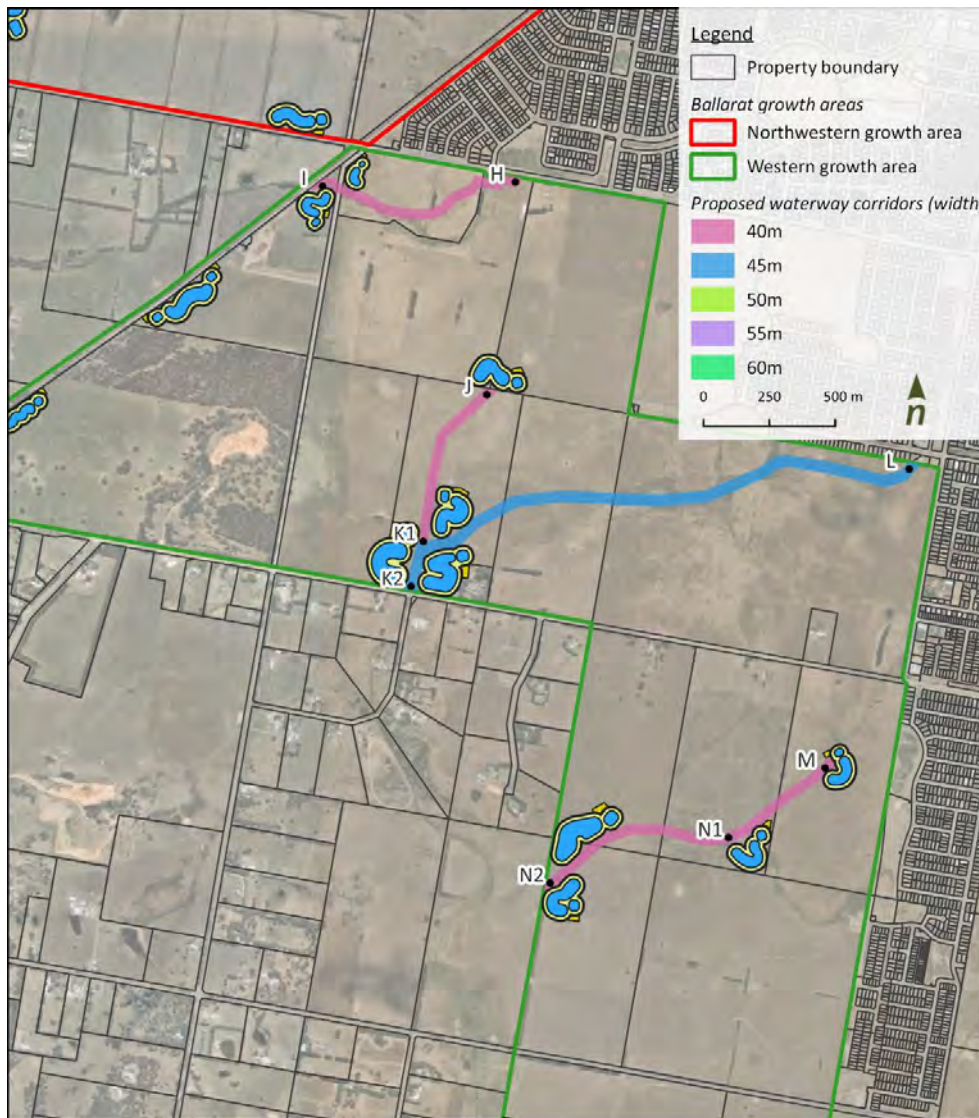


Figure 34. Waterway corridors within the Ballarat W growth area – plan 1



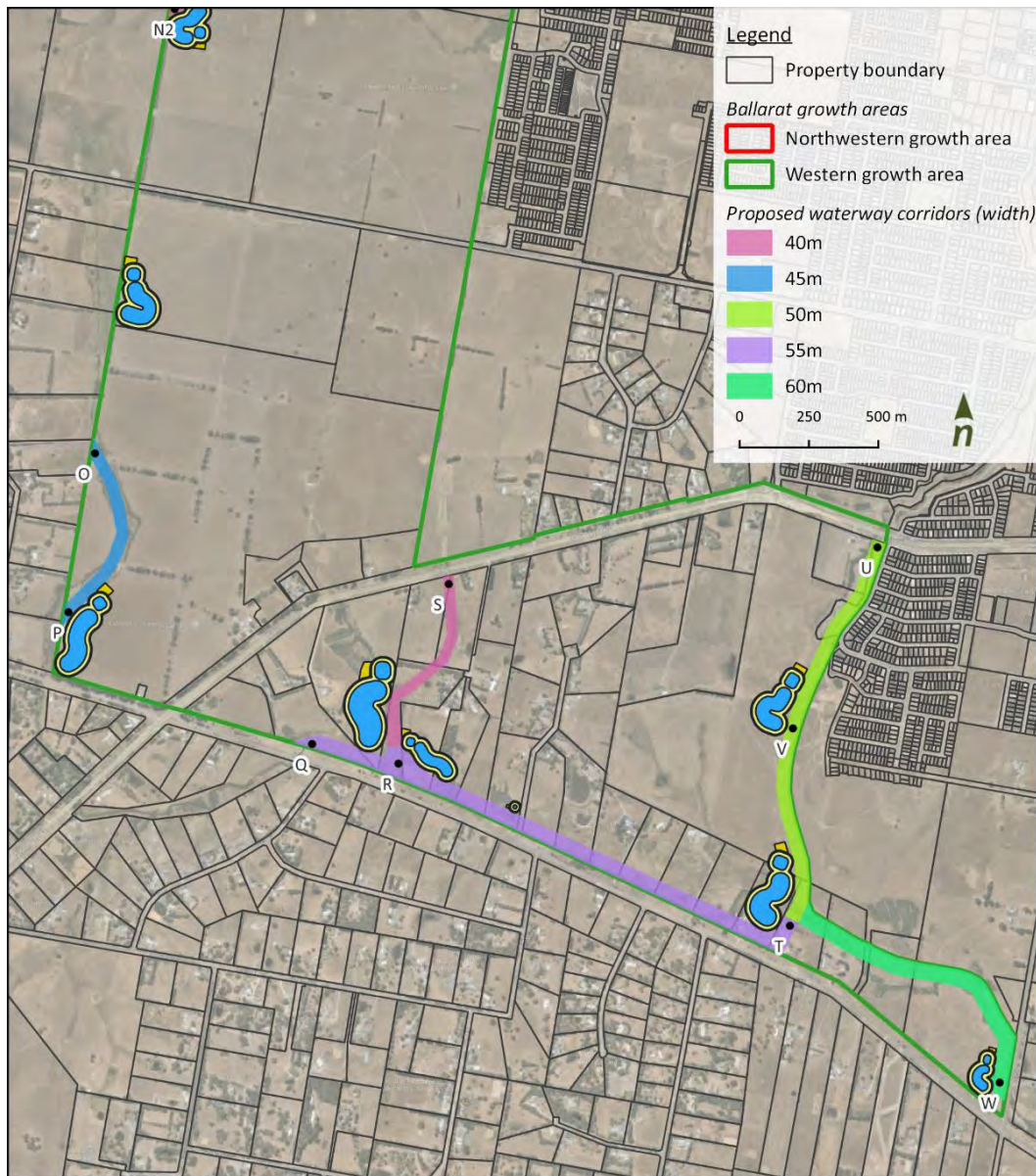


Figure 35. Waterway corridors within the Ballarat W growth area – plan 2

8.2 Longitudinal profile

The longitudinal slope is dictated by invert controls at the downstream and upstream extents of the constructed waterway. The provided design features change in slope along the alignment, discussed in Table 13. A key requirement with respect to waterway longitudinal grades is ensuring grades are no steeper than 1in200 for stability and erosion management. Where the average slope of the existing topography is steeper than 1in200, grade control structures will be required.

Table 13. Longitudinal slope along waterway reaches

Waterway Reach	Upstream elevation (m AHD)	Downstream elevation (m AHD)	Average slope (1 in x)	Number of grade control structures required
A – B	411	409	370	-
C – B	418	409	189	1
D – E	424	418	143	1
F – E	427	418	101	3
E – G	418	414	173	1
H – I	430	421	95	3
J – K2	422	416	143	2
L – K2	438	416	88	9
M – N2	424	412	105	4
O – P	405	404	750	-
S – R	404	396	95	5
Q – R	397	396	450	-
R – T	396	390	247	-
U – V	403	395	83	5
V – T	395	390	154	2
T – W	390	386	275	-

8.3 Cross section geometry

The cross-sectional geometry should be designed to accommodate the 4EY to 1EY flows in the low flow channel and the 1% AEP flows in the full compound channel. These flows are determined using RORB modelling as discussed in the flood modelling section. The proposed channel cross section has the dimensions given in Table 14.

Table 14. Channel cross-section geometry and design parameters

Parameter	Low flow channel	High flow channel
<i>40m Waterway corridor</i>		
Base width (m)	3	15
Depth (m)	0.5	0.8 (minimum)
Side slope (1 in x)	3	6
Bench slope (1 in x)	-	40 (maximum)
Top width (m)	6	28.2
Freeboard (m)	-	0.3
<i>45m Waterway corridor</i>		
Base width (m)	3	16
Depth (m)	0.6	1.4 (minimum)
Side slope (1 in x)	3	6
Bench slope (1 in x)	-	40 (maximum)
Top width (m)	6.6	36.4
Freeboard (m)	-	0.3
<i>50m Waterway corridor</i>		
Base width (m)	4	23
Depth (m)	0.6	1.4 (minimum)

Parameter	Low flow channel	High flow channel
Side slope (1 in x)	3	6
Bench slope (1 in x)	-	40 (maximum)
Top width (m)	7.6	43.4
Freeboard (m)	-	0.3
55m Waterway corridor		
Base width (m)	5	29
Depth (m)	0.6	1.4 (minimum)
Side slope (1 in x)	5	6
Bench slope (1 in x)	-	40 (maximum)
Top width (m)	11.0	49.4
Freeboard (m)	-	0.3
60m Waterway corridor		
Base width (m)	5	34
Depth (m)	0.6	1.6 (minimum)
Side slope (1 in x)	6	6
Bench slope (1 in x)	-	40 (maximum)
Top width (m)	12.2	56.8
Freeboard (m)	-	0.3

A conceptual layout of a typical cross section for each waterway corridor width is provided below.

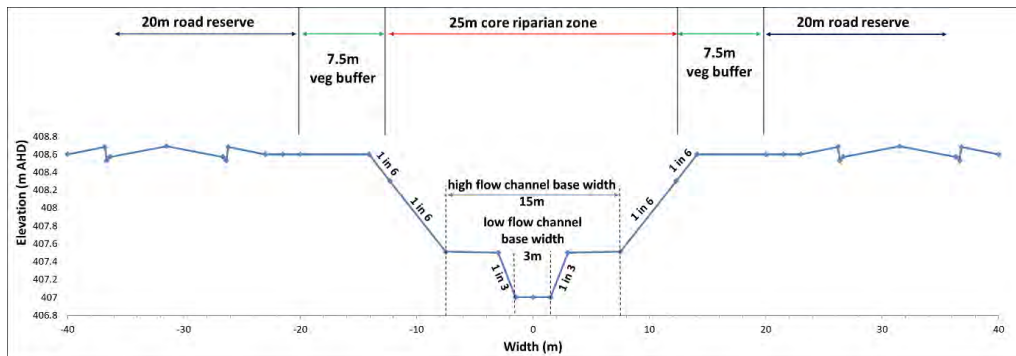


Figure 36. Conceptual arrangement of a typical cross section for a 40m wide waterway corridor

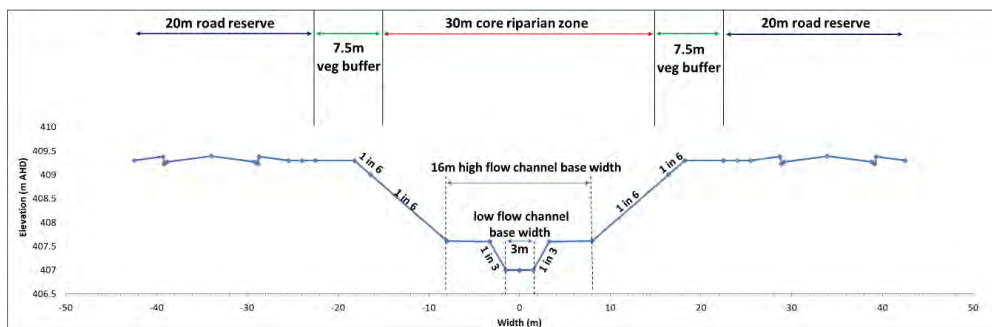


Figure 37. Conceptual arrangement of a typical cross section for a 45m wide waterway corridor



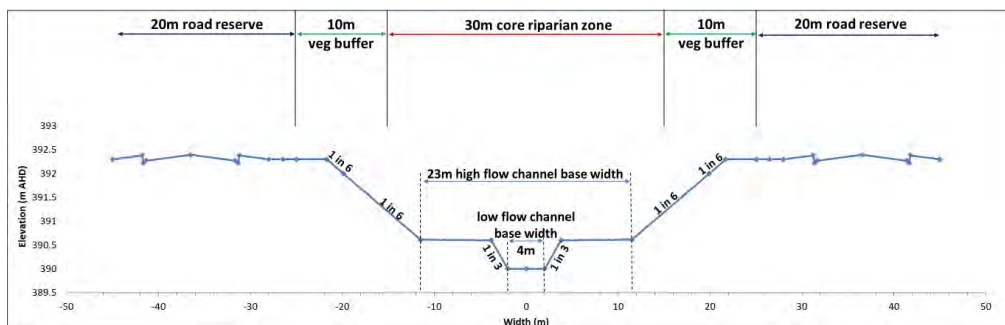


Figure 38. Conceptual arrangement of a typical cross section for a 50m wide waterway corridor

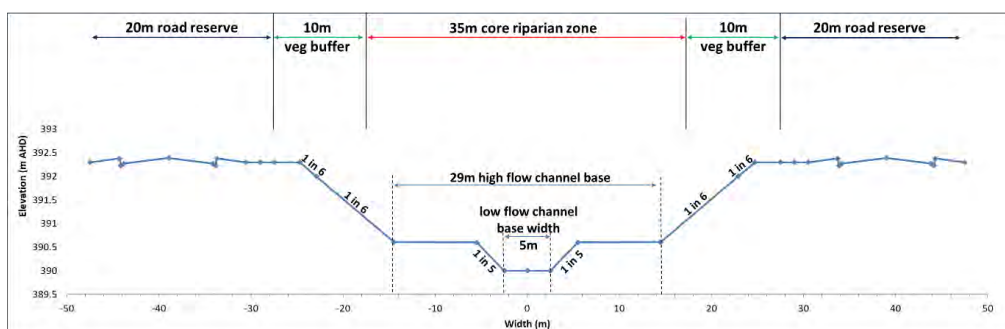


Figure 39. Conceptual arrangement of a typical cross section for a 55m wide waterway corridor

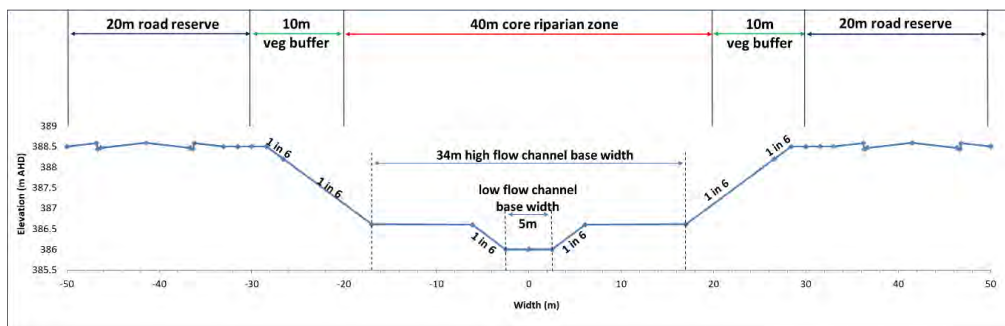


Figure 40. Conceptual arrangement of a typical cross section for a 60m wide waterway corridor

8.4 Considerations for future waterway continuity

A key consideration for constructed waterway design is to ensure that waterway continuity is provided through the reach. It is also important to ensure peak flood levels, velocities and shear stresses are managed within the growth area and the catchment downstream of the growth area. Alluvium has considered the proposed Ballarat North Western and Western growth areas, and how the proposed constructed waterways could be managed.

In particular, consideration of the waterway management approach for the southwestern draining waterway that intersects the boundary of the Western growth area (i.e. Winter Creek). The waterway naturally moves inside and outside of the growth area boundary at a number of locations. As a result, Alluvium has considered an alternative framework plan option which ‘extends’ the western growth area boundary to incorporate the entire waterway reach. This will allow future construction of the waterway corridor outside of the current



growth area whilst providing a natural buffer between the urbanised residential area and existing rural living area.

Similarly, further design of wetland/retarding basins would be required along the suggested waterway corridor to manage both the quantity and quality of stormwater runoff generated within the extension area.

This will include 157.4 ha of additional developable land whilst providing continuity in the Winter Creek waterway alignment. A summary of the additional area proposed for development is highlighted below.

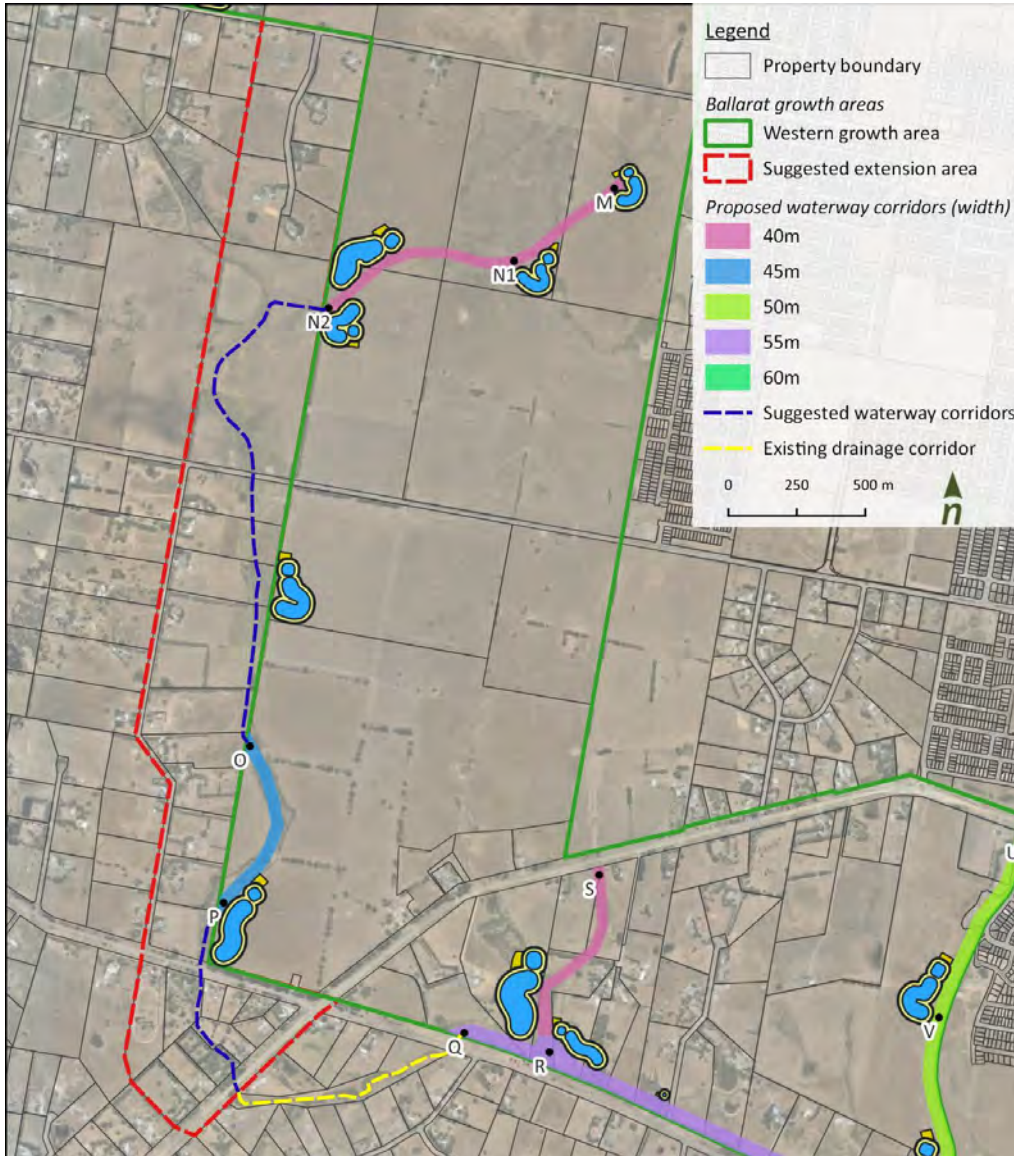


Figure 41. Suggested growth area changes to provide waterway continuity

9 Stormwater quality treatment

Alluvium understands that a key principle for the development of the Ballarat Growth Areas is that all stormwater is to be treated to best practice (ie Best Practice Environmental Management Guidelines (BPEM)) before being discharged into a waterway. The following BPEM targets have been adopted:

- 70% removal of the total Gross Pollutant load
- 80% removal of total Suspended Solids (TSS)
- 45% removal of total Nitrogen (TN)
- 45% removal of total Phosphorus (TP)

A MUSIC (Model for Urban Stormwater Improvement Conceptualisation) model was developed to estimate the pollutant loads generated from the developed conditions scenario. The model was used to size the WSUD assets, including wetland and sediment basins required to meet the pollutant reduction targets.

The key modelling inputs for the MUSIC model are meteorological data:

- Rainfall
- Evapotranspiration

A MUSIC template was created using meteorological data from nearby rainfall stations. Data was checked against the average annual rainfall (mm) and average evapotranspiration (mm/day) for the Ballarat area, in order to select the most appropriate 10 years of data. The Ballarat Aerodrome rainfall station was selected as the most appropriate geographic location, with the best available data. A template was created and is referred to as '89002_Ballarat Aerodrome_6min_1981_1990'.

The MUSIC model layout is shown in Figure 42. The assets have been sized to treat the loads being generated off the future developable area to best practice. Note, all wetland treatment systems are located within the base of the proposed retarding basins. To provide a multifunctional asset, which provides an efficient use of overall land take.

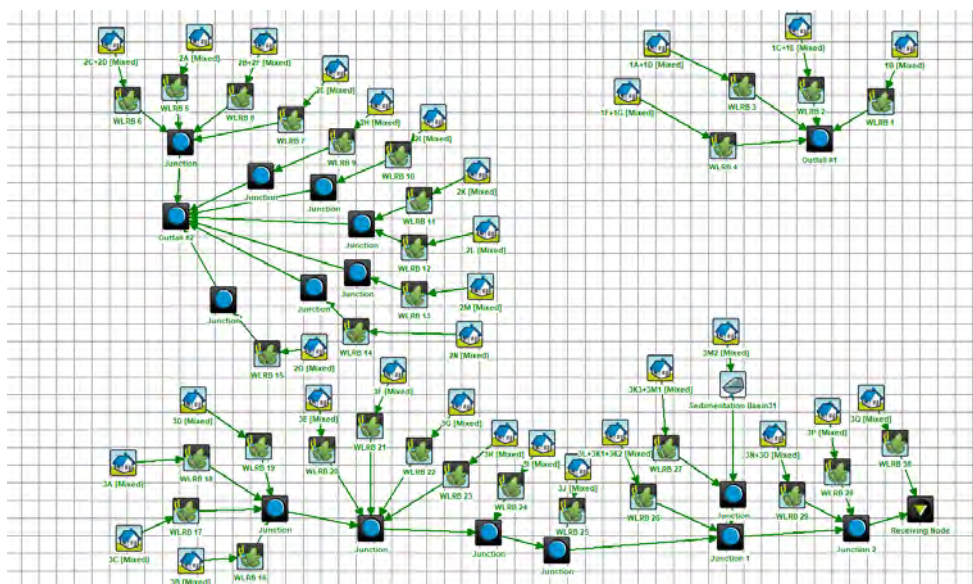


Figure 42. MUSIC model for the Ballarat growth areas

The configuration of the revised treatment train (wetlands and sediment basins) is provided in Table 15.

Table 15. Treatment asset parameters

	Catchment area (ha)	NWL area (m ²)	Average depth (m)	Inlet pond area (m ²)	Extended detention depth (m)	Residence time
WLRB 1	18.85	3,800	0.40	625	0.35	72 hrs
WLRB 2	80.00	14,500	0.40	2,500	0.35	72 hrs
WLRB 3	77.73	10,000	0.40	2,100	0.35	72 hrs
WLRB 4a	73.40	13,000	0.40	2,400	0.35	72 hrs
WLRB 4b	38.00	7,000	0.40	1,300	0.35	72hrs
WLRB 5	51.00	9,500	0.40	1,700	0.35	72 hrs
WLRB 6	128.00	23,000	0.40	3,000	0.35	72 hrs
WLRB 7	51.00	9,500	0.40	1,600	0.35	72 hrs
WLRB 8	77.50	14,500	0.40	1,800	0.35	72 hrs
WLRB 9	75.70	13,750	0.40	2,200	0.35	72 hrs
WLRB 10	40.57	7,500	0.40	1,300	0.35	72 hrs
WLRB 11	11.40	2,200	0.40	360	0.35	72 hrs
WLRB 12	28.20	5,500	0.40	750	0.35	72 hrs
WLRB 13	57.70	10,500	0.40	2,100	0.35	72 hrs
WLRB 14	26.60	5,000	0.40	950	0.35	72 hrs
WLRB 15	15.50	2,900	0.40	520	0.35	72 hrs
WLRB 16	44.00	8,250	0.40	1,400	0.35	72 hrs
WLRB 17	50.00	9,500	0.40	1,200	0.35	72 hrs
WLRB 18	81.90	14,500	0.40	2,800	0.35	72 hrs
WLRB 19	73.00	13,500	0.40	1,750	0.35	72 hrs
WLRB 20	29.00	5,500	0.40	900	0.35	72 hrs
WLRB 21	81.00	15,000	0.40	2,250	0.35	72 hrs
WLRB 22	37.00	7,000	0.40	1,200	0.35	72 hrs
WLRB 23	47.50	9,000	0.40	1,450	0.35	72 hrs
WLRB 24	67.65	12,250	0.40	1,900	0.35	72 hrs
WLRB 25	82.30	15,000	0.40	1,800	0.35	72 hrs
WLRB 26	121.36	21,500	0.40	3,200	0.35	72 hrs
WLRB 27	36.60	6,800	0.40	1,200	0.35	72 hrs
WLRB 28	62.00	11,500	0.40	2,100	0.35	72 hrs
WLRB 29	78.30	14,500	0.40	2,200	0.35	72 hrs
WLRB 30	19.00	3,700	0.40	750	0.35	72 hrs

An overall location plan of the wetland assets are shown in Figure 43. Further detail of individual wetland concepts are provided in Appendix C. In accordance with best practice principles, all wetlands are located off-line from the waterway corridors.

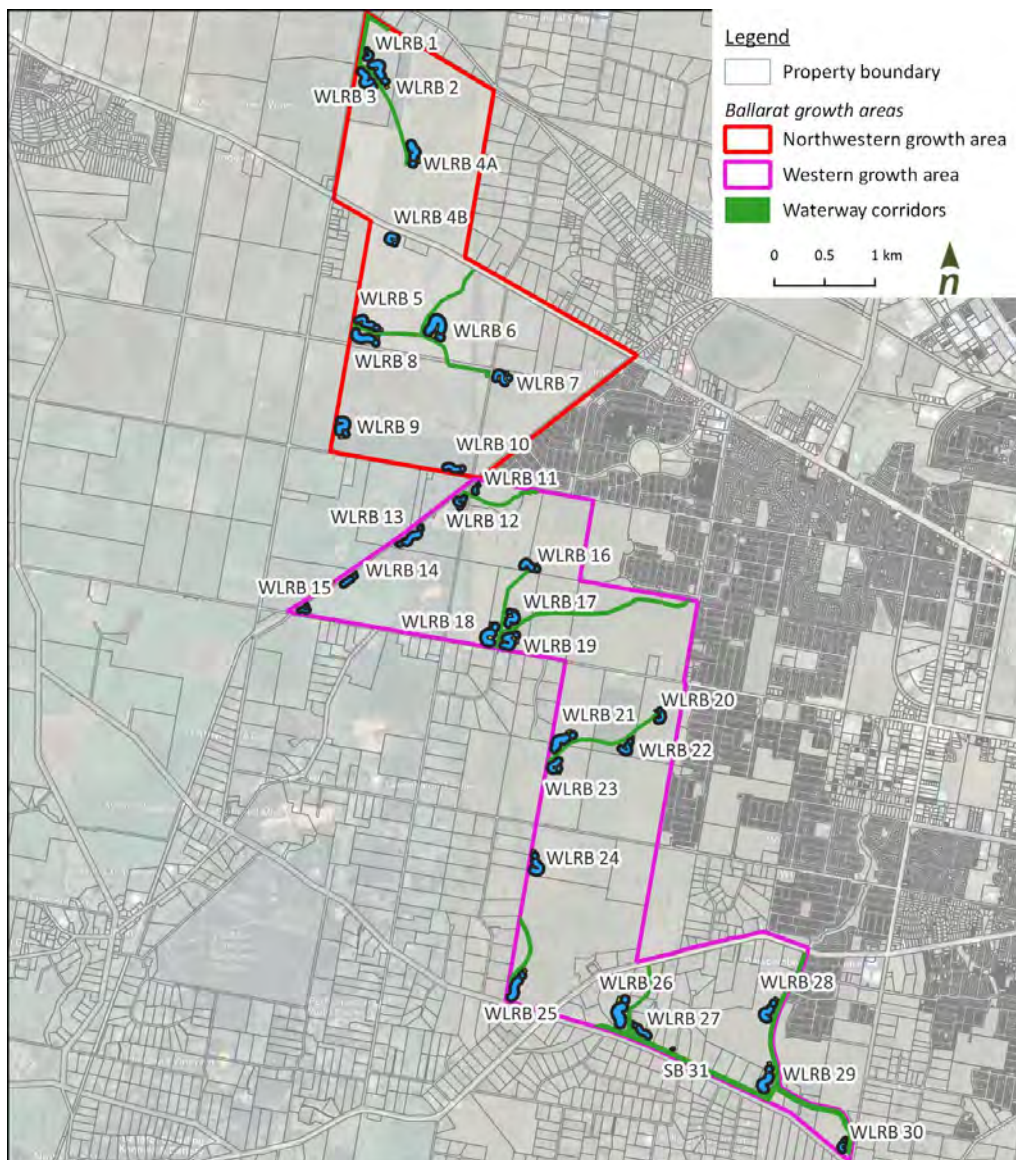


Figure 43. Treatment asset locations overview

The key requirement for the growth areas is to ensure stormwater runoff generated is treated to best practice, prior to leaving the growth area framework plan. The wetland performance has been determined at three key locations,

- The outfall to Burrumbeet Creek (major catchment 1)
- The outfall to Woody Yaloak River (major catchment 2)
- The outfall to Yarrowee River (major catchment 3).

Wetland performance is given in Table 16, Table 17 and Table 18, demonstrating the design meets the best achievable target relative to BPEM targets.



Table 16. Overall treatment performance of the system in Major Catchment 1 (Burrumbeet Creek)

Parameter	Total sources	Residual load	Percent removed (%)
Total Suspended Solids (kg/yr)	212,000	41,100	80.6%
Total Phosphorus (kg/yr)	435	136	68.7%
Total Nitrogen (kg/yr)	3,070	1,650	46.2%
Gross Pollutants (kg/yr)	44,500	0	100%

Table 17. Overall treatment performance of the system in Major Catchment 2 (Woody Yaloak River)

Parameter	Total sources	Residual load	Percent removed (%)
Total Suspended Solids (kg/yr)	422,000	85,100	79.8%
Total Phosphorus (kg/yr)	866	280	67.7%
Total Nitrogen (kg/yr)	6,120	3,320	45.7%
Gross Pollutants (kg/yr)	88,900	0	100%

Table 18. Overall treatment performance of the system in Major Catchment 3 (Yarrowee River)

Parameter	Total sources	Residual load	Percent removed (%)
Total Suspended Solids (kg/yr)	691,000	140,000	79.7%
Total Phosphorus (kg/yr)	1,420	462	67.5%
Total Nitrogen (kg/yr)	10,000	5,460	45.5%
Gross Pollutants (kg/yr)	145,000	0	100%

9.1 Sediment Basin

The sediment basin was sized using Melbourne Water's criteria and the design procedure as detailed in the *WSUD Engineering Procedures: Stormwater (2005)*. The procedure outlined in *WSUD Engineering Procedures (2005)* has been followed and is based on the typical sediment loading rate of 1.6 m³/ha/yr for a developed catchment, which is the appropriate loading rate since an upstream GPT is proposed. These areas assume a depth of 500mm and a sediment cleanout frequency of 5 years.

Sediment basin sizing calculations have been provided in Appendix B.

9.2 Velocities

Minimum width calculations have been undertaken for each proposed wetland, in order to determine the minimum widths required for each asset to meet velocity threshold requirements.

In lieu of local wetland design guidelines, Melbourne Water's constructed wetland design manual has been referred to for velocity threshold requirements. Specifically, the following criteria:

- Velocities must be < 0.05 m/s for events up to and including the 4EY in the macrophyte zone,
- Velocity must be < 0.50 m/s for all events up to the 1% AEP,
- Wetland macrophyte areas have a desirable length to width ratio of 4:1.

The velocity through each treatment asset is considered here. A flow depth of 0.35m, which is the extended detention depth, has been assumed for 4EY, 20% AEP and 1% AEP flows. Note that the 1% AEP flow is not diverted into the treatment asset.



10 Concept design layout

A key consideration for the development of the growth areas is providing appropriate outfall through downstream properties. Two options are generally considered when designing outfalls for a growth area. These are:

- Providing grade out works through the downstream landholdings, to 'daylight' the invert levels of all drainage infrastructure, where all drainage works are designed in cut, and
- Tying the invert level at the downstream boundary of the growth area in with the existing surface, where drainage works outfalling outside of the growth area boundary required embankment structures.

For the purposes of the concept design plan, Alluvium has assumed downstream grade out works will be required where appropriate. A conceptual layout of the wetland / retarding basins within the proposed drainage reserves are shown in Appendix C below.

The concept designs for the options investigated are presented within this section. Each option includes:

- The macrophyte treatment area (NWL) as established in MUSIC
- The storage requirements as established in the hydrologic modelling (RORB)
- A Normal Water Level (NWL) identified by looking at the topography of the site, as well as the inclusion of 0.35m EDD and any freeboard requirements
- An approximate overall footprint based on the selected NWL and battering up to existing surface at a 1 in 6 grade
- Indicative inlet pipe, transfer pipe (sediment basin to wetland), and outlet pipe locations
- A 4m path allowance around the site (alignments to be defined in later design stages)
- Allowance for sediment dry out area, as defined by the sediment basin calculations.

10.1 Alternative outfall arrangement

Alternatively, the growth area can provide outfalls which tie in the with existing surface levels at the downstream boundaries of the growth area. This will ensure that all future development works proposed do not rely on downstream works within landholdings located outside of the growth area. As downstream infrastructure will require embankments and filling of developable area, a significant increase in cost associated with fill material requires, and risk associated with embankment failure is likely, in particular:

- Embankment structures will be required on RBWL systems, to ensure the outfall is located at existing surface level to provide a free draining outfall,
- Extensive filling of future development areas will be required, to ensure incoming pipe, overland flow and waterway drainage infrastructure can outfall to the proposed RBWLs,
- Due to embankments being required for RBWL assets, an increased level of risk associated the failure of these system will be present,
- Consequence and risk assessments of embankments will be required, due to their impact of failure on the existing downstream landowners.

11 Conclusion

This SWMS has proposed management strategies for stormwater quantity, ultimate waterway corridors and stormwater quality. Through meeting these objectives, this SWMS acts as a critical component of the growth area plan and ensures storm water is managed in accordance with Council's requirements.

This SWMS informs the site specific requirements relating to drainage, required as part of the future Ballarat North Western and Western growth area Framework Plans.

Appendix A
Flood mapping

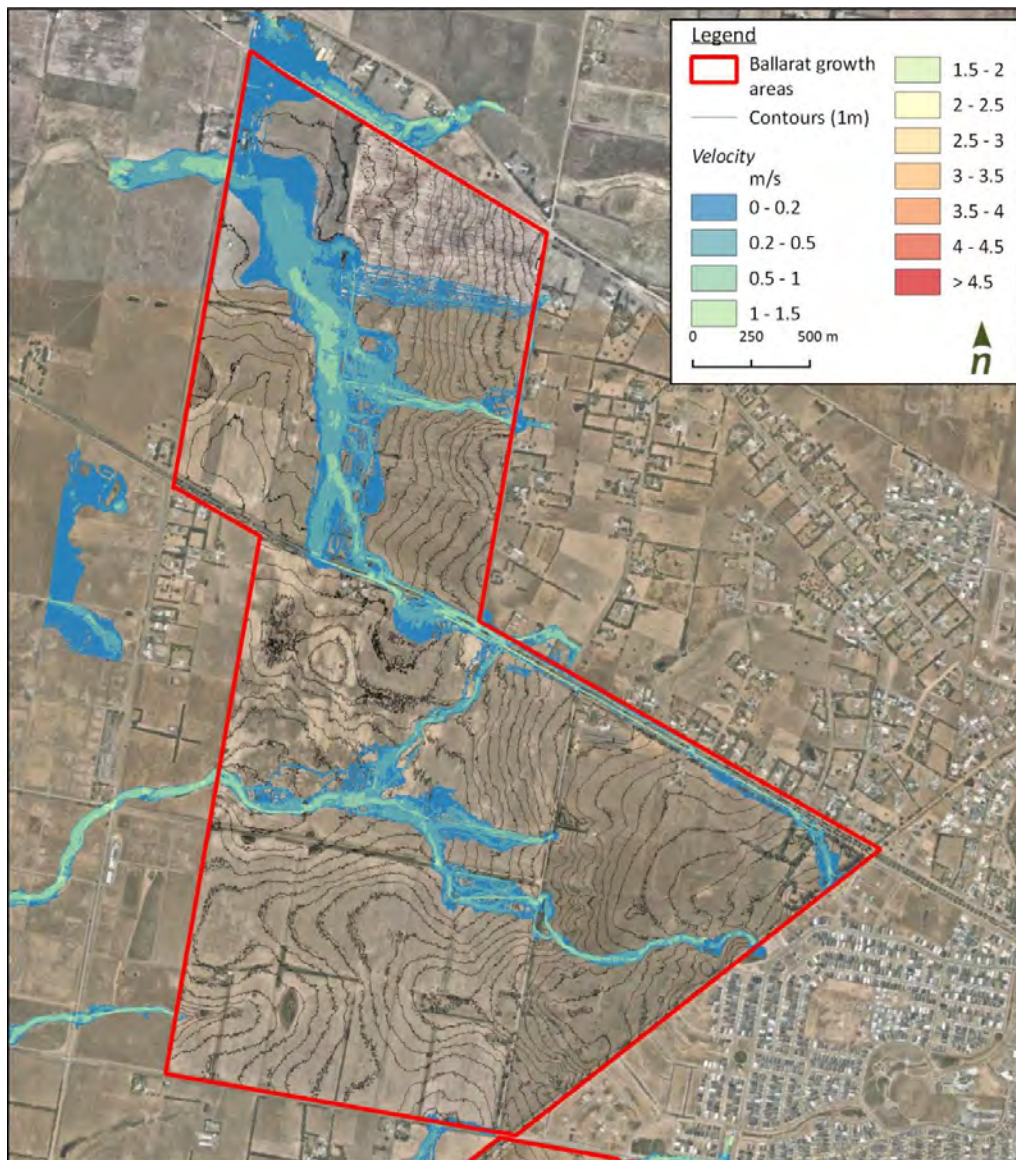


Figure 44. Existing conditions 1% AEP velocity – North Western growth area



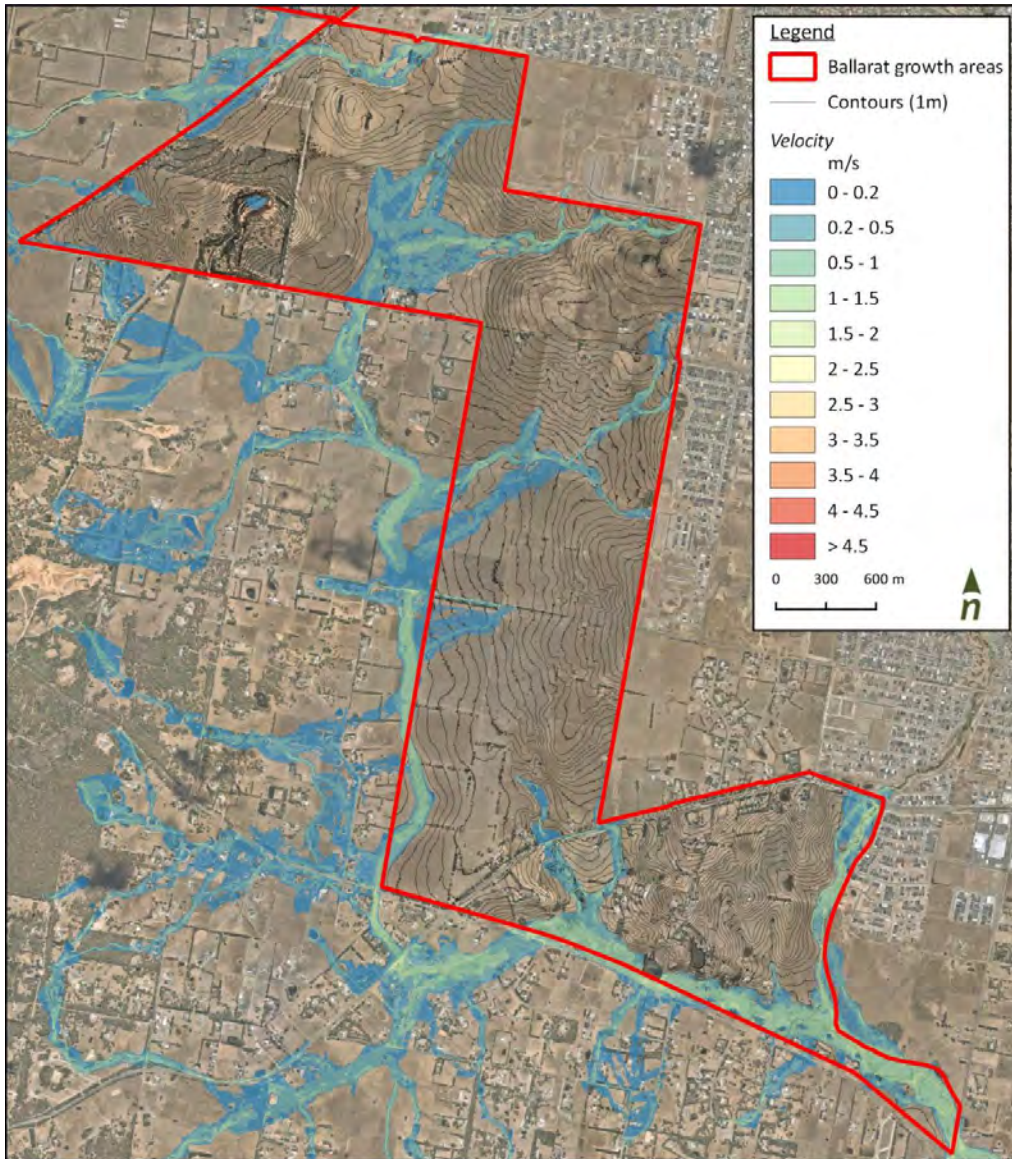


Figure 45. Existing conditions 1% AEP flood extents – Western growth area

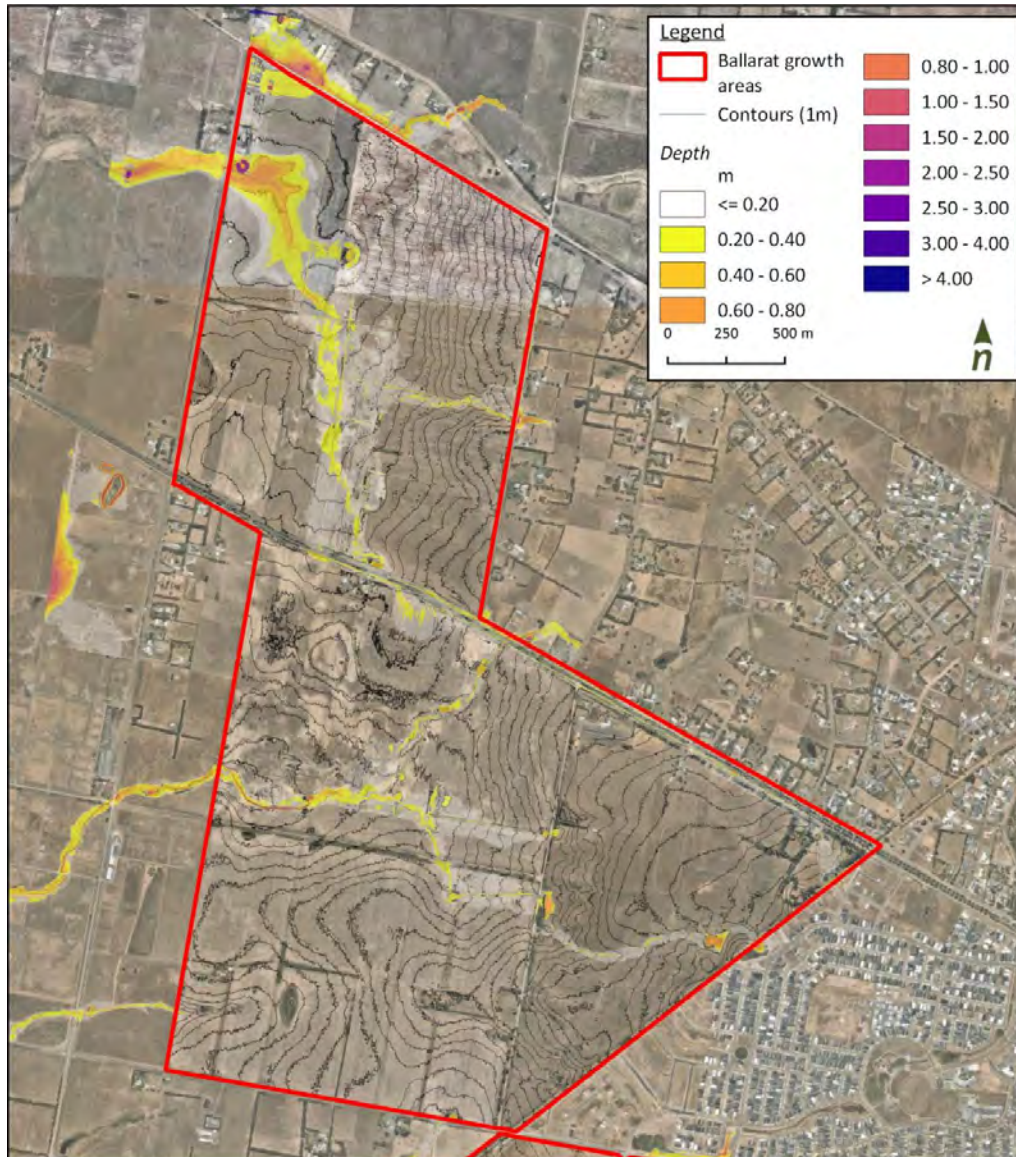


Figure 46. Existing conditions 1% AEP flood depth – North Western growth area

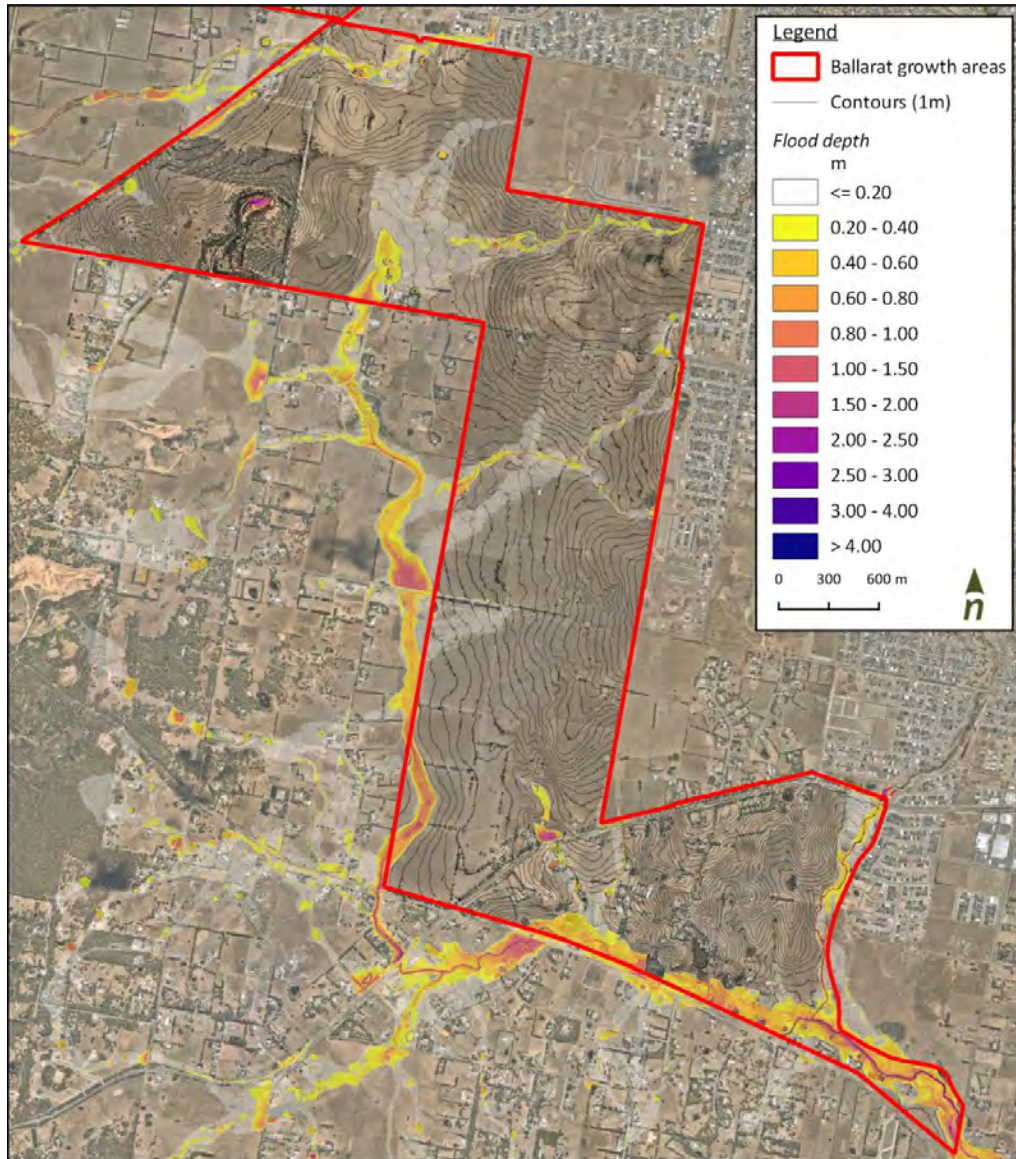


Figure 47. Existing conditions 1% AEP flood depth – Western growth area

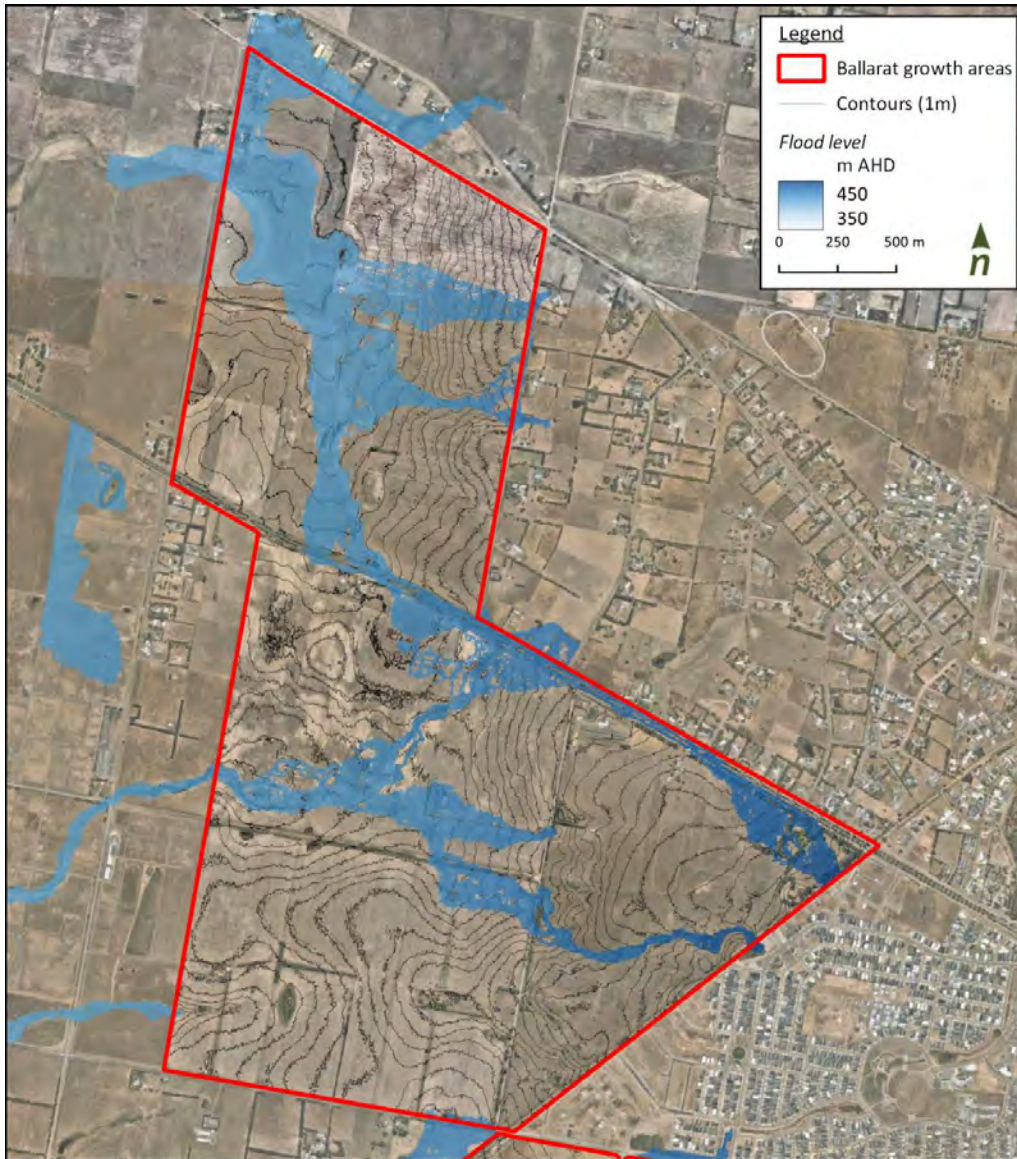


Figure 48. Existing conditions 0.5% AEP flood extents – North Western growth area

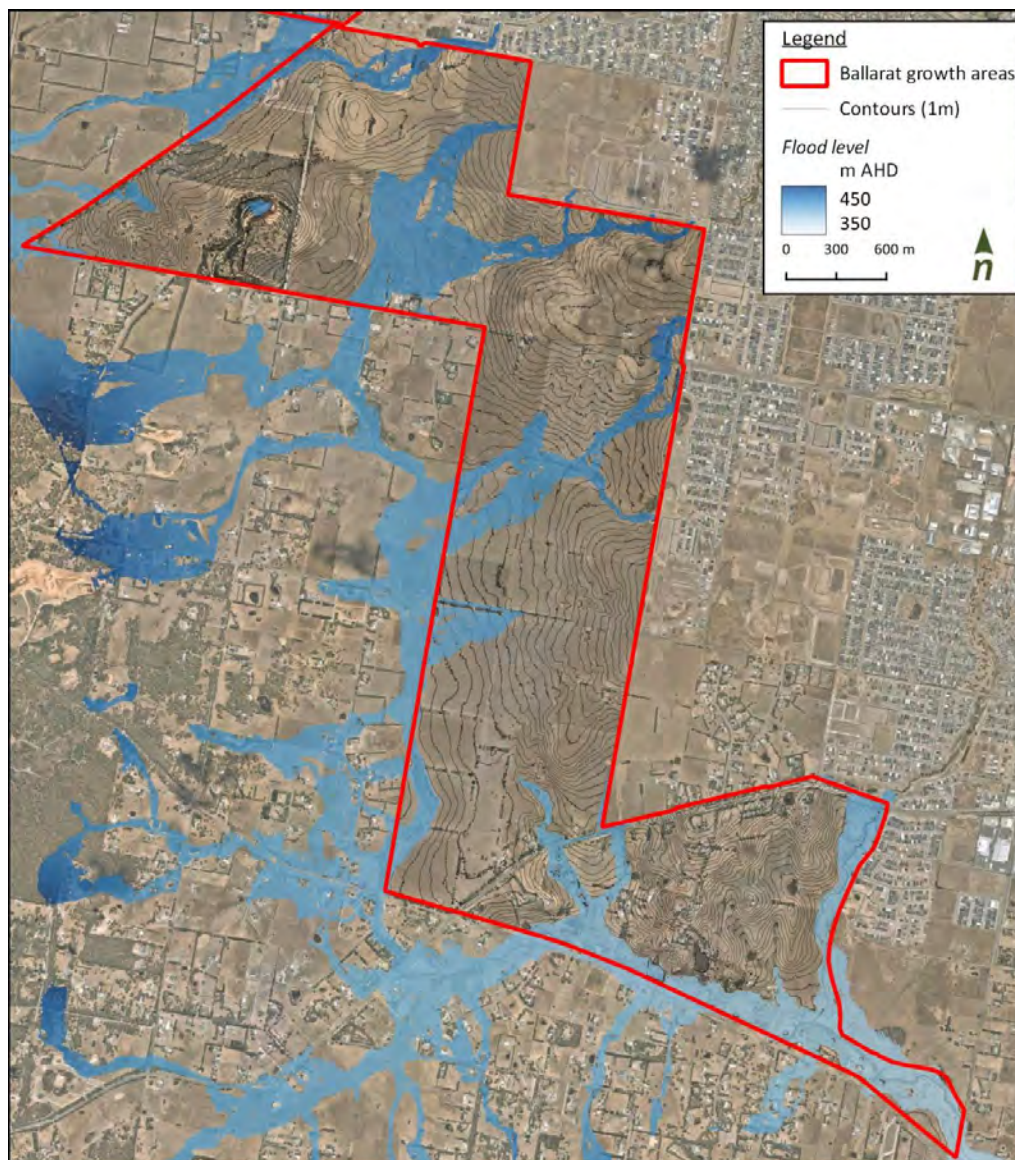


Figure 49. Existing conditions 0.5% AEP flood extents – Western growth area





Figure 50. Existing conditions 2% AEP flood extents – North Western growth area



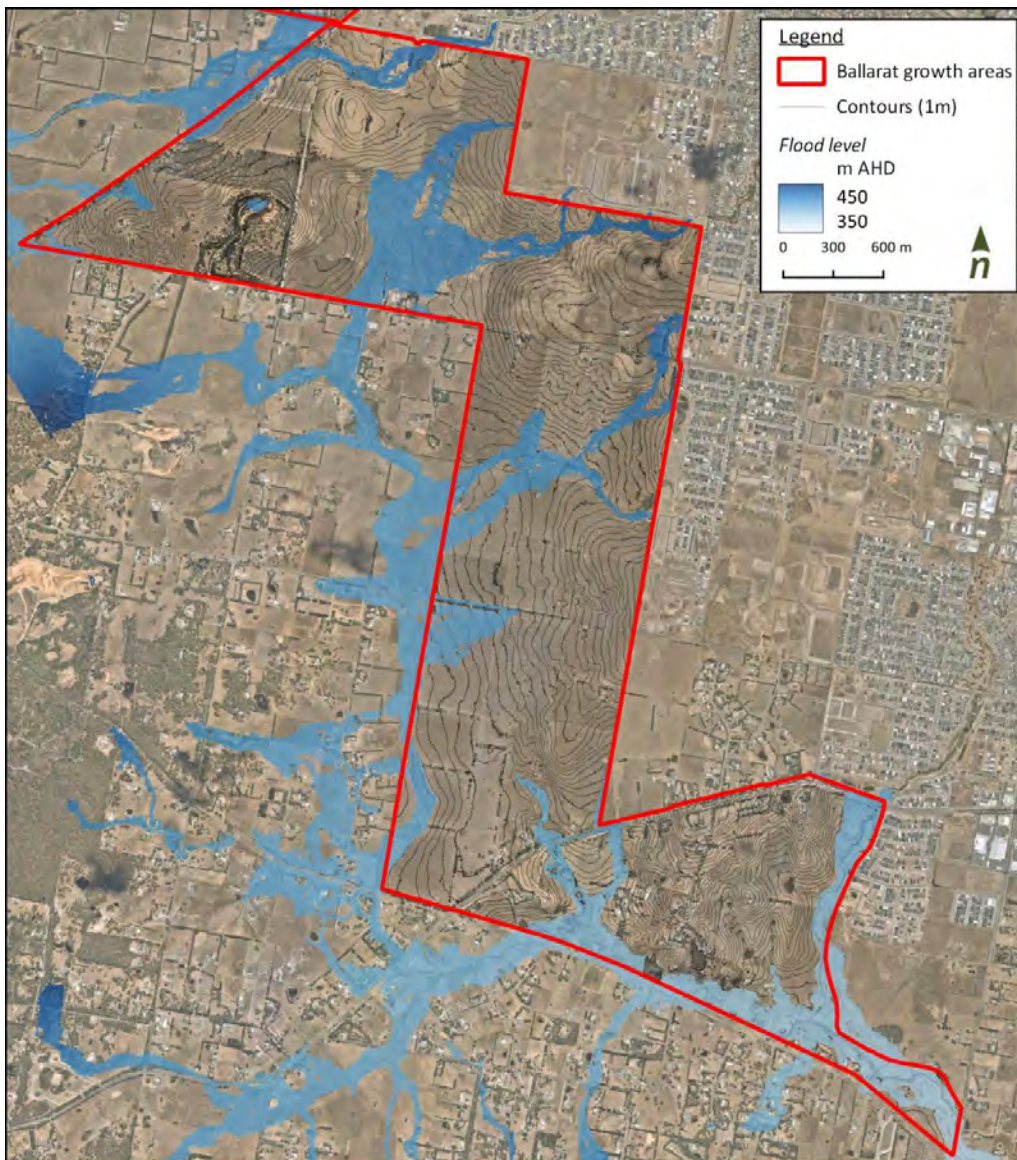


Figure 51. Existing conditions 2% AEP flood extents –Western growth area



Figure 52. Existing conditions 5% AEP flood extents – North Western growth area

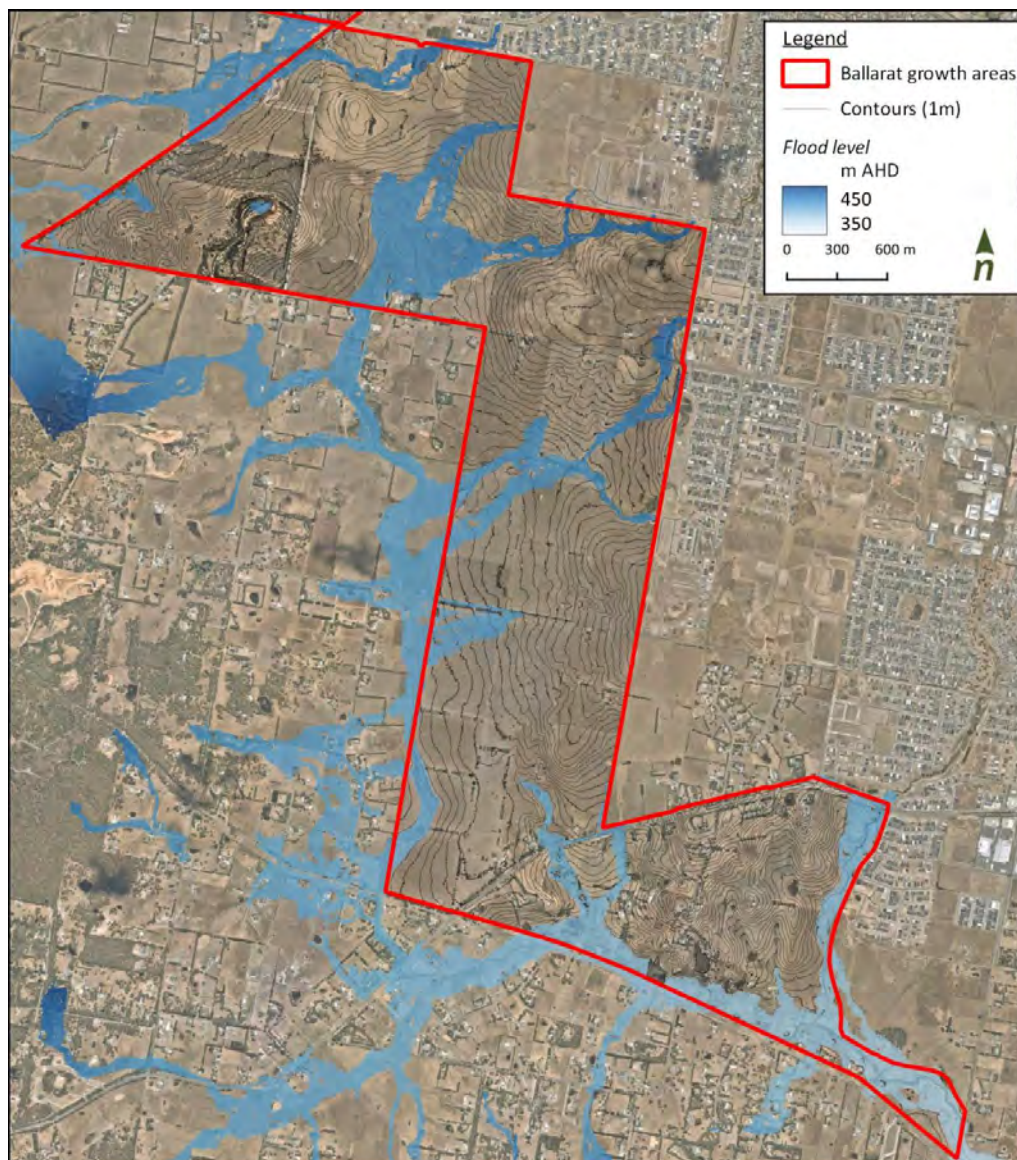


Figure 53. Existing conditions 5% AEP flood extents – Western growth area



Figure 54. Existing conditions 10% AEP flood extents – North Western growth area

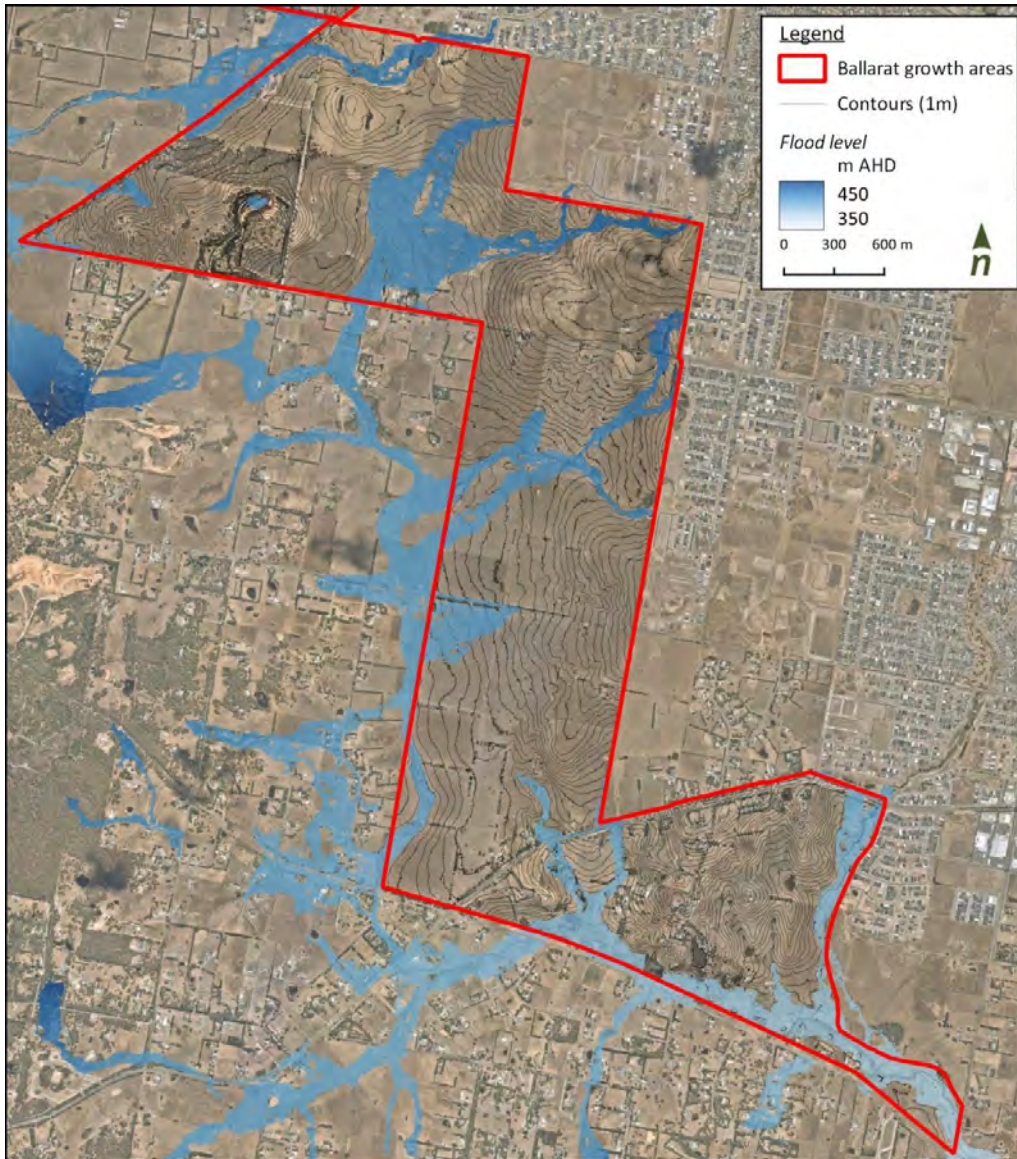


Figure 55. Existing conditions 10% AEP flood extents – Western growth area



Figure 56. Existing conditions 20% AEP flood extents – North Western growth area

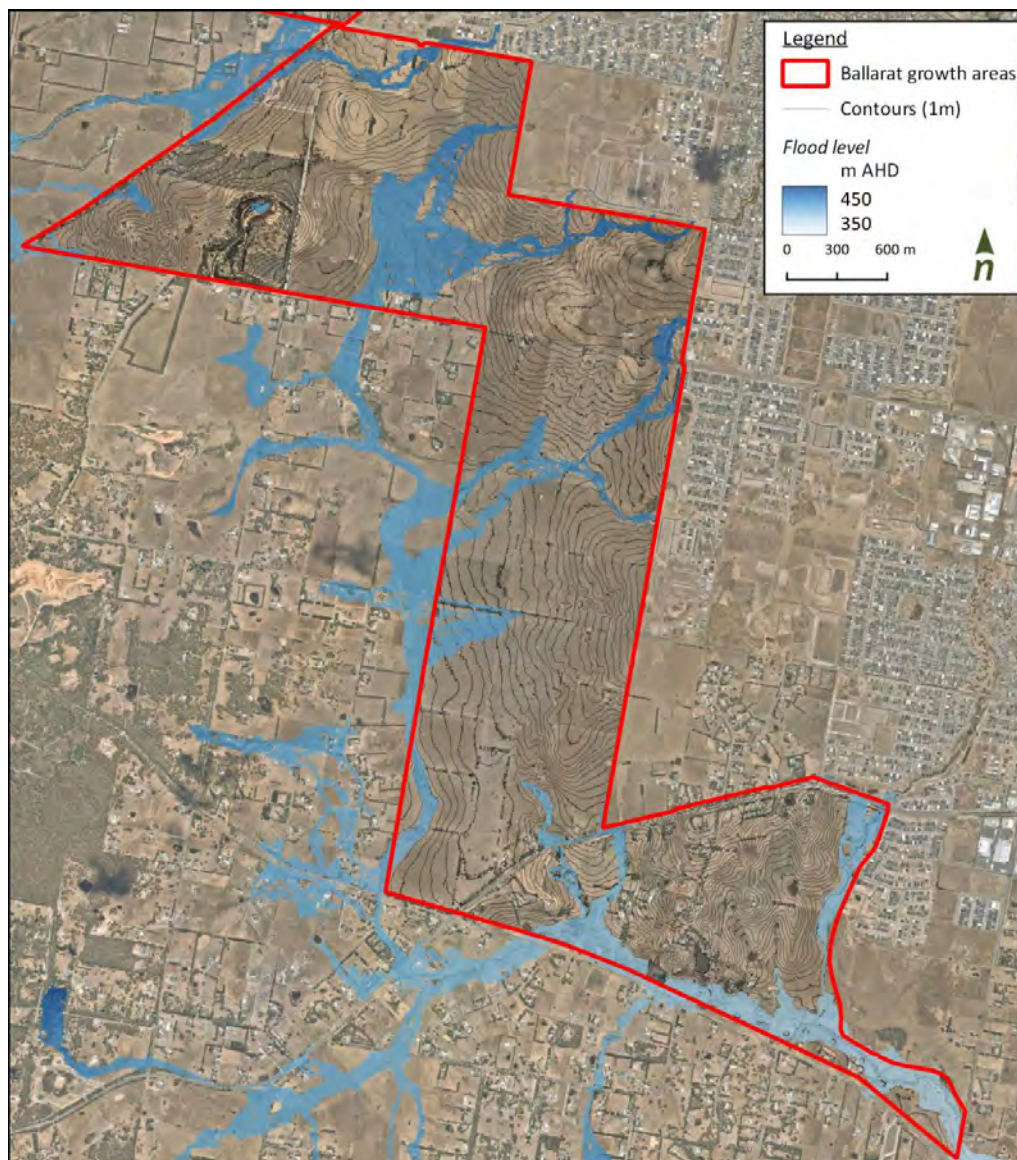


Figure 57. Existing conditions 20% AEP flood extents – Western growth area

Appendix B
Sediment Basin Fair and Geyer Calculations



Table 19. WLRB 1: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	18.85
	Area of Basin (m ²)	625
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.42
	Capture Efficiency	95.4%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		144
Available sediment storage volume		455
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	288

Table 20. WLRB 2: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	80.00
	Area of Basin (m ²)	2,500
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.70
	Capture Efficiency	95.4%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		610
Available sediment storage volume		2,160
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1,221



Table 21. WLRB 3: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	77.73
	Area of Basin (m ²)	2,100
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.5
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		592
Available sediment storage volume		1,793
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1,183

Table 22. WLRB 4A: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	73.40
	Area of Basin (m ²)	2,400
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.67
	Capture Efficiency	95.3%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		559
Available sediment storage volume		2070
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1,119



Table 23. WLRB 4B: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	38.00
	Area of Basin (m ²)	1,300
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.94
	Capture Efficiency	95.1%
	Check (>95%)	OK
Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)	1.6
	Desired clean-out frequency, Fr	5
	Storage volume required, St	289
	Available sediment storage volume	1,058
	Check (Available storage > required storage)	OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	578

Table 24. WLRB 5: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	51.00
	Area of Basin (m ²)	1,700
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.22
	Capture Efficiency	95.1%
	Check (>95%)	OK
Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)	1.6
	Desired clean-out frequency, Fr	5
	Storage volume required, St	388
	Available sediment storage volume	1,422
	Check (Available storage > required storage)	OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	776



Table 25. WLRB 6: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	128
	Area of Basin (m ²)	3000
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	2.18
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		973
Available sediment storage volume		2635
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1,946

Table 26. WLRB 7: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	51
	Area of Basin (m ²)	1600
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.12
	Capture Efficiency	95.2%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		389
Available sediment storage volume		1329
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	777



Table 27. WLRB 8: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	77.50
	Area of Basin (m ²)	1800
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.26
	Capture Efficiency	95.2%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		590
Available sediment storage volume		1515
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1,181

Table 28. WLRB 9: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	75.7
	Area of Basin (m ²)	2200
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.59
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		576
Available sediment storage volume		1883
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1,151



Table 29. WLRB 10: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	40.57
	Area of Basin (m ²)	1300
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.93
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		309
Available sediment storage volume		1053
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	617

Table 30. WLRB 11: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	11.40
	Area of Basin (m ²)	360
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.26
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		87
Available sediment storage volume		229
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	173



Table 31. WLRB 12: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	28.2
	Area of Basin (m ²)	750
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.54
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		215
Available sediment storage volume		567
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	429

Table 32. WLRB 13: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	57.70
	Area of Basin (m ²)	2100
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.50
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		439
Available sediment storage volume		1793
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	878



Table 33. WLRB 14: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	26.60
	Area of Basin (m ²)	950
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.70
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		202
Available sediment storage volume		745
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	404

Table 34. WLRB 15: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	15.50
	Area of Basin (m ²)	520
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.37
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		118
Available sediment storage volume		366
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	236



Table 35. WLRB 16: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	44.00
	Area of Basin (m ²)	1400
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.99
	Capture Efficiency	95.2%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		335
Available sediment storage volume		1149
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	670

Table 36. WLRB 17: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	50.00
	Area of Basin (m ²)	
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.86
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		380
Available sediment storage volume		967
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	761



Table 37. WLRB 18: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	81.90
	Area of Basin (m ²)	2800
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	2.03
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		623
Available sediment storage volume		2445
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1245

Table 38. WLRB 19: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	73.00
	Area of Basin (m ²)	1750
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.24
	Capture Efficiency	95.2%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		556
Available sediment storage volume		1473
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1112



Table 39. WLRB 20: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	29.00
	Area of Basin (m ²)	900
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.65
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		221
Available sediment storage volume		696
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	441

Table 40. WLRB 21: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	81.00
	Area of Basin (m ²)	2250
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.66
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		615
Available sediment storage volume		1931
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1231



Table 41. WLRB 22: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	37.00
	Area of Basin (m ²)	1200
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.87
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		281
Available sediment storage volume		967
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	563

Table 42. WLRB 23: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	47.5
	Area of Basin (m ²)	1450
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.07
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		361
Available sediment storage volume		1195
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	722



Table 43. WLRB 24: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	67.65
	Area of Basin (m ²)	1900
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.39
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		514
Available sediment storage volume		1607
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1028

Table 44. WLRB 25: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	82.30
	Area of Basin (m ²)	1800
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.30
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		626
Available sediment storage volume		1515
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1252

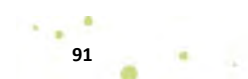


Table 45. WLRB 26: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	121.36
	Area of Basin (m ²)	3200
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	2.35
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		922
Available sediment storage volume		2820
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1844

Table 46. WLRB 27: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	36.60
	Area of Basin (m ²)	1200
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.87
	Capture Efficiency	95.0%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		278
Available sediment storage volume		967
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	557



Table 47. WLRB 28: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	62.00
	Area of Basin (m ²)	2100
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.50
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		472
Available sediment storage volume		1793
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	944

Table 48. WLRB 29: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	78.30
	Area of Basin (m ²)	2200
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	1.61
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		595
Available sediment storage volume		1883
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	1190



Table 49. WLRB 30: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	19.00
	Area of Basin (m ²)	750
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.53
	Capture Efficiency	95.2%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		145
Available sediment storage volume		567
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	289

Table 50. Sediment Basin SB31: Sediment Pond design parameters and checks

	Parameter	Proposed design
Conditions	Contributing Catchment (ha)	6.53
	Area of Basin (m ²)	250
Capture Efficiency	Settling Velocity of Target Sediment (mm/s) [Particle size 125 µm]	11
	Hydraulic Efficiency (λ)	0.11
	Permanent Pool Depth, dp (m)	0.50
	Extended detention depth, de	0.35
	Number of CTSR's, n	1.12
	Depth below permanent pool that is sufficient to retain sediment, d* (m)	0.50
	Design Discharge (m ³ /s) [4EY]	0.18
	Capture Efficiency	95.1%
	Check (>95%)	OK
	Sediment Storage	Sediment Loading rate, Lo (m ³ /ha/yr)
Desired clean-out frequency, Fr		5
Storage volume required, St		50
Available sediment storage volume		142
Check (Available storage > required storage)		OK
Sediment dewatering	Depth for dewatering area (m)	0.50
	Area required for dewatering (m ²)	99



Appendix C
Wetlands/Retarding Basins Conceptual Layout

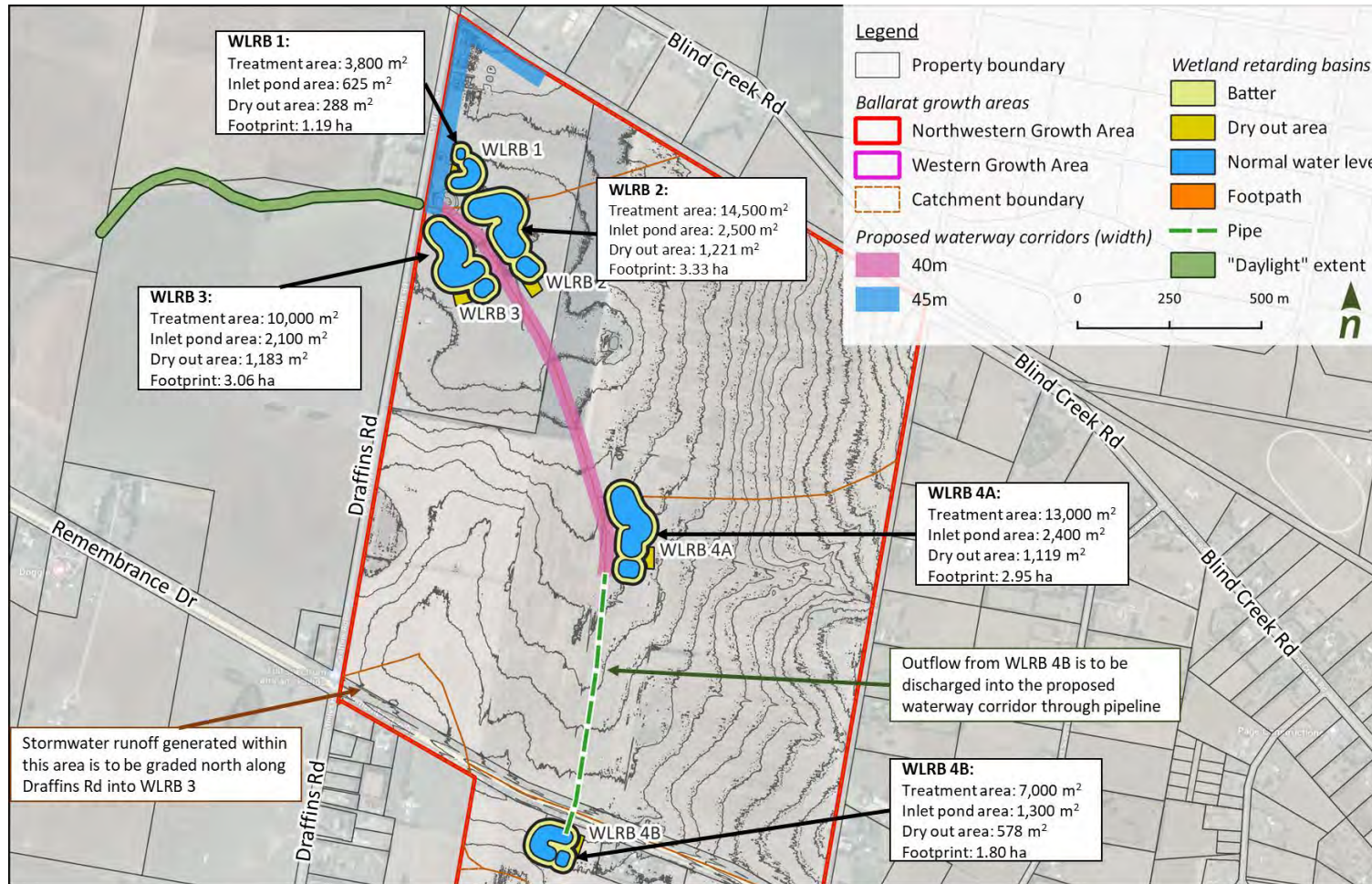


Figure 58. Asset details of WLRB 1 to WLRB 4B

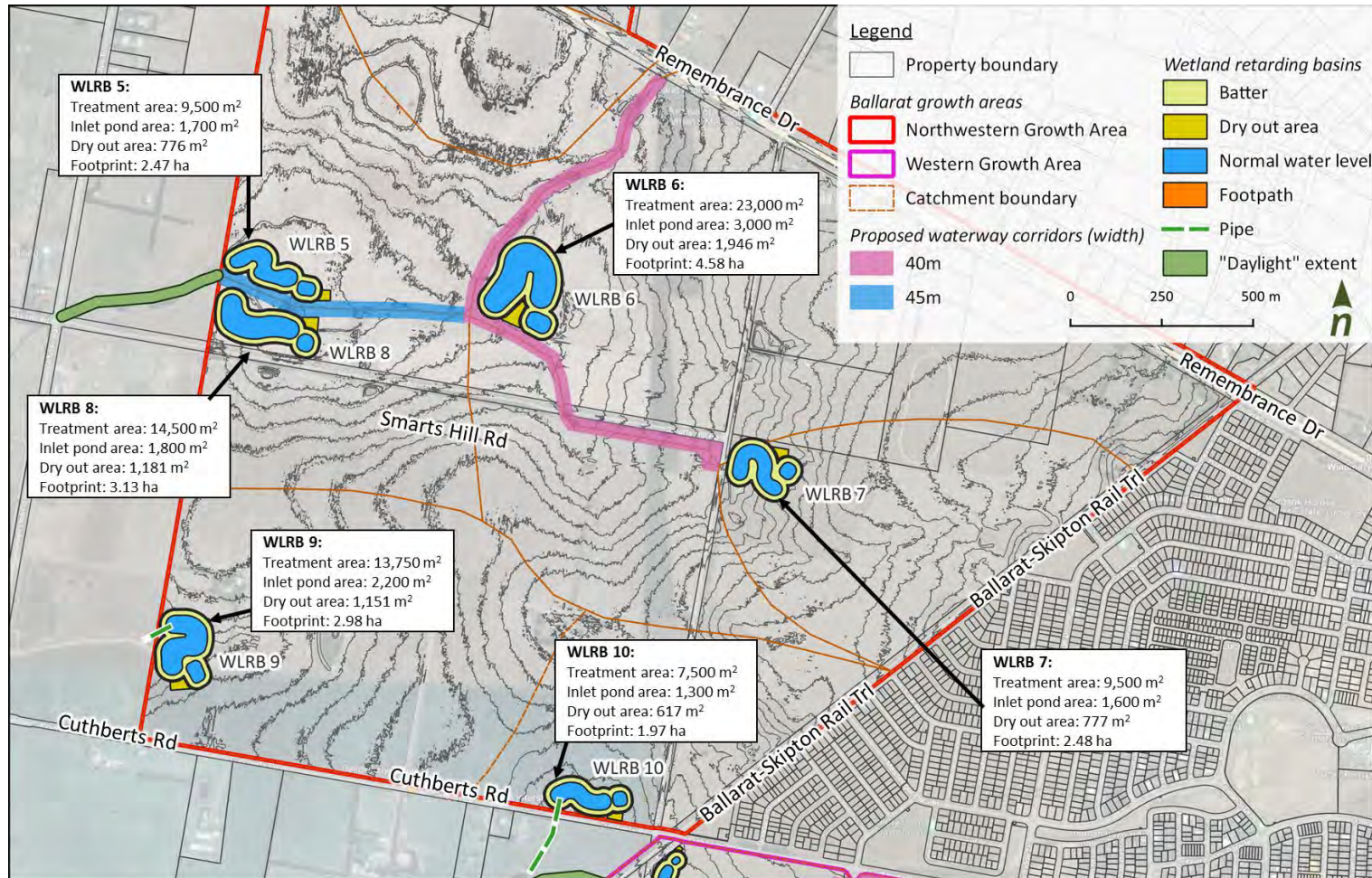


Figure 59. Asset details of WLRB 5 to WLRB 10

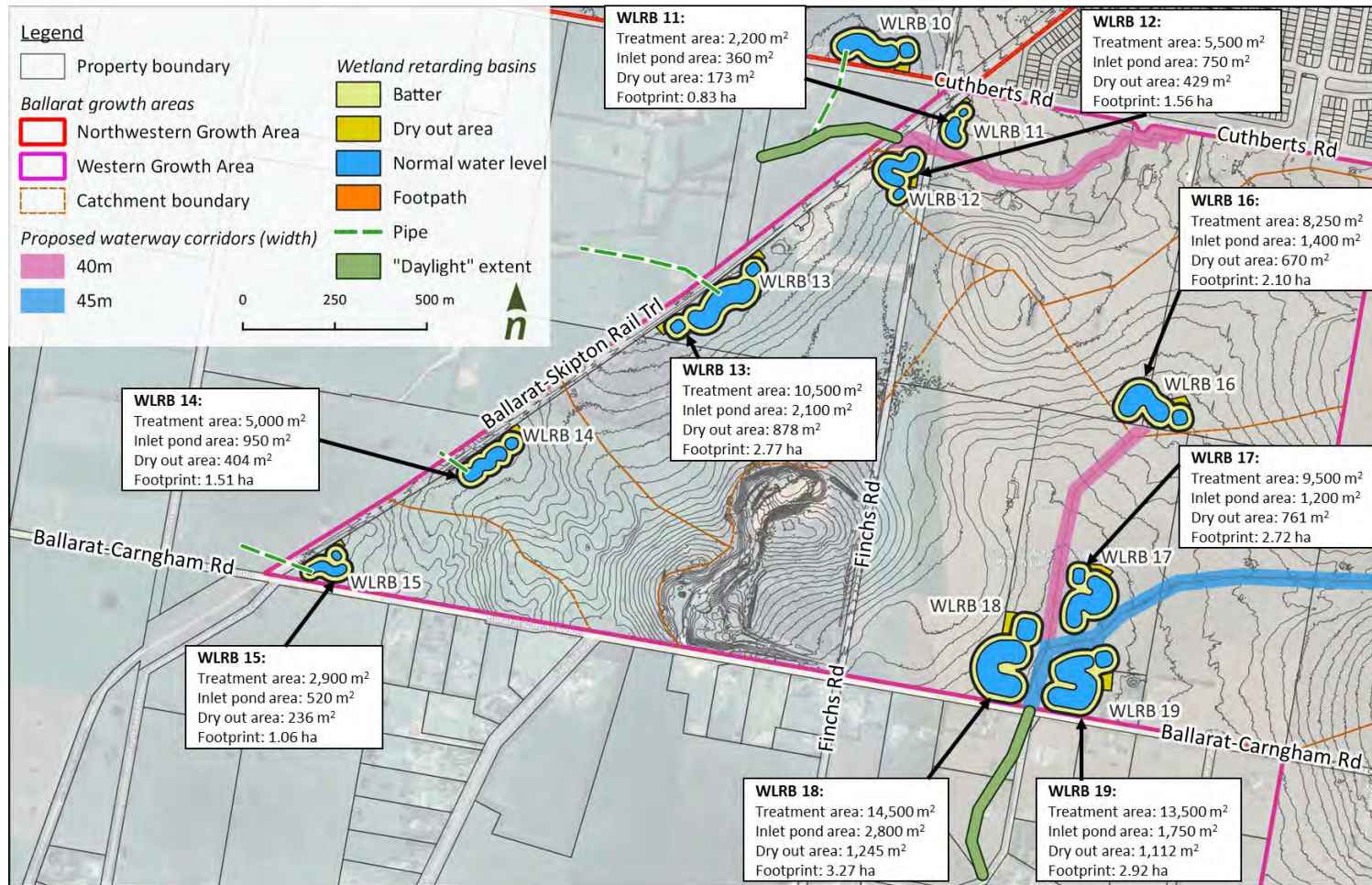


Figure 60. Asset details of WLRB 11 to WLRB 19

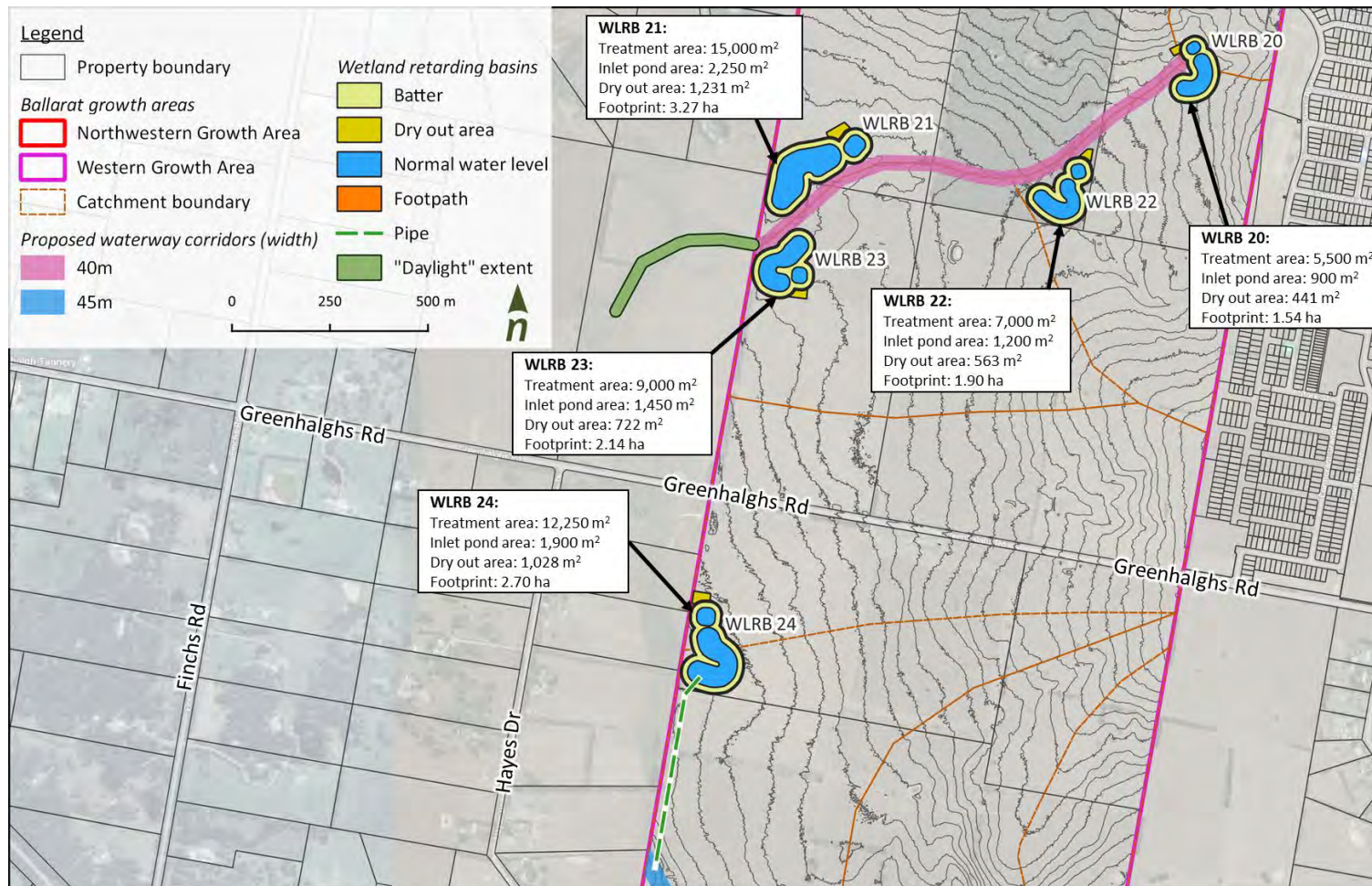


Figure 61. Asset details of WLRB 20 to WLRB 24

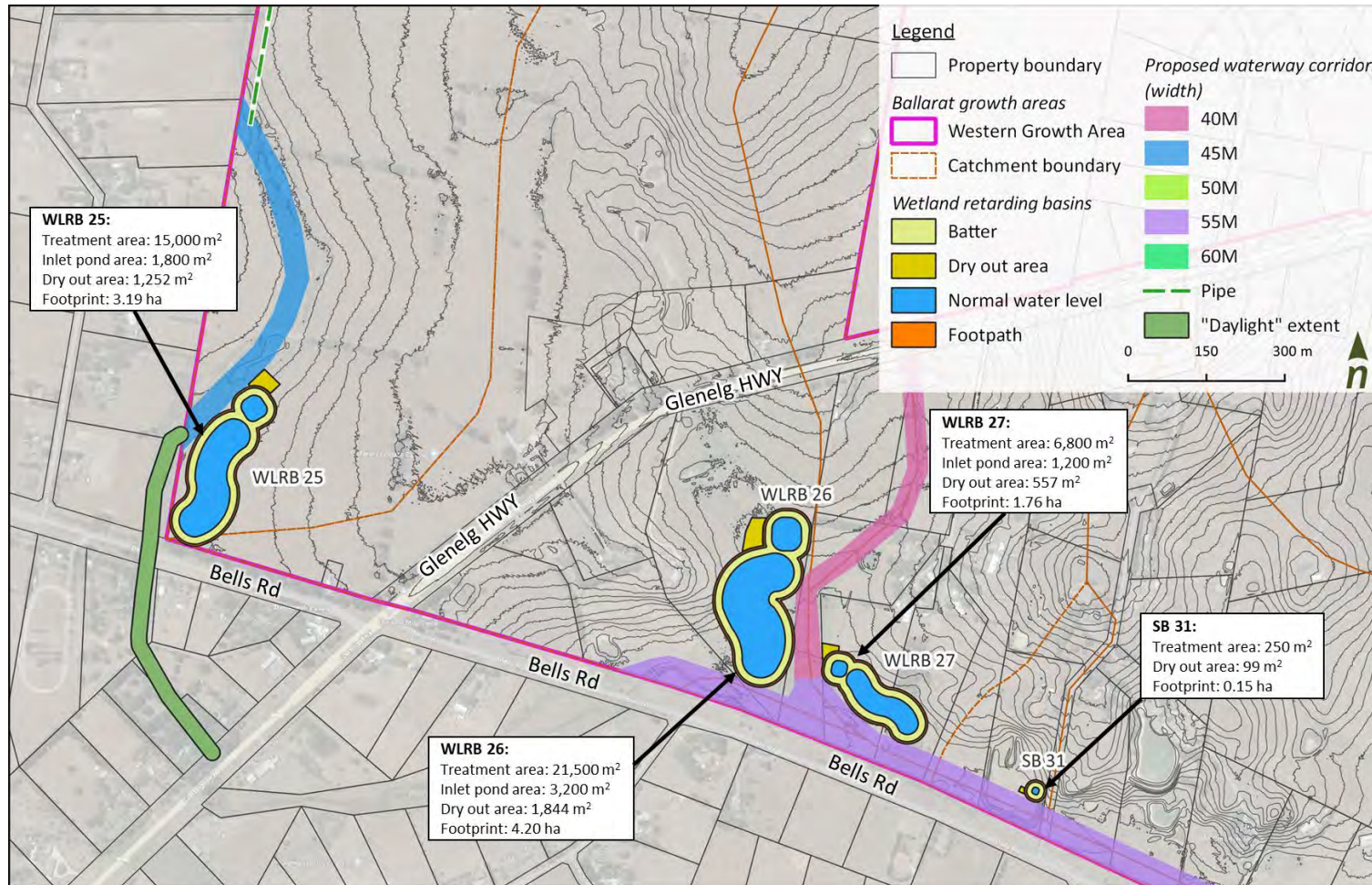


Figure 62. Asset details of WLRB 25 to WLRB 27 (including SB 31)

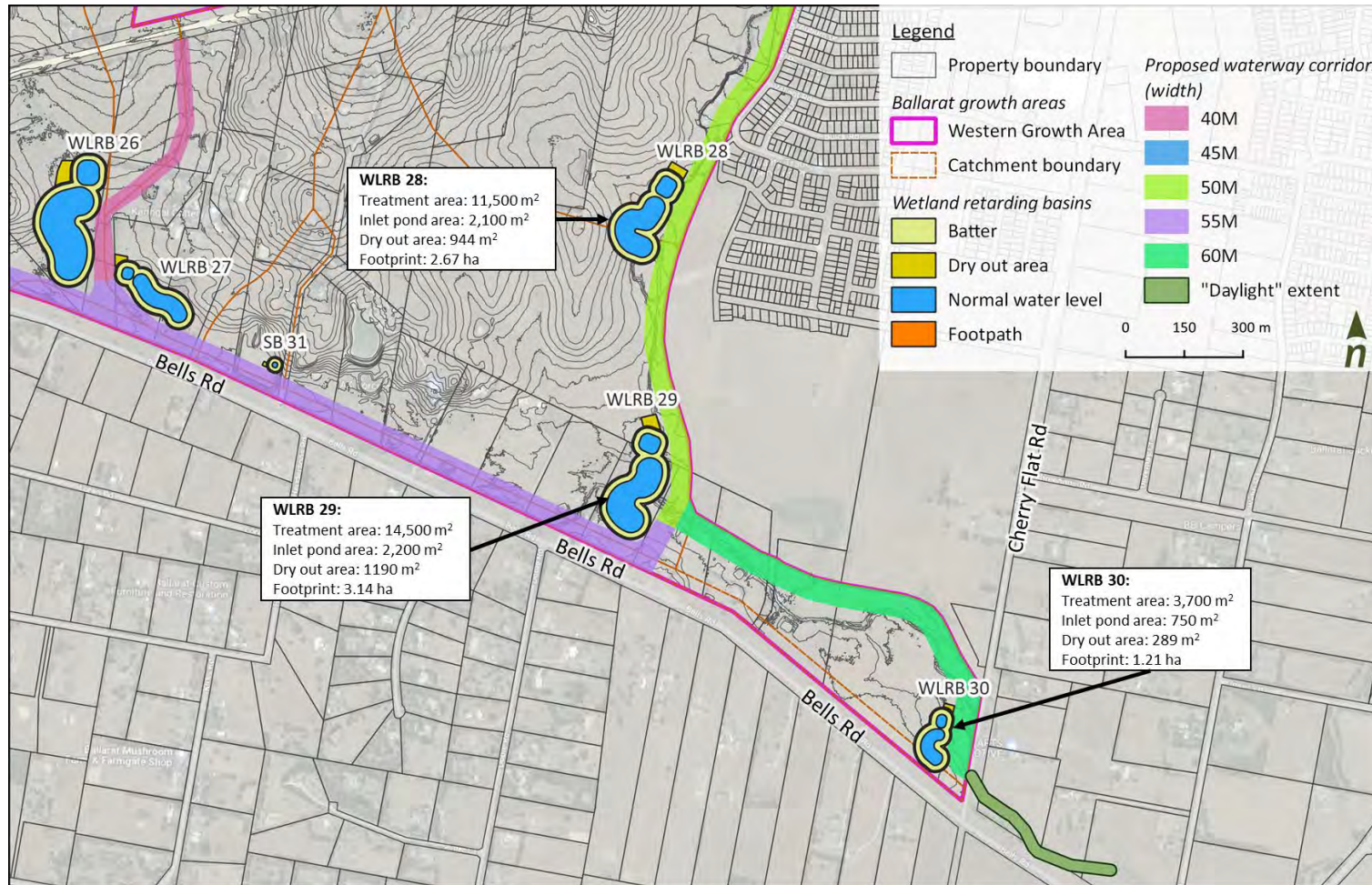


Figure 63. Asset details of WLRB 28 to WLRB 30

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



13 APPENDIX B – INTEGRATED WATER MANAGEMENT



TAYLORS DEVELOPMENT STRATEGISTS

Ballarat West and North West Growth Areas

Integrated Water Management Strategy

March 2024

alluvium



Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Melissa Barton. This piece was commissioned by Alluvium and tells our story of caring for Country, through different forms of waterbodies, from creeklines to coastlines. The artwork depicts people linked by journey lines, sharing stories, understanding and learning to care for Country and the waterways within.

This report has been prepared by Alluvium Consulting Australia Pty Ltd for **Taylors** under the contract titled **'Ballarat West and North West Growth Areas, Integrated Water Management Strategy'**.

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Contents

1	Introduction	1
1.1	<i>IWM and the Water Sensitive Urban Design</i>	2
1.2	<i>Context</i>	3
	Central Highlands Water – Urban Water Strategy (2022)	3
	Central Highlands Strategic Directions Statement (2018 and 2022).....	3
	Central and Gippsland Region Sustainable Water Strategy (2022)	4
	The Environment Protection Act 2017.....	4
	EPA 1739.1 Urban Stormwater Management Guidance (2021).....	4
2	Project context.....	5
2.1	<i>Water cycle assets</i>	5
2.2	<i>Water security</i>	7
2.3	<i>Rainfall</i>	8
2.4	<i>Climate Change.....</i>	8
2.5	<i>Catchment, Waterways and Wetlands.....</i>	9
	Catchments.....	9
	Waterways	10
	Constructed assets	11
2.6	<i>Change in Land Use</i>	12
3	Water and Pollutant Balance	13
3.1	<i>Household Water Consumption.....</i>	13
3.2	<i>Wastewater Generation.....</i>	14
3.3	<i>Open Space Irrigation.....</i>	14
3.4	<i>Stormwater volumes, pollutant loads and reduction targets</i>	15
	Stormwater volume reduction targets.....	16
3.5	<i>Water Balance Summary</i>	17
4	Issues and Opportunities	19
4.1	<i>Issues.....</i>	19
	Available space	19
	Operation and maintenance.....	19
	Community values.....	19
	Feasibility	20
	Future proofing	20
4.2	<i>Opportunities.....</i>	20
4.3	<i>IWM Plan</i>	22
5	Preliminary water balance	26
6	Discussion	28
	Masterplanning with water, greening and amenity in mind	28
	Futureproofing	28
	Engagement and investigation	28

7	References	30
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Figures

Figure 1	<i>Ballarat northwest and west growth areas context map</i>	1
Figure 2.	<i>Urban Water Transitions Framework (Brown, 2009)</i>	2
Figure 3	<i>Greater Central Highlands Strategic Directions Statement outcomes (Source: IWM Forums)</i>	3
Figure 4	<i>Greater Water’s additional water source options</i>	4
Figure 5	<i>Ballarat’s water supply network, showing the connections to reservoirs and townships including Creswick and Ballan (Source: Central Highlands Water)</i>	6
Figure 6	<i>Ballarat’s projected water supply and demand 2022 – 2072 under various climate scenarios (Source: Central Highlands Water)</i>	7
Figure 7	<i>Monthly rainfall pattern of Ballarat Aerodrome station (Bureau of Meteorology)</i>	8
Figure 8	<i>CMA Intersection of developing areas and catchments</i>	9
Figure 9	<i>Designated waterways within the Corangamite CMA region with accompanying photos illustrating typical waterway condition of the Ballarat growth areas</i>	10
Figure 10	<i>Constructed wetlands and waterways as proposed within the Surface Water Management Plan (Alluvium, 2022)</i>	11
Figure 11	<i>Quantitative performance objectives for urban stormwater (Source: EPA Urban Stormwater Management Guidance (2021)</i>	16
Figure 12	<i>Comparison of excess stormwater, irrigation need and stormwater reduction target guidance</i>	26
Figure 13	<i>Constructed wetlands and waterways as proposed within the Surface Water Management Plan (Alluvium, 2022)</i>	27

Tables

Table 1.	<i>Ballarat water efficiency targets (Source: Central Highlands Water, 2018)</i>	13
Table 2.	<i>Potable water demand estimate</i>	13
Table 3.	<i>Assumed irrigation rates</i>	14
Table 4.	<i>Irrigation demand by catchment</i>	14
Table 5.	<i>Pre and post development stormwater volume summary</i>	15
Table 6.	<i>Pre and post development stormwater pollutant summary</i>	15
Table 7.	<i>Stormwater harvesting and infiltration targets</i>	17
Table 8.	<i>Water balance summary (both growth areas)</i>	17
Table 9.	<i>Water balance summary by Growth Area</i>	18
Table 10.	<i>IWM Opportunities in the Ballarat Growth Areas</i>	21
Table 11.	<i>IWM Plan Summary</i>	22

1 Introduction

The City of Ballarat is experiencing rapid growth with predictions that population will grow from approximately 113,000 in 2021 to over 142,000 by 2036 (<https://forecast.id.com.au/ballarat>, Accessed October 2023). On February 23, 2022, the City of Ballarat responded to the need for additional housing by identifying additional land to accommodate future growth within Western and North-Western growth areas. The growth areas were expected to accommodate over 20,000 new houses. While these growth areas will provide housing to accommodate Ballarat's growing population, greenfield developments represent the best and most cost-effective opportunity for implementing Integrated Water Management (IWM) initiatives.

The Ballarat North-Western and Western growth areas (Figure 1) cover a total area of 1,769 ha with an estimated Net Developable Area (NDA) of 1,396 Ha. 96% will be residential with the remainder non-residential.

The **North-Western growth area** has an NDA of 500 Ha and an estimated residential yield of between 7,200 (@ 15 dwellings / Ha) and 9,600 (@ 20 dwellings / Ha). It is located to the west of Ballarat in the areas of Lucas and Cardigan. It is bounded by Draffins Road to the west, the railway line along with Blind Creek Road to the north, Cuthberts Road to the south, and Ballarat-Skipton Rail Trail to the east.

The **Western growth area** has an NDA of 896 Ha and an estimated residential yield of between 12,902 (@ 15 dwellings / Ha) and 17,203 (@ 20 dwellings / Ha). This growth area covers parts of Bunkers Hill, Lucas, and Smythes Creek. It is bounded by Ballarat-Skipton Rail Trail to the west, Cuthberts Road to the north, Bells Road to the south, and Cherry Flat Road to the east.



Figure 1 Ballarat northwest and west growth areas context map

Both growth areas will combine to deliver a lot yield of between 20,102 and 26,803 lots.

This Plan has been prepared to identify opportunities for IWM and to ensure that these are incorporated early in the planning process.



1.1 IWM and the Water Sensitive Urban Design

Since 2017, DEECA (formerly DELWP) has provided support for the planning and implementation of Integrated Water Management (IWM). They define IWM as a “collaborative approach to the way we plan for and manage all elements of the water cycle”. It explores the provision of water, wastewater, and stormwater services to build system resilience while enhancing urban and natural landscapes and assets. Successful IWM projects rely upon the collaboration between water cycle stakeholders like water corporations, catchment management authorities (CMAs), Traditional Owners and local governments.

In considering the aspirations of this plan, it can be useful to understand the meaning of the term ‘water sensitive city’ that has been defined by the Co-operative Research Centre (CRC) for Water Sensitive Cities (<https://watersensitivecities.org.au/>). The water sensitive city can be described as a liveable, resilient, sustainable and productive place where the city:

- Acts as a catchment, providing different water sources, at different scales, for different end uses
- Has a healthy natural environment that delivers ecosystem services with ecological, social and economic benefits
- Has a ‘water sensitive community’ that is informed, knowledgeable and makes wise choices about water. They are engaged in decision making and exhibit positive behaviour (including water conservation).

The development of an IWM Plan and the concept of the water sensitive city are intrinsically linked and an important step toward becoming ‘water sensitive’. This transition toward water sensitivity is described in Figure 2. The Water Supply, Sewered and Drained City illustrate the progress of cities to deliver clean water, safe disposal of sewage and protection of people and property from flood. In more recent times cities like Melbourne and Ballarat have made progress toward becoming ‘Waterways Cities’ by focussing on the protection of their receiving environments like Port Phillip Bay (through the *Port Phillip Bay Environmental Management Plan, 2001*), the Mulawalla Wetland and the Yarrowee River.

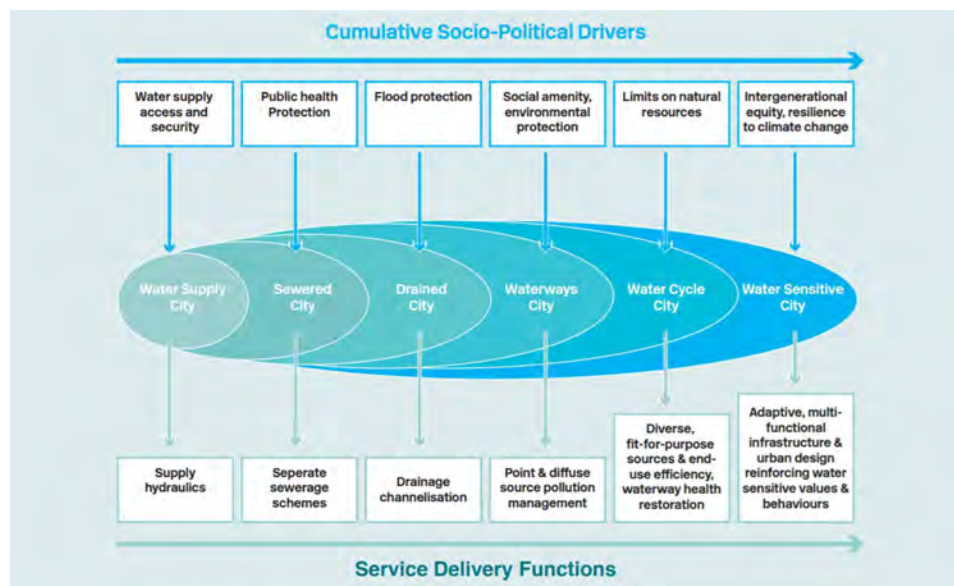


Figure 2. Urban Water Transitions Framework (Brown, 2009)



1.2 Context

The City of Ballarat has a relatively long and successful relationship with IWM planning having prepared the industry leading Ballarat IWM Plan in 2017. IWM practice has evolved since that time, particularly in terms of how it is planned for at a State level. The stakeholders to the 2017 plan continue to be involved in what is now a State wide and State led effort. Some of the key strategic documents that are relevant today are summarised below.

Central Highlands Water – Urban Water Strategy (2022)

The Urban Water Strategy is a planning document that is produced every 5 years by Victoria’s water authorities. It highlights CHW strategic priorities across water, sewerage and recycled water planning as well as highlighting the following priorities that are relevant for this IWM plan:

- Water efficiency through digital metering and education
- Investigating a portfolio of water sources to improve water security and system resilience
- Contributing to State Government initiatives, like the IWM Forum process.

Information pertaining to water, sewerage and recycled water systems has been drawn from the Urban Water Strategy (2022) for inclusion in this document.

Central Highlands Strategic Directions Statement (2018 and 2022)

A critical development in IWM was the formation of Metropolitan and Regional IWM Forums in or about 2018. The Forums were formed by the State Government and provided a space for collaboration between water cycle agencies and the preparation of the Central Highlands Strategic Directions Statement (CHSDS) in 2018. That document has been updated in 2022. The seven outcomes from the 2018 SDS are retained in the 2022 update. These outcomes form the basis of this IWM plan ensuring that, at least at a high level, the outcomes of the growth area and the region are aligned.



Figure 3 Greater Central Highlands Strategic Directions Statement outcomes (Source: IWM Forums)

The 2022 version set out the progress that has been made since 2018 and next steps. Two opportunities that relate directly to Ballarat, and potentially this project include:

- Expanding Ballarat’s Diverse Water Network (noted as being ‘in progress’), and
- Ballarat West Stormwater Harvesting (‘Not started’).

This plan responds to both of these initiatives. Ongoing work is being undertaken in relation to the “Breathing Life into the Yarrowee River: Implementing Priority Actions” project. A masterplan has been completed that importantly focuses on improving the river’s ecology through, at least in part, adopting IWM approaches.

The development of this IWM will look for opportunities to align with these plans and projects.



Central and Gippsland Region Sustainable Water Strategy (2022)

This strategy sets regional scale targets including for 14% of all water used to be ‘manufactured’ (e.g. desalination, recycled water, stormwater or rainwater) by 2030, with this percentage to be increased to 30% by 2040 (Figure 4). This is seen as required to meet projected shortfalls in water supply in future. Relevant to this IWM Plan is *Action 8-6: Investigate the use of recycled water and stormwater for environmental flows in the Yarrowee and Leigh rivers.*

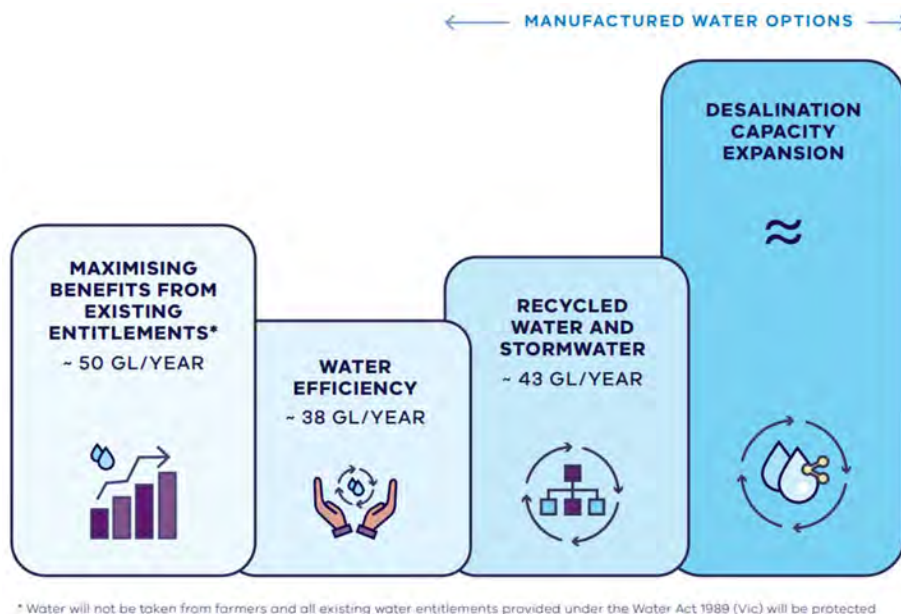


Figure 4 Greater Water’s additional water source options

The Environment Protection Act 2017

The Act gives the Environment Protection Authority “powers and tools to prevent and minimise the risks of harm to human health and the environment from pollution and waste” (<https://www.epa.vic.gov.au/>, Accessed October 2023). The general environmental duty (GED) is at the centre of the Act. The GED specifies that it is the responsibility of individuals and businesses to reduce risks to the environment, including through the production of “runoff to stormwater”.

EPA 1739.1 Urban Stormwater Management Guidance (2021)

This guidance document reinforces the need for managing stormwater to protect waterways. It includes stormwater harvesting and infiltration targets against a range of average annual rainfall bands. The guidance also provides theoretical stormwater management scenarios to meet the volumetric targets. These requirements are in addition to the water quality targets defined under the *Best Practice Environmental Management Guidelines* (BPEM). The guidance outlines Ballarat’s regional targets for stormwater harvesting and infiltration to protect regional waterways based on a rainfall of between 600 and 700mm:

- 29% of excess stormwater to be harvested, and
- 7% of excess stormwater to be infiltrated.

While these targets are not mandatory, they provide a guide as to what targets an IWM plan for new growth areas could aspire to.



2 Project context

The Ballarat North-Western and Western growth areas have a combined area of 1,769 ha. Existing land use is predominantly privately owned farms and open paddocks. While the planned number of dwellings has not been published by the City of Ballarat, indicative lot yields (from Taylors) suggest between 20,102 and 26,803 lots across both growth areas.

2.1 Water cycle assets

Ballarat relies on surface and groundwater from a range of sources (UWS, 2022). These include the following water sources that are also shown schematically in Figure 5. This figure has been included courtesy of Central Highlands Water.

- White Swan Reservoir and connected in-feed storages of Beales, Cosgrave, Gong Gong, Kirks, Moorabool, Newlyn, Pincotts and Wilsons reservoirs
- Lal Lal Reservoir
- Goldfields Superpipe
- Ballarat West bores.

Much of Ballarat's wastewater is treated at the Ballarat South and Ballarat North wastewater treatment plants for release into the Yarrowee River and Burrumbeet Creek systems. Recycled water from Ballarat North is used for maintaining levels in Lake Wendouree and the irrigation of school grounds and open spaces.

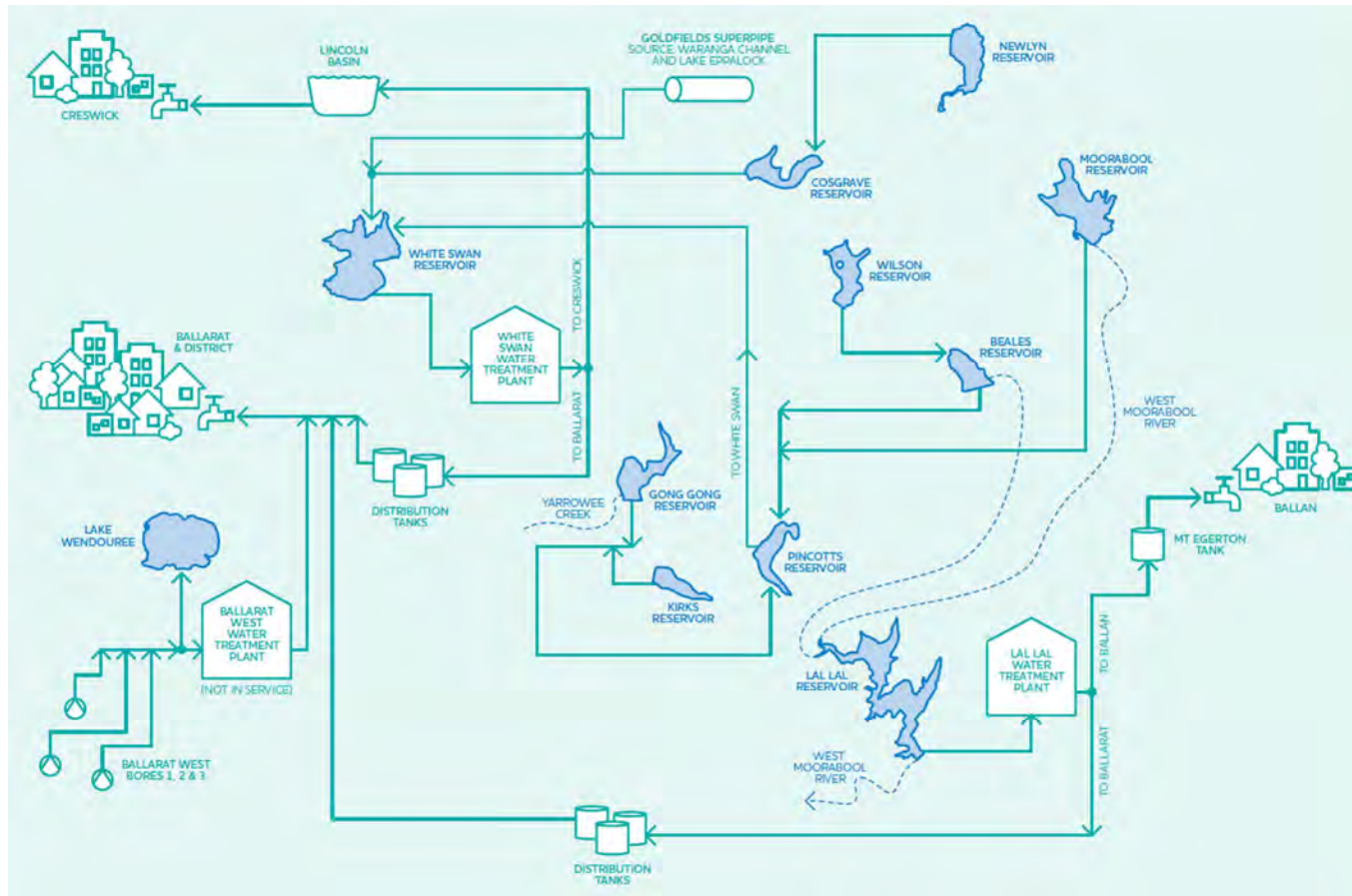


Figure 5 Ballarat's water supply network, showing the connections to reservoirs and townships including Creswick and Ballan (Source: Central Highlands Water)

2.2 Water security

Climate change and population growth are commonly cited as drivers for an IWM approach. Central Highlands Water have produced Figure 6 to illustrate this. It shows demand growing with population and water resource yield decreasing over time under varying climate scenarios. It identifies 2041 as a potential early year for when demand may begin to exceed supply.

This graph highlights the challenge for IWM and the importance that new greenfield developments minimise their impact on water demand and contribute to providing supply options whenever possible.

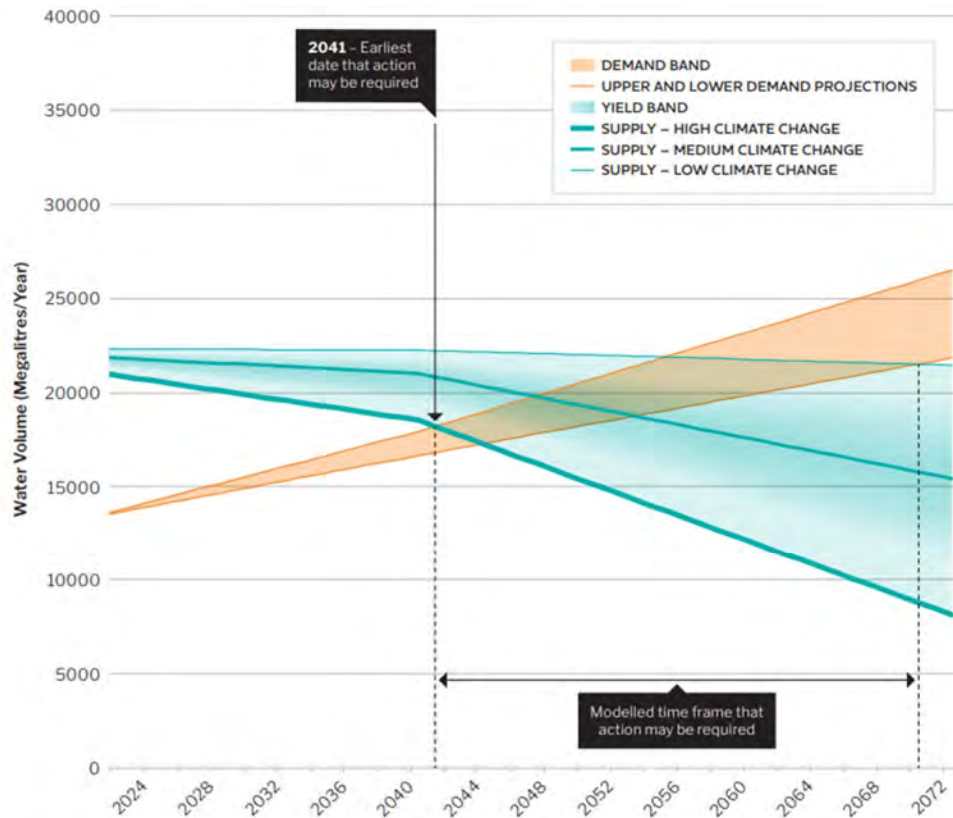


Figure 6 Ballarat’s projected water supply and demand 2022 – 2072 under various climate scenarios (Source: Central Highlands Water)



2.3 Rainfall

Rainfall data has been sourced from the Bureau of Meteorology’s Ballarat Aerodrome station (Site number: 089002) located within the Ballarat Airport. This station reports an annual average rainfall of 686.8 mm and with relatively consistent levels of rainfall over the year, increasing in winter.

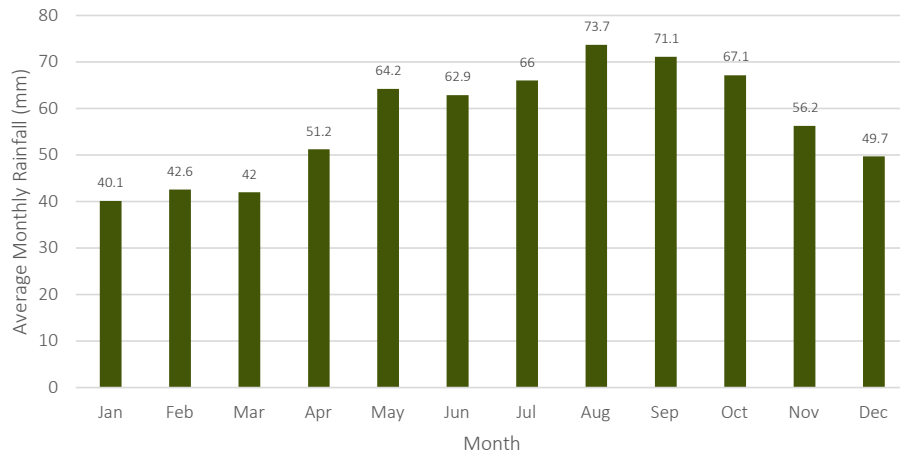


Figure 7 Monthly rainfall pattern of Ballarat Aerodrome station (Bureau of Meteorology)

2.4 Climate Change

The Central Highlands Region, where the City of Ballarat and the growth areas are located, faces a warmer and drier future. Assuming data for the Loddon River Basin, the *Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria (DEWLP, 2020)* predicts that average annual temperatures across the region are projected to rise by 1.3°C to 2.4°C between 2040 and 2065. This may be exacerbated in urban settings due to the urban heat island effect. In addition to temperature rise, the average annual rainfall is predicted to decrease by 2.8 – 5.6 % between 2040 and 2065.

This establishes further drivers to identify non-traditional water sources and to use that water to cool urban centres where possible.



2.5 Catchment, Waterways and Wetlands

Catchments

The two development areas overlap with three catchments and receiving waterways:

1. Outfalls west towards the tributary of Burrumbeet Creek.
2. Outfalls west towards the tributaries of the Woody Yaloak River.
3. Outfalls south-east towards the tributary of the Yarrowee River.

These catchments are managed by two Catchment Management Authorities (CMAs): The Corangamite CMA and the Glenelg Hopkins CMA (Figure 8).

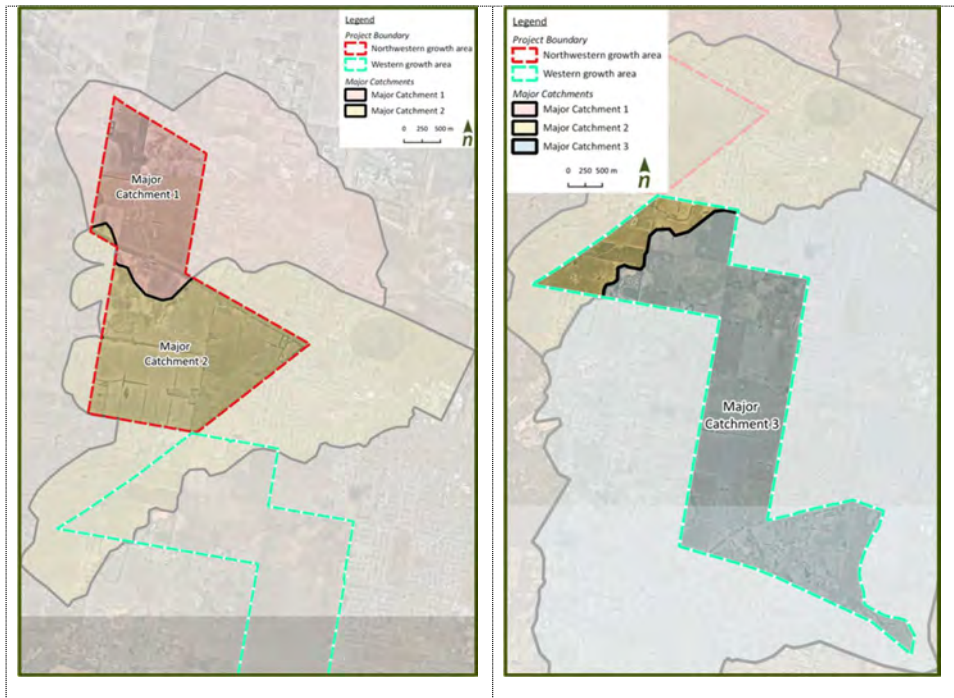


Figure 8 CMA Intersection of developing areas and catchments

Waterways

The Corangamite CMA provided Alluvium with a GIS layer of the designated waterways (Figure 9), while Glenelg Hopkins CMA has not provided information on designated waterways. These waterways have been extensively modified and have low geomorphic value (see Figure 9). In response the City of Ballarat, Corangamite and Glenelg Hopkins CMAs agreed that Melbourne Water’s Waterway Corridor Guidelines will be used to define appropriate waterway corridor widths.

The Yarrowee River is a major waterway that is downstream of the growth areas and is the subject of the SDS priority project: “*Breathing Life into the Yarrowee River: Implementing Priority Actions*” and the resulting masterplan. The Yarrowee runs through the city from the northeast to the south and receives runoff from Ballarat. It is also a critical recreational asset for the people of Ballarat.

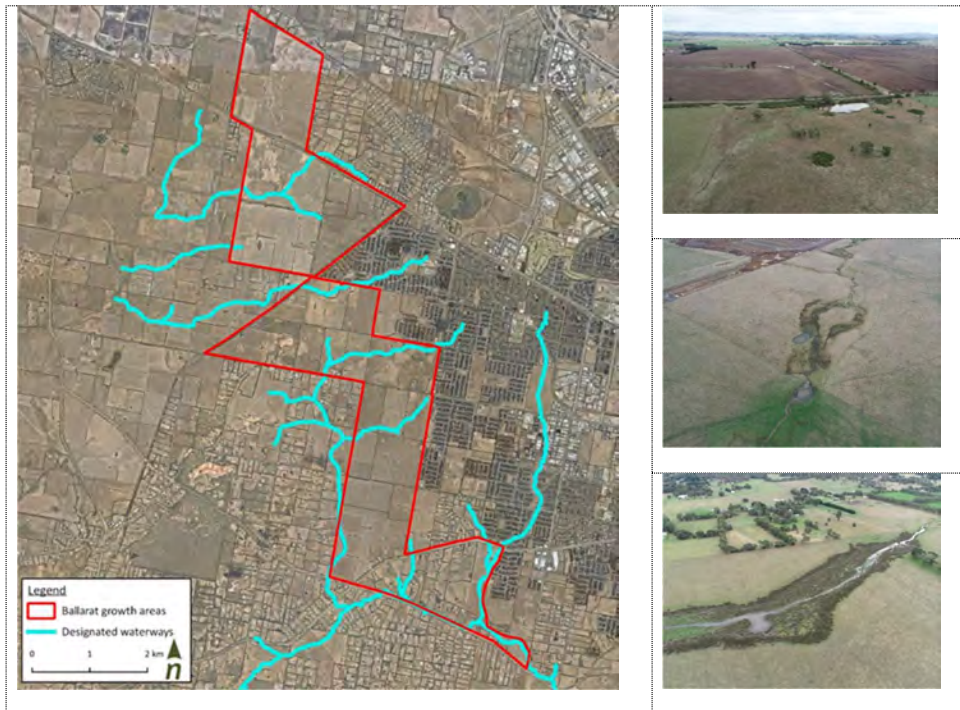


Figure 9 Designated waterways within the Corangamite CMA region with accompanying photos illustrating typical waterway condition of the Ballarat growth areas

Constructed assets

There are only two small, natural wetlands that exist within the development area. The Surface Water Management Strategy (Alluvium, 2022) has identified the need for up to 30 constructed wetlands to treat stormwater along with a number of constructed waterways to convey larger flows. These are important assets from an IWM perspective as wetlands offer a potential source of non-potable water while constructed waterways will be critical natural and community assets into the future.

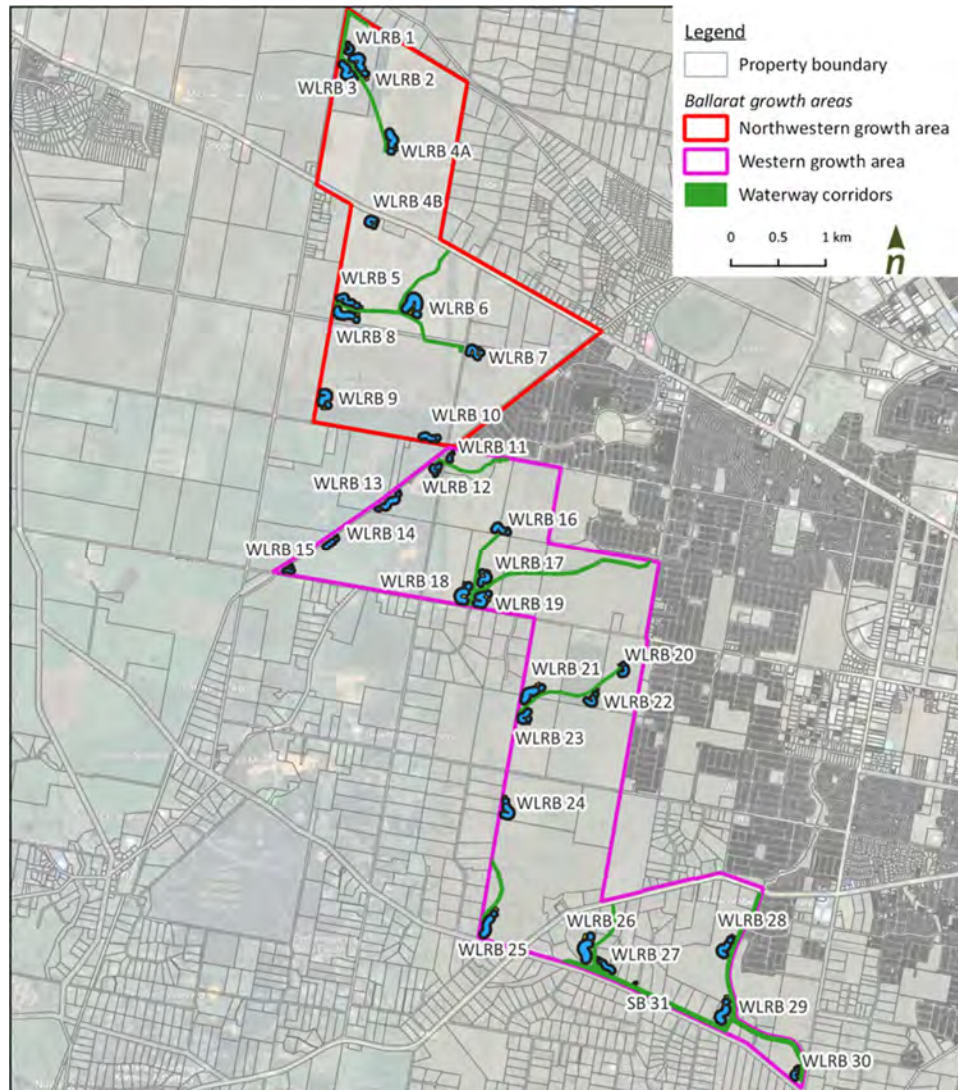


Figure 10 Constructed wetlands and waterways as proposed within the Surface Water Management Plan (Alluvium, 2022)

2.6 Change in Land Use

In addition to climate change and population growth, a key water cycle driver for the adoption of an IWM approach is the volume of poor quality stormwater that is generated during and following development.

Estimating this volume can be undertaken using Model for Urban Stormwater Improvement Conceptualisation, or MUSIC software. Excess stormwater is generated when there is a change on perviousness. That is, when land surfaces like grasslands, pasture or forests are converted into hard surfaces like roads, roofs and pavements creating increased volume of runoff.

Pre development surfaces in these growth areas are estimated to change from an imperviousness fraction of 0.05 that is typical for pastures and farmland, to 0.75 that is typical for residential developments. These fractions have been used in the modelling presented below and are drawn from Melbourne Water's MUSIC Guidelines (2018).

3 Water and Pollutant Balance

The following section sets out estimates for critical elements of the urban water cycle from stormwater and associated pollutants to potable water used and estimates of sewage generated. Given the relatively early stage of planning these are estimates only with all assumptions provided.

The aim of this section is to highlight water cycle risks that present IWM related opportunities.

3.1 Household Water Consumption

Assumptions on potable water demand have been sourced from the Ballarat Potable Water Demand Target (CHW, 2018). It states that there is an existing target water usage of 124 litres per person per day (l/p/day) for residential developments. The guidance provided within the document is designed to achieve this target. While the document doesn't rule out alternatives, it does identify that the target can be achieved through water efficient appliances, fixtures and fittings as well as the connection of a rainwater tank to toilet, laundry and garden (Table 1).

Table 1. Ballarat water efficiency targets (Source: Central Highlands Water, 2018)

Scenario	Water savings (L/person/day)	Net result (L/person/day)	Notes
Base case	-	220	
Water efficiency measures	54	166	Efficient kitchen, toilet and laundry fixtures
Rainwater harvesting (connected to toilet, laundry and garden)	42	124	Assumes a 2kL tank connected to toilet, laundry and garden

For the purpose of estimating future water consumption, two potential development densities have been assumed. For each we have assumed:

- 3 people per lot at densities of 15 lots / Ha, and
- 2.3 people per lot at densities of 20 lots / Ha.

These numbers have been estimated based on [Australian Bureau of Statistics \(2021\)](#) population and density data for new development to the east of the growth areas in question. It can be seen in Table 2 that overall the total consumption estimate is similar, that is, increased lots per Ha is balanced out by a reduced residential population.

For the purposes of ongoing estimates we will assume that water consumption is approximately **2.7 GL/year**.

Table 2. Potable water demand estimate

Scenario	15 Lots / Ha	20 lots / Ha
Total number of lots	20,102	26,803
People per lot	3.0	2.3
Annual consumption (GL/year assuming 124 L/person/day)	2.7	2.8

3.2 Wastewater Generation

Wastewater volumes are not metered and are generally estimated as a percentage of potable water consumed. Sewage volumes typically equate to approximately 80% of potable water use, allowing for consumption and use like irrigation. If we assume 2.7 GL/year of potable water use, then 80% of this, or **2.2 GL/year**, is assumed to be the volume of additional wastewater that can be expected in future.

3.3 Open Space Irrigation

As well as reducing potable water use in the house, reducing the volume of potable water used for the irrigation of open spaces is also important. Given that a Masterplan is not yet available, some general assumptions have been made regarding open space and irrigation water demand, including:

- The Net developable area (NDA) across both development areas is approximately 1,396 Ha
- 10% of the estimated NDA will be some kind of open space (~139.6 Ha)
- Half (or 5% of NDA) of open space will be high water demand sportsfields
- Half (or 5% of NDA) of open space will be lower water demand local parks and reserves.

These assumptions were based on the performance targets for open space within the *Victorian Planning Authority's Precinct Structure Planning Guidelines: New Communities in Victoria (October 2021)*. Irrigation demand was estimate using a range of demand and irrigation assumptions drawn from *Efficient Irrigation: A reference manual for turf and landscape (G Connellan, 2002)*. Two irrigation rates were developed using those assumptions, one for sportsfields and one for local parks and reserves (Table 3).

Table 3. Assumed irrigation rates

Open space type	Irrigation rate (ML/Ha/year)
Sportsfield	7.3
Parks and reserves	3.1

This approach estimated an overall irrigation demand of 732 ML/year across the growth areas. Irrigation demand by catchment is summarised in Table 4 below.

Table 4. Irrigation demand by catchment

Catchment	Open space water demand (ML/year)		Sub-Total (ML/year)
	Sportsfield	Parks and Reserves	
1	82	35	117
2	164	70	234
3	266	114	380
		Total	732

3.4 Stormwater volumes, pollutant loads and reduction targets

The pre and post development stormwater volumes were estimated using MUSIC with the results summarised in Table 5. Given similar land use change assumptions were applied to each catchment, there is an estimated 166% increase in stormwater volume across each catchment.

Table 5. Pre and post development stormwater volume summary

Catchment	Total Area (Ha)	Stormwater flows (ML / average year)		Excess stormwater (ML/year)	Excess stormwater (Average %)
		Pre development	Post development		
1	223	390	1040	650	
2	447	760	2020	1260	
3	726	1240	3290	2050	
Total	1,396	2390	6350	3960	166%

Similarly, the estimated increase in stormwater pollutant loads is relatively consistent across catchments as the land uses and assumptions are similar. Therefore the average increase in pollutants is summarised in Table 6.

Table 6. Pre and post development stormwater pollutant summary

Catchment	TN			TP			TSS		
	Pre	Post	Change (%)	Pre	Post	Change (%)	Pre	Post	Change (%)
1	946	1700	80	100	145	45	32,200	44200	37
2	1850	3320	79	195	280	44	63300	87800	39
3	3010	5440	81	319	456	43	103000	140000	36
Average increase (%)			80%			44%			37%

Stormwater volume reduction targets

As noted in Section 1.2 above, the *EPA 1739.1 Urban Stormwater Management Guidance (2021)* identifies stormwater harvesting and infiltration targets for areas within similar rainfall bands. The aim of the stormwater reduction target set out within the EPA guidance, is to reduce the impact of stormwater on waterway health both in terms of water quality but also the erosion and degradation of the waterways physical values. For this plan, that rainfall band for Ballarat is between 600 and 700 mm per year and this requires:

- 29% of excess stormwater to be harvested, and
- 7% of excess stormwater to be infiltrated.

Priority areas have been identified within Melbourne’s Metropolitan Area; however these targets do not apply to regional Victoria.

Indicator	Performance objective				
Suspended solids	80% reduction in mean annual load (Note:1)				
Total phosphorus	45% reduction in mean annual load (Note:1)				
Total nitrogen	45% reduction in mean annual load (Note:1)				
Litter	70% reduction of mean annual load				
Flow (water volume)		Priority areas (Notes 2, 4, 5, 6)		Other areas (Notes 3, 4, 5, 6)	
	rainfall band (ml)	Harvest/evapotranspire (% mean annual impervious run-off)	Infiltrate/filter (% mean annual impervious run-off)	Harvest/evapotranspire (% mean annual impervious run-off)	Infiltrate/filter (% mean annual impervious run-off)
	200	93	0	37	0
	300	88	0	35	0
	400	83	0	33	0
	500	77	5	31	4
	600	72	9	29	7
	700	68	11	27	9
	800	64	14	26	11
	900	60	16	24	13
	1000	56	18	22	14
	1100	53	19	21	15
	1200	50	21	20	17
	1300	48	22	19	18
	1400	46	23	18	18
1500	44	25	18	20	
1600	42	26	17	21	
1700	40	27	16	22	
1800	38	28	15	22	

Figure 11 Quantitative performance objectives for urban stormwater (Source: EPA Urban Stormwater Management Guidance (2021))

Taking these targets, and the estimated flows presented in Table 5, the notional stormwater harvesting and infiltration targets are presented in Table 7. It shows a notional target of 1,148 ML/year of harvesting and 277 ML/year for infiltration.

Table 7. Stormwater harvesting and infiltration targets

Catchment	Excess stormwater (ML/year)	Flow Reduction Target	Infiltration Reduction Target	Stormwater Harvesting Target Volume (ML/year)	Infiltration Target Volume (ML/year)
1	650			188	45
2	1,260	29%	7%	365	88
3	2,050			594	143
Total	3,960			1,148	277

3.5 Water Balance Summary

As illustrated above, urban development will introduce significant changes to the hydrology and water balance of the Western and North-Western growth areas. The key outcomes of this are collated in Table 8. The implications of these changes include:

- Significant increase in potable water demand in future
- The risk that demand (across Ballarat) exceeds supply in the foreseeable future
- Greater wastewater flows to be treated, reused and discharged, and
- Stormwater volumes and associated pollutants that will impact the health of downstream waterways and environments.

Table 8. Water balance summary (both growth areas)

Water cycle element	Pre development	Post development	Change
Potable water demand (ML/year)	-		
• Household		2,840	+2,840
• Irrigation		732	+732
Wastewater generated (ML/year)	-	2,270	+2,270
Stormwater generated (ML/year)	2,390	6,350	+3,960

The table below breaks up each aspect of the water cycle in terms of development area. The breakdown is based on the proportion of developable area within each.

Table 9. Water balance summary by Growth Area

Water cycle element	North-Western growth area	Western growth area
Net developable area	500	896
Residential yield	7,200 – 9,600	12,902 - 17,203
Household potable water demand (ML/year)	1,017	1,823
Irrigation potable water demand (ML/year)	262	470
Wastewater generated (ML/year)	814	1,458
Stormwater generated (ML/year)	2,274	4,076

4 Issues and Opportunities

The IWM Issues and Opportunities identified in this chapter were sourced from the Central Highlands SDS, a workshop with stakeholders on the 5th of October 2023 and previous IWM projects undertaken within the Central Highlands Region.

Given the relatively early stages of planning for the North and North Western Growth areas, the issues and opportunities presented below range from location specific to strategic in nature. They may also build off opportunities that have been identified by Central Highlands Water, the City of Ballarat and the IWM Forum. Some opportunities, such as potable water use reduction targets and smart meters, are planned for and are assumed to be rolled out in future. They are still included here to ensure they are considered along with other IWM opportunities.

Given the early stages of planning for these development areas, preparing this plan now, allows sufficient time for IWM opportunities to be reviewed and investigated further to ultimately gain stakeholder support.

4.1 Issues

There are issues that are driving an IWM approach such as population growth, climate change, water supply reliability and the urban heat island effect. There are also issues for IWM planning and implementation. The following provides a brief summary of these issues that will need to be addressed as IWM opportunities are progressed.

Available space

Adequate space is necessary across all scales - lot, street and precinct - to accommodate IWM related assets. It is important that this be considered early in the planning process and that needs are translated to the masterplan. Examples include:

- On-lot to accommodate assets like rainwater tanks.
- Streetscape widths to accommodate greening and canopy cover initiatives e.g. passive irrigation.
- Open spaces need to accommodate tanks or treatment infrastructure prior to irrigation. Note that an AFL sized oval would typically require 100 kL onsite storage. Council is also aware that aesthetically, it is undesirable to have tanks on every open space.
- In the event that a stormwater network is planned for, then alignments and easements for pipelines will also be required as well as space for pump stations near wetland outlets.

Operation and maintenance

Responsibility and cost of operation and maintenance is a common issue for all scales of IWM intervention. As this IWM plan progresses minimising the maintenance burden will be critical e.g.:

- Low maintenance passive irrigation assets
- Smart networks for things like networked rainwater and stormwater harvesting schemes to improve operability and support feasibility
- Collaboration with IWM partners like Central Highlands Water, to understand the technical requirements associated with stormwater harvesting including for a 'regional' scheme where more than one wetland is networked, and
- Planning streetscapes from the start to maximise passive heating and cooling benefits e.g. ensuring suitable orientation.

Community values

Further engagement with the traditional owners of the land, the Wadawurrung People, will be required to better understand the cultural and environmental values that some of the opportunities below are seeking to support (e.g. Mulawalla Wetland management plan). Engagement has not been undertaken at this time for this plan.

Feasibility

While cost and cost sharing is always an IWM implementation issue some factors will need to be investigated further as this IWM plan evolves and greater development detail is available:

- Construction of IWM assets ‘with development’ as opposed to ‘retrofitting’: while there are many cost uncertainties, avoiding retrofitting is a logical way to reduce cost and improve feasibility.
- Previous work has informed how schemes can be feasible through optimal location and co-location of assets. For example, Central Highlands Water suggest that the upper limit of distance between a stormwater harvesting wetland and an open space is 800m. This should be incorporated into planning and is a limit that is referenced in the opportunities section below.








Future proofing

Given the long lead times and development timeframes, technologies like smart meters and smart networks will be critical to improving the viability of IWM systems like the stormwater harvesting network suggested below, or using lot scale rainwater tanks as smart tanks that can control outflow and provide catchment wide storage volumes.

4.2 Opportunities

The IWM opportunities that have been identified are organised according to SDS Outcome and scale (i.e. lot, street and catchment) below.

Table 10. IWM Opportunities in the Ballarat Growth Areas

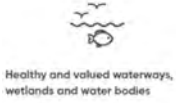
	 Safe, secure and affordable supplies in an uncertain future	 Effective and affordable wastewater systems	 Avoided or minimised existing and future flood risks	 Healthy and valued waterways, wetlands and water bodies	 Healthy and valued landscapes	 Community values reflected in place-based planning	 Jobs, economic benefits and innovation
Lot							
<p>40% reduction in household potable water use (via rainwater tank, efficient appliances etc)</p> <p>Smart meters on lot</p> <p>Lot scale rainwater harvesting and as a source of water for a managed aquifer recharge scheme over time</p> <p>Large roof harvesting schemes (either to MAR or nearby demand)</p>							
Street							
<p>Streets that do not form part of the overland flow path network will need to be resilient to flooding</p> <p>WSUD in areas of high imperviousness to treat stormwater, increase infiltration, mitigate urban heat and place making e.g. car parks, industrial and commercial areas</p> <p>Passive irrigation of street trees using stormwater. Preference for low maintenance options e.g. kerb cuts or similar</p> <p>Climate resilience of canopy trees and habitat vegetation (e.g. along constructed waterways)</p> <p>Habitat suitability of street trees</p> <p>Wider street reserves to accommodate streetscape IWM and WSUD</p> <p>Orientation of dwellings to maximise passive heating / cooling</p> <p>Maximise connectivity of communities to natural spaces / Orientation of households toward natural assets</p> <p>Consideration of wider road widths along key commuter boulevards to accommodate WSUD and passive irrigation assets.</p>							
Catchment							
<p>Co-locate commercial and activity centres, open spaces with wetlands to support irrigation and other end uses. 800m is estimated as a theoretical limit</p> <p>Consider groundwater top up for open space irrigation to increase reliability</p> <p>Regional stormwater harvesting scheme is an idea that can be discussed further / Smart technologies will be critical to efficiency of a networked stormwater scheme</p> <p>Additional 2.2 GL/year of wastewater that could add to existing non-potable water supply resource (e.g. for agricultural and/or commercial activities in surrounding areas.</p> <p>Co-location of retarding basins and wetlands, as per surface water management strategy (<i>Assumed to be completed as part of the Surface Water Management Strategy</i>)</p> <p>Development wide imperviousness targets (see Sydney Water for precedent). For example reducing from typical residential of 0.75 to 0.6.</p> <p>Leaky wetlands to meet infiltration targets. A confined aquifer means leaky wetlands would not impact groundwater quality.</p> <p>Understanding of groundwater dependent ecosystems and how (leaky) wetlands can complement and support these</p> <p>Mulawalla Wetland management plan (Winter Swamp) maintaining cultural and environmental values</p> <p>Align passive irrigation to Urban Forest Strategy target of 40% canopy cover in public realm</p> <p>Ecological corridors along constructed waterway corridors with plantings and approach aligning to biodiversity objectives for the region</p> <p>Investigate supplying farms to the west with excess treated stormwater</p>							


4.3 IWM Plan


The section above identifies a range of issues and opportunities that are common when trying to implement IWM in greenfield environments. The following table and plan includes proposed actions to address common issues implementing IWM as well as realising opportunities that IWM in greenfield developments present.

Table 11. IWM Plan Summary

Outcome	Issue or opportunity	Proposed action	Comment / Next steps	
 <p>Safe, secure and affordable supplies in an uncertain future</p>	Water efficiency: 40% reduction in household potable water use to meet 124 L/person/day	No action - Assumed to be a CHW requirement for new development	Require water efficient appliances and rainwater tanks to meet this target, unless an alternative approach is proposed	
	Non-potable water sources	Rainwater harvesting: on lot and as a source of water for a managed aquifer recharge scheme		Continue investigations into the viability of rainwater to MAR e.g. residential and commercial roofs in the West and North West Growth areas as part of the rainwater to MAR scheme.
		Stormwater harvesting investigations: <ul style="list-style-type: none"> Align with Ballarat West Stormwater Harvesting (SDS Action). Investigate regional stormwater harvesting scheme feasibility. Smart technologies to be considered as part of the scheme to optimise performance. Investigate additional potential demand for treated stormwater including surrounding agricultural or commercial areas. 		There is an excess of approximately 1,148 ML/year of stormwater. Figure 12 (below) illustrates a maximum of 732 ML/year of potential irrigation demand within the growth areas. An external demand will be critical to utilising excess stormwater and reducing impacts on waterways. CHW could engage with Melbourne Water to gather learnings from the Sunbury and Melton Growth Area regional stormwater harvesting schemes.
		Recycled water: incorporate additional flows into future recycled water planning, including for potential demands from surrounding agricultural or commercial areas.		An additional 2.2 GL/year is ultimately expected to be generated.
		Instal smart meters on all lots	No action - Assumed to be rolled out as per current CHW policy	
Co-locate commercial and activity centres, open spaces with wetlands to support irrigation and other end uses.	As part of Masterplanning, ensure that water demand nodes like open spaces are proximate to potential non-potable water sources like stormwater wetlands		Identify larger open spaces and ensure these and other non-potable demand nodes are well within the 800m theoretical distance limit between source and demand. Propose 400m or similar as a maximum distance.	

Outcome	Issue or opportunity	Proposed action	Comment / Next steps
	<p>WSUD in areas of high imperviousness to treat stormwater, increase infiltration, mitigate urban heat and place making e.g. car parks, industrial and commercial areas</p>	<p>As part of Masterplanning, identify areas with high areas of imperviousness (e.g. > 80%). Consider applying a concentrated WSUD approach that includes biofiltration, passively irrigated canopy cover and 'ground level' greening through WSUD</p>	<p>This is to address stormwater quality, increase infiltration as well as urban heat and amenity issues in car parks, industrial and commercial areas etc</p>
	<p>Development wide imperviousness targets</p>	<p>Consider reducing imperviousness across the development as part of Masterplanning For example reducing from typical residential of 0.75 to 0.6.</p>	<p>Reduced imperviousness targets have been adopted by Sydney Water in the Western Growth Areas of Sydney. This may fundamentally change the approach and requirements for surface water management.</p>
	<p>Leaky wetlands to meet infiltration targets.</p>	<p>As part of wetland design, investigate the potential for stormwater treatment wetlands to have a leaky base to contribute to infiltration Consider also the potential to reduce costs through changed material and construction requirements.</p>	<p>The confined aquifer means that leaky wetlands are unlikely to impact groundwater quality As part of this work, consider the impact of leaky wetlands on groundwater dependent ecosystems</p>

Outcome	Issue or opportunity	Proposed action	Comment / Next steps
	<p>Passive irrigation of street trees using stormwater</p>	<p>Passive irrigation to support trees to meet canopy cover targets</p>	<p>There is a preference for low maintenance passive irrigation options e.g. kerb cuts or similar</p>
	<p>Align passive irrigation to Urban Forest Strategy target of 40% canopy cover in public realm</p>	<p>Identify main boulevards and passive transport routes to design enhanced canopy cover or 'shadeways'</p>	<p>Examples of shadeways are available having been designed in Melbourne Metropolitan greenfield developments</p>
	<p>Climate resilience of canopy trees and habitat vegetation (e.g. along constructed waterways)</p>	<p>Ensure that species selected for street trees and vegetation within open space is</p> <ul style="list-style-type: none"> Resilient to the effects of climate change Consistent with broader habitat and biodiversity goals 	<p>Habitat suitability of street trees</p>
	<p>Mulawalla Wetland management plan (Winter Swamp) maintaining cultural and environmental values</p>	<p>Undertake an ecohydrology assessment of the Mulawalla Wetland (Winter Swamp) to understand the impact of development on cultural and environmental values</p>	<p>Ensure that analysis provides options or recommendations for maintaining values and/or mitigating the impacts of development</p>
	<p>Ecological corridors along constructed waterway corridors with plantings and approach aligning to biodiversity objectives for the region</p>	<p>Related to canopy trees action above, ensure that plantings around wetlands and along waterway corridors are consistent with broader biodiversity and ecological objectives</p>	

Outcome	Issue or opportunity	Proposed action	Comment / Next steps
 <p>Community values reflected in place-based planning</p>	<p>Orientation of dwellings to maximise passive heating / cooling</p> <p>Maximise connectivity of communities to natural spaces / Orientation of households toward natural assets</p> <p>Co-locate commercial and activity centres, open spaces with wetlands to support irrigation and other end uses</p>	<p>The masterplan needs to support IWM objectives through</p> <ul style="list-style-type: none"> <li>• Co-location of wetlands and open spaces <li>• Alignment of streetscapes (to minimise energy needs), and <li>• Connection of residences to natural areas. 	<p>Input to the masterplanning process from an IWM perspective to make sure that these opportunities are not eliminated.</p>
	<p>Consideration of wider road widths along key commuter boulevards to accommodate WSUD and passive irrigation assets.</p>	<p>Related to the above, introduce wider road widths along key boulevards and 'shadeways' to accommodate necessary assets and infrastructure e.g. passive irrigation, streetscape WSUD etc</p>	

5 Preliminary water balance

Taking into account a number of the items discussed above, a small number of scenarios have been modelled to offer a preliminary understanding of the relationship between some factors that will influence water supply and demand in the future development.

Figure 12 provides a comparison between the estimated volume of excess stormwater that will be generated within each catchment, compared to the stormwater volume reduction target guidance and estimated irrigation need. In brief, the excess in stormwater generated is significant when compared to both the target and irrigation need. Further, even if all open space was irrigated with stormwater, this may not meet the EPA's stormwater volume reduction target.

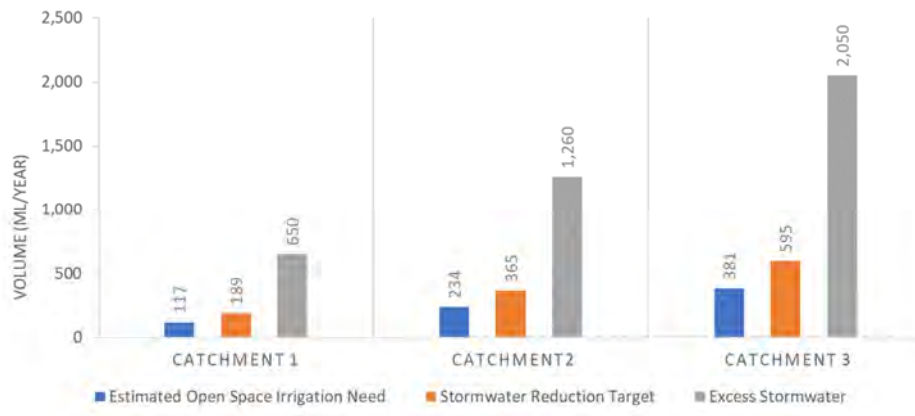


Figure 12 Comparison of excess stormwater, irrigation need and stormwater reduction target guidance

By considering residential use of rainwater tanks we can estimate their impact on potable water use and the volume of excess stormwater. Figure 13 below shows that harvesting rainwater (assuming a 2kL tank connected to toilet, laundry and garden) can yield over 900 ML of water per year. This is based on the assumption that rainwater tanks save 42 L/person/day (Central Highlands Water, 2018). For the purposes of the graph below it is assumed that there are 20,102 lots and 3 people per lot. When combined with open space irrigation, the stormwater targets can conceivably be met.

While we reiterate that the stormwater volume targets are not mandatory, they are used here as a guide to the volume of stormwater that should or could be harvested and reused to protect downstream waterways. With this target as a guide, it can inspire creative thinking regarding opportunities to achieve that target, such as a networked stormwater harvesting scheme, or supplying nearby agricultural operations.

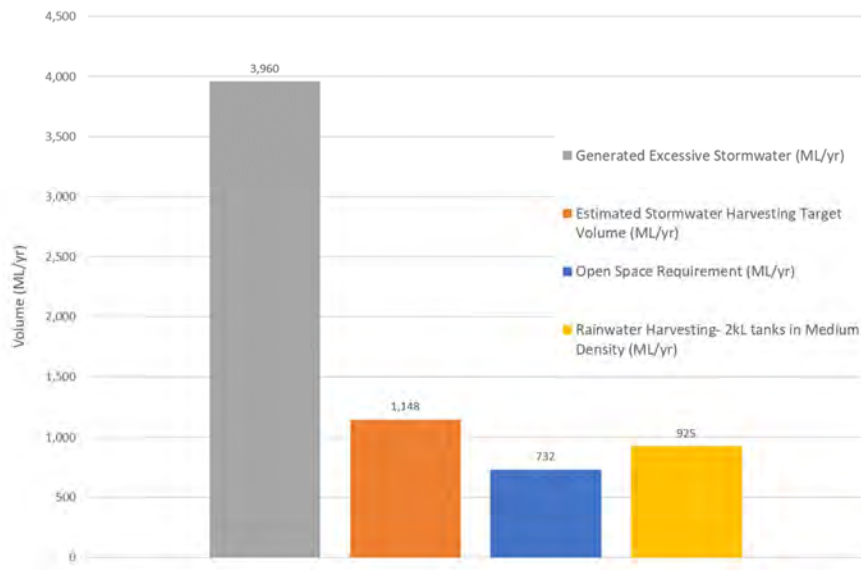


Figure 13 *Constructed wetlands and waterways as proposed within the Surface Water Management Plan (Alluvium, 2022)*

6 Discussion

The IWM plan set out above is pitched at a relatively strategic level, reflecting the early stage of planning for the growth areas and the absence of a detailed masterplan. As such, the plan primarily responds to issues and opportunities that have been identified through literature review, water balance analysis and engagement with water cycle stakeholders. Engagement with the traditional owners has not been undertaken during the preparation of this IWM Plan and should be as the plan progresses. Given the likely timing to development, the Northern Ballarat PSP is planned to be gazetted by mid-2026, there is an opportunity to plan the development to give the best opportunity for feasible IWM initiatives to be implemented.

In summarising how this IWM plan can contribute to and influence future masterplanning, the following more general statements regarding IWM actions are offered below:

Masterplanning with water, greening and amenity in mind

There are many aspects to this including:

- Co-locating water sources and nodes of water demand wherever possible. Locations for water demanding assets or facilities can be located according to where larger wetlands are thereby reducing conveyance distances and also improving the potential reliability of supply.
- Identifying green boulevards and spaces and designing street widths that can accommodate greening infrastructure.
- Using waterways as ecological corridors that incorporate climate resilient vegetation and specifically designed species habitat. This should align with other City of Ballarat biodiversity (or similar) strategies.
- Identifying large areas of impermeability across the development that will have potential high urban heat and applying greening to cool and WSUD to increase infiltration of stormwater.
- As part of future investigations consider the need for Growling Grass Frog (GGF) habitat and the potential to co-locate GGF habitat and treatment wetlands along the drainage reserve network.

Futureproofing

Applying smart technologies to IWM assets is yet to be fully realised in practice. These growth areas, noting their large area and time to development, hold excellent opportunities to apply smart technologies at a range of scales including:

- Smart metering on individual houses
- Smart control of lot scale rainwater tanks to provide co-ordinated and distributed storage across the growth areas (between 20, 102 and 26,803 lots with 2kL tanks equates to between 40 and 53 ML of storage)
- Smart management of wetlands including water levels, if two or more wetlands are 'networked' to supply a nearby end use. This could extend to a number of wetlands supplying an external demand, such as agriculture to the development's west.

Optimising performance through smart technologies will improve the feasibility of IWM initiatives and exhibit the cutting edge of IWM application.

Engagement and investigation

There has been limited engagement in the preparation of this plan. It is intended that this plan provide the basis for further discussion, particularly with Traditional Owners, so that the plan evolves with the masterplan for the growth areas. There is also time for investigations into some of the potentially more ambitious actions in the plan. For example:

- Smart technologies to co-ordinated lot scale rainwater tanks
- A regional stormwater scheme to supply internal demands and potentially a large, external demand (e.g. agriculture).
- The impact of development on groundwater dependent ecosystems.
- Urban heat modelling to understand where hotspots will be and to formulate mitigating strategies.

These growth areas hold a unique opportunity to implement industry leading initiatives in the greenfield context. The result could be as uniquely liveable growth area with protected ecologies within the development and downstream. An advantage that this region has is the positive collaborative history between the City of Ballarat and Central Highlands Water. Both organisations have experience in planning and implementing IWM strategies and projects. Collaboration is a critical element of IWM and this strong relationship between IWM partners means that the planning, research and design processes can be undertaken and implemented together.

7 References

<https://forecast.id.com.au/ballarat>, Accessed October 2023

Central Highlands Water (2018), Ballarat Potable Water Demand Target

G Connellan (2002), Efficient Irrigation: A reference manual for turf and landscape

The State of Victoria Department of Environment, Land, Water and Planning (2020), Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria

Victorian Planning Authority (2021), Precinct Structure Planning Guidelines: New Communities in Victoria



Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



14 APPENDIX C – STORMWATER MANAGEMENT INFRASTRUCTURE LIST

North Western Growth Area

Item	Growth Area	Precinct	Responsible Authority	Indicative Cost (\$)	Funding Source	Timing (ST-MT-LT)	
Waterway Corridor – A to B	NW	5	Council	\$3.00M	DCP	LT	Refer Alluvium SWMS Fig 33 pg 50
Waterway Corridor – C to B	NW	5	Council	\$3.85M	DCP	LT	Refer Alluvium SWMS Fig 33 pg 50
Wetland Retarding Basin – WLRB1	NW	5	Council	\$2.38M	DCP	LT	Refer Alluvium SWMS Fig 58 pg 96
Wetland Retarding Basin – WLRB2	NW	5	Council	\$6.66M	DCP	LT	Refer Alluvium SWMS Fig 58 pg 96
Wetland Retarding Basin – WLRB3	NW	5	Council	\$6.12M	DCP	LT	Refer Alluvium SWMS Fig 58 pg 96
Wetland Retarding Basin – WLRB4A	NW	5	Council	\$5.90M	DCP	LT	Refer Alluvium SWMS Fig 58 pg 96
Waterway Corridor – D to E	NW	4	Council	\$3.05M	DCP	LT	Refer Alluvium SWMS Fig 33 pg 50
Waterway Corridor – F to E	NW	4	Council	\$3.01M	DCP	LT	Refer Alluvium SWMS Fig 33 pg 50
Waterway Corridor – E to G	NW	4	Council	\$2.54M	DCP	LT	Refer Alluvium SWMS Fig 33 pg 50
Wetland Retarding Basin – WLRB4B	NW	4	Council	\$3.60M	DCP	LT	Refer Alluvium SWMS Fig 59 pg 97
Wetland Retarding Basin – WLRB5	NW	4	Council	\$4.94M	DCP	LT	Refer Alluvium SWMS Fig 59 pg 97
Wetland Retarding Basin – WLRB6	NW	4	Council	\$9.16M	DCP	LT	Refer Alluvium SWMS Fig 59 pg 97
Wetland Retarding Basin – WLRB7	NW	4	Council	\$4.96M	DCP	LT	Refer Alluvium SWMS Fig 59 pg 97
Wetland Retarding Basin – WLRB8	NW	4	Council	\$6.26M	DCP	LT	Refer Alluvium SWMS Fig 59 pg 97
Wetland Retarding Basin – WLRB9	NW	4	Council	\$5.96M	DCP	LT	Refer Alluvium SWMS Fig 59 pg 97
Wetland Retarding Basin – WLRB10	NW	4	Council	\$3.94M	DCP	LT	Refer Alluvium SWMS Fig 59 pg 97
Road Culverts Precinct 5: Draffins Road WLRB1 - 1 x 675 dia	NW	5	Council	\$0.10M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 58 pg 96
Road Culverts Precinct 5: Draffins Rd WLRB3 - 2 x 900 dia	NW	5	Council	\$0.24M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 58 pg 96
Road Culverts Precinct 4: Remembrance Drive WLRB4B - 1 x 1050 dia	NW	4	Council	\$0.16M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 59 pg 97
Road Culverts Precinct 4: West Bdy WLRB5 - 1 x 1050 dia	NW	4	Council	\$0.16M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 59 pg 97
Road Culverts Precinct 4: West Bdy WLRB8 - 1 x 1050 dia	NW	4	Council	\$0.16M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 59 pg 97
Road Culverts Precinct 4: West Bdy WLRB9 - 2 x 900 dia	NW	4	Council	\$0.17M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 59 pg 97
Road Culverts Precinct 4: Finch Rd WLRB7 - 1 x 1500 dia	NW	4	Council	\$0.21M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 59 pg 97
Road Culverts Precinct 4: Cuthberts Rd WLRB10 - 1 x 1050 dia	NW	4	Council	\$0.16M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 59 pg 97
Main Drains Precinct 5: WLRB 4B to 4A 1050 dia	NW	5	Council	\$1.12M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 58 pg 96
Main Drains Precinct 4: WLRB10 to outfall - 1 x 1050 dia	NW	4	Council	\$0.47M	DCP	LT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 60 pg 98
Downstream Outfall Grade Out Works	NW	5	Council	\$4.58M	DCP	LT	
Downstream Outfall Grade Out Works	NW	4	Council	\$2.38M	DCP	LT	
IWMS – Passive Irrigation Street Trees			Council		Develop er		
IWMS – Irrigation Open Space			Council		Unknow n at this stage		
TOTAL NORTH WESTERN GROWTH AREA				\$85.24M			

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Western Growth Area

Item	Growth Area	Precinct	Responsible Authority	Indicative Cost (\$)	Funding Source	Timing (ST-MT-LT)	
Waterway Corridor – H to I	W	3	Council	\$2.68M	DCP	MT	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor –J to K1	W	3	Council	\$2.31M	DCP	MT	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – K1 to K2	W	3	Council	\$0.76M	DCP	MT	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – L to K1	W	3	Council	\$7.92M	DCP	MT	Refer Alluvium SWMS Fig 34 pg 51
Wetland Retarding Basin – WLRB11	W	3	Council	\$1.66M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB12	W	3	Council	\$3.12M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB13	W	3	Council	\$5.54M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB14	W	3	Council	\$3.02M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB15	W	3	Council	\$2.12M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB16	W	3	Council	\$4.20M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB17	W	3	Council	\$5.44M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB18	W	3	Council	\$6.54M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Wetland Retarding Basin – WLRB19	W	3	Council	\$5.84M	DCP	MT	Refer Alluvium SWMS Fig 60 pg 98
Waterway Corridor – M to N1	W	2	Council	\$1.79M	DCP	MT	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – N1 to N2	W	2	Council	\$2.80M	DCP	MT	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – N2 to O	W	2	Council	\$7.66M	DCP	MT	Refer Alluvium SWMS Fig 41 pg 56
Waterway Corridor – O to P	W	2	Council	\$2.78M	DCP	ST	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – P to Q	W	2	Council	\$3.40M	DCP	ST	Refer Alluvium SWMS Fig 41 pg 56
Wetland Retarding Basin – WLRB20	W	2	Council	\$3.08M	DCP	MT	Refer Alluvium SWMS Fig 61 pg 99
Wetland Retarding Basin – WLRB21	W	2	Council	\$6.54M	DCP	MT	Refer Alluvium SWMS Fig 61 pg 99
Wetland Retarding Basin – WLRB22	W	2	Council	\$3.80M	DCP	MT	Refer Alluvium SWMS Fig 61 pg 99
Wetland Retarding Basin – WLRB23	W	2	Council	\$4.28M	DCP	MT	Refer Alluvium SWMS Fig 61 pg 99
Wetland Retarding Basin – WLRB24	W	2	Council	\$5.40M	DCP	ST	Refer Alluvium SWMS Fig 61 pg 99
Wetland Retarding Basin – WLRB25	W	2	Council	\$6.38M	DCP	ST	Refer Alluvium SWMS Fig 62 pg 100
Waterway Corridor – S to R	W	1	Council	\$2.66M	DCP	ST	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – Q to R	W	1	Council	\$1.83M	DCP	ST	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – R to T	W	1	Council	\$6.50M	DCP	ST	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – U to V	W	1	Council	\$4.12M	DCP	ST	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – V to T	W	1	Council	\$2.77M	DCP	ST	Refer Alluvium SWMS Fig 34 pg 51
Waterway Corridor – T to W	W	1	Council	\$7.43M	DCP	ST	Refer Alluvium SWMS Fig 34 pg 51
Wetland Retarding Basin – WLRB26	W	1	Council	\$8.40M	DCP	ST	Refer Alluvium SWMS Fig 62 pg 100
Wetland Retarding Basin – WLRB27	W	1	Council	\$3.52M	DCP	ST	Refer Alluvium SWMS Fig 62 pg 100
Wetland Retarding Basin – WLRB28	W	1	Council	\$5.34M	DCP	ST	Refer Alluvium SWMS Fig 63 pg 101
Wetland Retarding Basin – WLRB29	W	1	Council	\$6.28M	DCP	ST	Refer Alluvium SWMS Fig 63 pg 101
Wetland Retarding Basin – WLRB30	W	1	Council	\$2.42M	DCP	ST	Refer Alluvium SWMS Fig 63 pg 101
Sediment Basin - SB1	W	1	Council	\$0.30M	DCP	ST	Refer Alluvium SWMS Fig 62 pg 100
Road Culverts Precinct 3: WLRB18 - 2 x 900 dia	W	3	Council	\$0.24M	DCP	MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 60 pg 98
Road Culverts Precinct 3: WLRB19 - 1 x 1350 dia	W	3	Council	\$0.19M	DCP	MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 60 pg 98
Road Culverts Precinct 2: WLRB21 - 1 x 1500 dia	W	2	Council	\$0.21M	DCP	ST/MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99 & Fig 62 pg 100

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Item	Growth Area	Precinct	Responsible Authority	Indicative Cost (\$)	Funding Source	Timing (ST-MT-LT)	
Road Culverts Precinct 2: WLRB23 - 1 x 1350 dia	W	2	Council	\$0.19M	DCP	ST/MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99 & Fig 62 pg 100
Road Culverts Precinct 2: WLRB25 / Bells Rd - 1 x 1500 dia	W	2	Council	\$0.21M	DCP	ST/MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99 & Fig 62 pg 100
Road Culverts Precinct 1: Bells Rd to WLRB26 - 1 x 1500 dia	W	1	Council	\$0.21M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 62 pg 100
Road Culverts Precinct 1: WLRB30 Cherry Flat Road - 1 x 600 dia	W	1	Council	\$0.10M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 62 pg 100
Main Drains Precinct 3: WLRB13 - 1 x 1650 dia	W	3	Council	\$0.89M	DCP	MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 60 pg 98
Main Drains Precinct 3: WLRB 14 - 1 x 675 dia	W	3	Council	\$0.11M	DCP	MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 60 pg 98
Main Drains Precinct 3: WLRB15 - 1 x 900 dia	W	3	Council	\$0.29M	DCP	MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 60 pg 98
Main Drains Precinct 2: WLRB24 to Waterway - 1 x 1650 dia	W	2	Council	\$1.05M	DCP	ST/MT	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99
Main Drains Precinct 1: WLRB26 to Waterway - 2 x 1050 dia	W	1	Council	\$0.31M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99
Main Drains Precinct 1: WLRB27 to Waterway - 1 x 1050 dia	W	1	Council	\$0.16M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99
Main Drains Precinct 1: WLRB28 to Waterway - 1 x 1350 dia	W	1	Council	\$0.19M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99
Main Drains Precinct 1: WLRB29 to Waterway - 1 x 1350 dia	W	1	Council	\$0.19M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99
Main Drains Precinct 1: WLRB30 to Waterway - 1 x 600 dia	W	1	Council	\$0.10M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99
Main Drains Precinct 1: SB31 to Waterway - 1 x 1650 dia	W	1	Council	\$0.21M	DCP	ST	Refer Alluvium SWMS Table 11 Pg 44 & Fig 61 pg 99
Downstream Outfall Grade Out Works	W	3	Council	\$4.30M	DCP	MT	
Downstream Outfall Grade Out Works	W	2	Council	\$1.60M	DCP	ST/MT	
Downstream Outfall Grade Out Works	W	1	Council	\$2.50M	DCP	ST	
IWMS – Passive Irrigation Street Trees			Council		Developer		
IWMS – Irrigation Open Space			Council		Unknown at this stage		
TOTAL WESTERN GROWTH AREA				\$163.88M			

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



15 APPENDIX D – TRAFFIC & TRANSPORT REPORT



Ballarat Western & North Western Growth Areas
Infrastructure Servicing Strategy – Traffic & Transport



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30 April 2024

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CONTENTS

1	INTRODUCTION.....	5
2	EXISTING CONDITIONS.....	5
2.1	Site Location.....	5
3	STRATEGIC CONTEXT.....	6
3.1	Integrated Transport Action Plan.....	6
3.2	Ballarat Cycling Action Plan.....	6
3.3	Strategic Cycling Corridors.....	7
3.4	Ballarat's Urban Transit Future	8
3.5	Ballarat Walking Framework –Evolution Roadmap.....	9
3.6	Ballarat's Future Rail Network.....	9
3.7	Ballarat Strategy.....	10
3.8	Ballarat Link Road.....	10
3.9	Planned Works.....	11
4	BALLARAT WEST PRECINCT STRUCTURE PLAN.....	12
4.1	General.....	12
4.2	Road Network, Public Transport, Walking and Cycling.....	13
4.3	Ballarat West Development Contributions Plan.....	16
5	ROAD NETWORK.....	18
5.1	Traffic Volumes and Speeds.....	18
5.2	Freight.....	20
5.3	Road Hierarchy.....	20
6	PUBLIC TRANSPORT.....	22
6.1	Principles.....	22
6.2	Public Transport Network.....	23
7	ACTIVE TRANSPORT.....	25
7.1	Principles.....	25
7.2	Active Transport Network.....	26
8	TRAFFIC.....	28
8.1	Principles.....	28
8.2	Traffic Modelling.....	28
8.3	Discussion.....	36
8.4	Sensitivity Testing.....	39
8.5	Development Sequencing.....	45
8.6	Cost Apportionment.....	46
9	CONCLUSION.....	47

TABLES

Table 1	Traffic Volume and Speed Surveys.....	19
Table 2	Road Network Characteristics.....	21
Table 3	Development Yields – Number of Lots.....	28
Table 4	Future Road Network.....	33
Table 5	Future Road Network (No Link Road).....	42
Table 6	Road Upgrade Thresholds.....	45

FIGURES

Figure 1	Site Location.....	5
Figure 2	Ballarat Bicycle Network.....	7
Figure 3	Strategic Cycling Corridors.....	8
Figure 4	Ballarat Link Road Alignment.....	11

Figure 5	PSP Future Urban Structure	12
Figure 6	PSP Road Network	13
Figure 7	PSP Public Transport Network	14
Figure 8	PSP Walking & Cycling Network	15
Figure 9	Development Contributions Plan – Roads and Traffic Management.....	16
Figure 10	Development Contributions Plan – Land for Roads and Traffic Management	17
Figure 11	Traffic Survey Locations.....	18
Figure 12	Heavy Vehicle Routes	20
Figure 13	Future Public Transport Network	24
Figure 14	Active Transport Network.....	27
Figure 15	Traffic Volume Growth – Low Yield	30
Figure 16	Traffic Volume Growth – High Yield	31
Figure 17	Traffic Network – Low Yield	34
Figure 18	Traffic Network – High Yield	35
Figure 19 (bottom)	Remembrance Drive: Finchs Road to Link Road – Existing (top) and proposed 37	
Figure 20 (bottom)	Remembrance Drive: Link Road to Ring Road – Existing (top), 4-lane (middle), 6-lane 38	
Figure 21	Traffic Volume Growth – Low Yield (No Link Road)	40
Figure 22	Traffic Volume Growth – High Yield (No Link Road)	41
Figure 23	Traffic Network – Low Yield (No Link Road)	43
Figure 24	Traffic Network – High Yield (No Link Road)	44

1 INTRODUCTION

onemilegrid has been requested by Taylors to assist with traffic and transport aspects of the Ballarat North-Western and Western Growth Areas Infrastructure Servicing Strategy

As part of this assessment the subject site has been inspected with due consideration of the project context, traffic data has been sourced and relevant background reports have been reviewed.

2 EXISTING CONDITIONS

2.1 Site Location

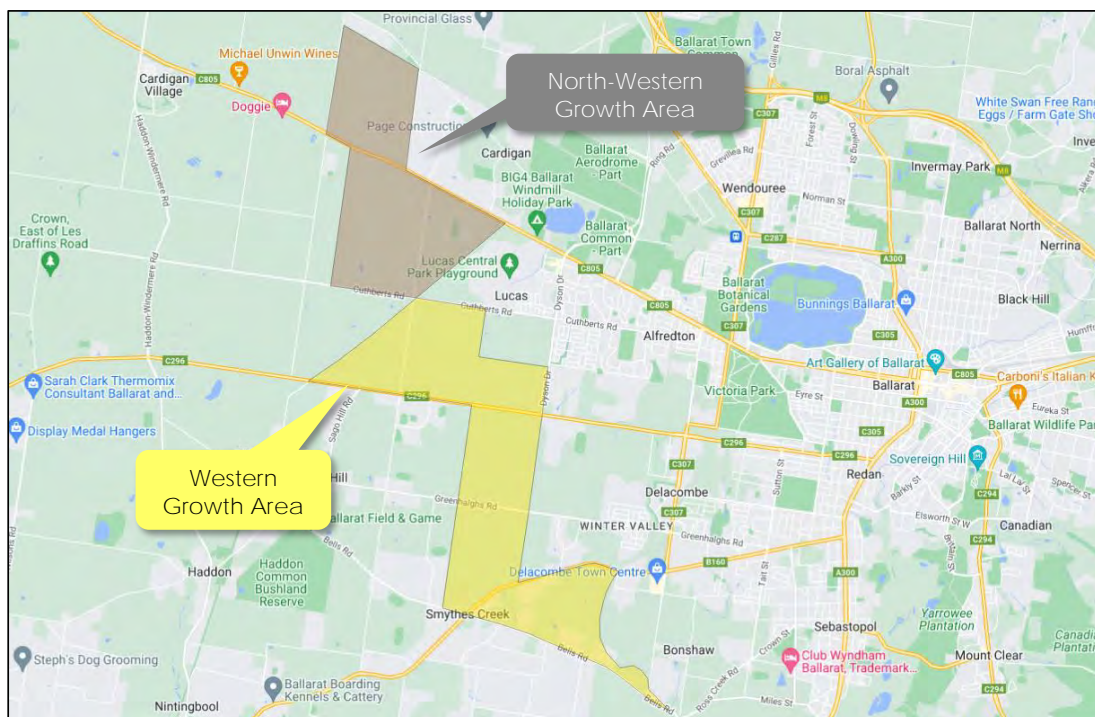
The study area comprises both the Western and North-Western growth areas, and is located to the west of established areas of Ballarat.

The North-Western Growth Area is generally bound by the railway line to the north, Draffins Road to the west, Cuthberts Road to the south, and the Ballarat-Skipton Rail Trail to the south and east.

The Western Growth Area is located further south, immediately west of the Ballarat West Precinct Structure Plan area, and is generally bound by the Ballarat-Skipton Rail Trail to the west, the Dyson Drive / Link Road alignment to the east, and Bells Road to the south.

The study area is shown in Figure 1 below.

Figure 1 Site Location



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Land use within the study area is largely rural/agricultural, with some pockets of low-density residential uses to the south.

3 STRATEGIC CONTEXT

3.1 Integrated Transport Action Plan

The *Ballarat Integrated Transport Action Plan* was prepared by Council in July 2020. The document acknowledges the challenges presented by continuing population growth in Ballarat, and outlines a vision, approach, advocacy needs and directions for the preferred transport network.

Fundamentally, the plan seeks to create a more liveable, sustainable, healthy, equitable and prosperous city through increased emphasis on walking, cycling, and public transport.

Of relevance to the planning for transport within the western and north-western growth areas, the following points are noted:

- Design of transport infrastructure should consider the safety of all road users;
- Transport infrastructure should support Council's aspirations for compact, 10-minute cities, including safe and well-connected neighbourhoods for cyclists and pedestrians, and well-connected and efficient public transport networks;
- The bus network will be transitioned to high-frequency transit corridors, and allow for future conversion to high-capacity bus routes or tram corridors in the long-term. Ballarat-Carngham Road, Glenelg Highway, Remembrance Drive and the Link Road are identified as potential routes providing 10-15-minute headway services.
- Long-term planning should allow for the preservation of existing transit corridors or new corridors for transit use;
- Alternative routes to Remembrance Drive should be investigated over the longer term to minimise traffic growth along the corridor. Changes to improve safety and capacity should consider its historical and commemorative significance in design;
- Consider provision of additional linkages rather than upgrading existing roads to add capacity;
- Completion of the Link Road is a high priority.

3.2 Ballarat Cycling Action Plan

The *Ballarat Cycling Action Plan 2017-2025* was prepared in 2017 and establishes a network of cycling routes to encourage cycling use among all members of the community. The Action plan aims to make Ballarat a better place to ride a bike, and expresses Council's goal to embed cycling as a fundamental mode of transport within an integrated transport system for Ballarat.

Key aspects of the Action Plan relating to the Infrastructure Servicing Strategy, in particular the establishment of new cycling routes, include:

- Establishing a cohesive network of cycling routes between destinations, targeted at novice or everyday riders;
- Cycling routes should provide direct connections between Activity Centres across the Municipality;
- The network should maximise coverage and accessibility (more than 90% of urban homes within 500m of a route), providing excellent levels of local access;
- Routes should connect with cycle networks already planned for in Precinct Structure Plans for Ballarat West and Alfredton West (Lucas) growth areas

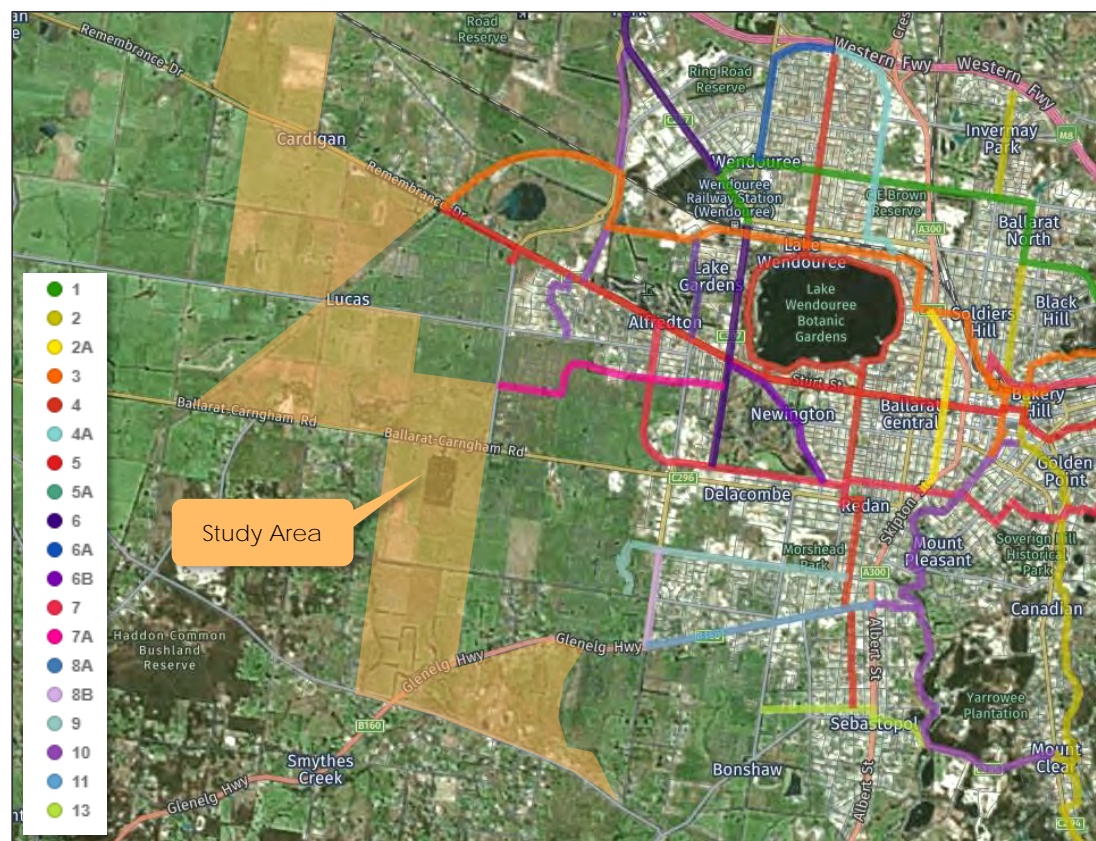
As part of the Action Plan, the [Ballarat Bicycle Network](#) was established which identifies a network of continuous, safe cycling routes linking key destinations across the city. Key routes connecting to or near the study areas include:

- Route 3: BWEZ to CBD
- Route 5: Lucas to Warrenheip

- Route 7A: Alfredton to Ballarat Station
- Route 9: Ballarat West to Sebastopol
- Route 11: Glenelg Highway to Sebastopol

These are shown in Figure 2 below.

Figure 2 Ballarat Bicycle Network



3.3 Strategic Cycling Corridors

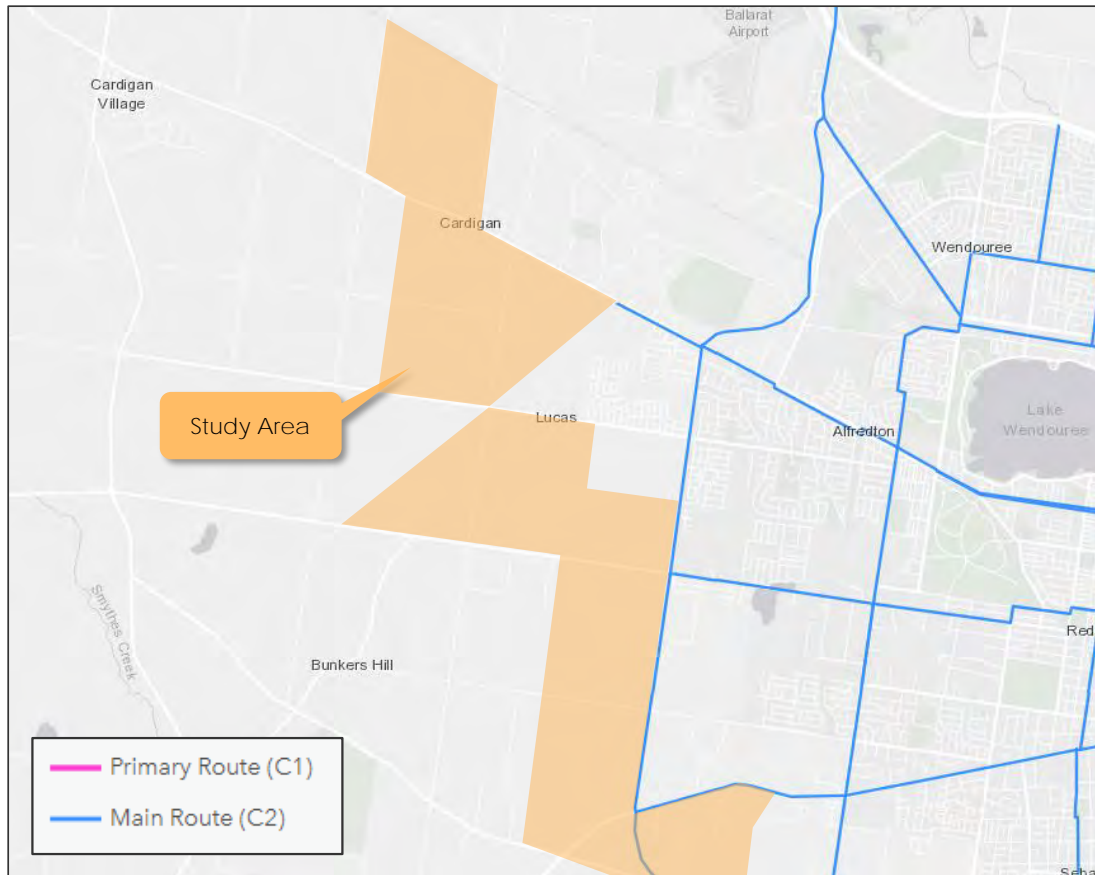
Strategic Cycling Corridors are important routes for cycling for transport and link up important destinations including the Central City, National Employment and Innovations Clusters, Metropolitan Activity Centres and other destinations of metropolitan and regional significance.

Strategic Cycling Corridors (SCC) are considered to be the arterials for bicycles, and have been designed to provide connected, low stress and safe routes, intended primarily for the use of cyclists for transport (rather than recreation).

These corridors are the responsibility of Department of Transport and Planning (DTP).

The SCCs in the vicinity of the site are shown in Figure 3.

Figure 3 Strategic Cycling Corridors



SCCs in the vicinity of the site include:

- Remembrance Drive / Sturt Street;
- Link Road;
- Ballarat-Carngham Road;
- Glenelg Highway; and
- Bells Road.

It is noted that SCCs do not necessarily reflect existing, high-quality routes, but instead include existing *and* aspirational routes.

3.4 Ballarat's Urban Transit Future

The *Ballarat's Urban Transit Future* document was prepared by Movement & Place Consulting in November 2019 to explore the issues, challenges and opportunities for the urban transit network in the Ballarat region.

Of relevance to the project, the following items were noted:

- Urban transit offers affordable alternatives to car use, improving; traffic congestion, health and environmental outcomes, and economic activity. It also improves access to education and employment for those who do not own cars, or prefer not to provide long distances;
- The majority of work trips are directed to the CBD;

- It is planned to establish high-quality public transport services (10-minute headways) to facilitate "Convenience Living Corridors" along Remembrance Drive, Ballarat-Carngham Road and Glenelg Highway;
- The potential expansion of Route 26 and provision of new routes to service the western growth areas; and
- Continuing improvements to public transport infrastructure and service will drive increase patronage, and may ultimately require provision of mass transit systems to cater for passenger demands.

3.5 Ballarat Walking Framework – Evolution Roadmap

The *Ballarat Walking Framework – Evolution Roadmap* document was prepared by Movement & Place Consulting in February 2019, and outlines the development of a walking strategy, with a goal for supporting enhanced transport options.

Of relevance to the project, the following items were noted:

- Council seeks to increase the proportion of people walking to work and education through the 10-minute city concept in the Ballarat Strategy;
- Council will manage the transport network so as to promote sustainable transport alternatives, improve accessibility and inclusiveness, and benefit the walking economy;
- All of the street network should have a footpath on at least one side of the road;
- 90% of urban streets should have footpaths on both sides of the road;
- Footpaths should be 2m wide;
- Pedestrian movements should be prioritised in areas of intensity;

We understand that Council is developing a Footpath Construction Strategy to identify and prioritise where new footpaths are to be constructed. The strategy will include a framework that prioritises where new footpaths are needed most while identifying missing links in the footpath network.

3.6 Ballarat's Future Rail Network

The *Ballarat's Future Rail network* document was prepared by Movement & Place Consulting in June 2019 and explores the issues, challenges and opportunities for the heavy rail network in the Ballarat region.

Of relevance to the planning for transport within the western and north-western growth areas, the following points are noted:

- Upgrades are planned for the Ballarat Line, including additional services to/from Maryborough, and investigation of the need for extra stations within Ballarat;
- The document recognises the need for improved frequency and reliability to ensure it remains an attractive option for residents and workers;
- Wendouree station (the closest to the study area) has seen considerable patronage growth;
- If opportunities arise, railway stations west of Ballarat on the Ararat line should be considered as part of future Precinct Structure Planning. Such stations could form part of the Ballarat Metro rail connection into Ballarat and Wendouree Stations, as well as connections to Melbourne and Geelong. Any future long-term greenfield growth should be assessed for possible rail connections at an early stage as part of integrated land use and transport planning.

3.7 Ballarat Strategy

The *Ballarat Strategy* is a document prepared by the City of Ballarat in 2015, that outlines Council's plan for growth and development of Ballarat to 2040.

Part 4 of the strategy relates to transport and connections within Ballarat, with an overarching goal to integrate transport and land use planning to link people to each other, jobs, services and goods to markets.

Of relevance to the planning for transport within the western and north-western growth areas, the following items within the strategy are noted:

- Council intends to encourage a transition to a more sustainable transport system which achieves a greater balance between cars and other modes such as walking, cycling and public transport will help address challenges of congestion, rising costs, and environmental impacts;
- Provision of high quality cycle paths, tracks and trails as well as highly walkable routes between key nodes such as schools, employment hubs and activity centres;
- The Link Road forms a key transport connection for the growth areas west of Ballarat;

3.8 Ballarat Link Road

The Ballarat Link Road is a proposed 12 kilometre arterial link along the western boundary of Ballarat, connecting industrial and residential growth zones in Ballarat's west with other parts of the region.

The first stage of the Link Road is complete, connecting from the Western Highway to Remembrance Drive. The second and third stages are still in the planning phase, and are intended to extend further south, linking Ballarat-Carngham Road, Greenhalghs Road, Glenelg Highway, Bells Road, and Midland Highway.

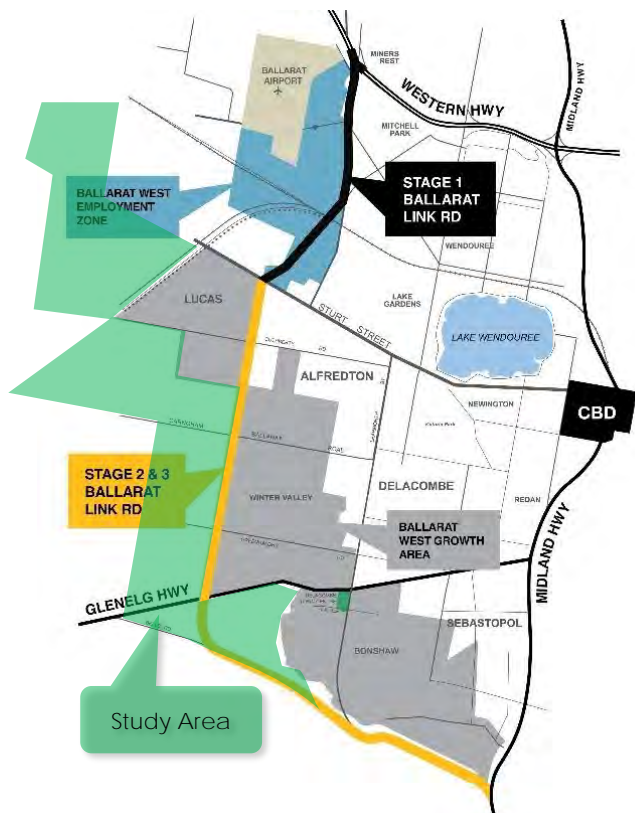
The road will initially operate with a two-way, two-lane cross-section, and will include major intersections at intersecting road, including:

- Roundabout at Cuthberts Road;
- Roundabout at Ballarat-Carngham Road;
- Roundabout at Greenhalghs Road;
- Roundabout at Glenelg Highway;
- T-intersections at Lewis Court, Kirks Road, Heather Close, Doble Road, Cherry Flat Road;
- Roundabout at Bells Road / Midland Highway;

Ultimately, the Link Road will operate with a two-way, four-lane cross-section from the Western Freeway to the Glenelg Highway, and with a two-way, two-lane cross-section from Glenelg Highway to Midland Highway (with provision for future widening). Preliminary concepts also depicting on-road cycle lanes in both directions.

The proposed alignment is shown in Figure 4 below.

Figure 4 Ballarat Link Road Alignment



Public Acquisition Overlays are in place to facilitate the transport of land for Stages 2 and 3 of the Link Road (including intersections), to the west of the Dyson Drive alignment (north of Ballarat-Carngham Road), and then centrally along property boundaries for the remainder of the alignment up to Bells Road.

3.9 Planned Works

Works are presently underway for upgrade of the Dyson Drive and Ballarat-Carngham Road intersection to a roundabout control.

In addition, land has been set aside through a Public Acquisition Overlay (PAO) to facilitate the future duplication of Ballarat-Carngham Road between Dyson Drive and Wiltshire Lane to the north of the existing carriageway. The duplication works are not yet funded.

4 BALLARAT WEST PRECINCT STRUCTURE PLAN

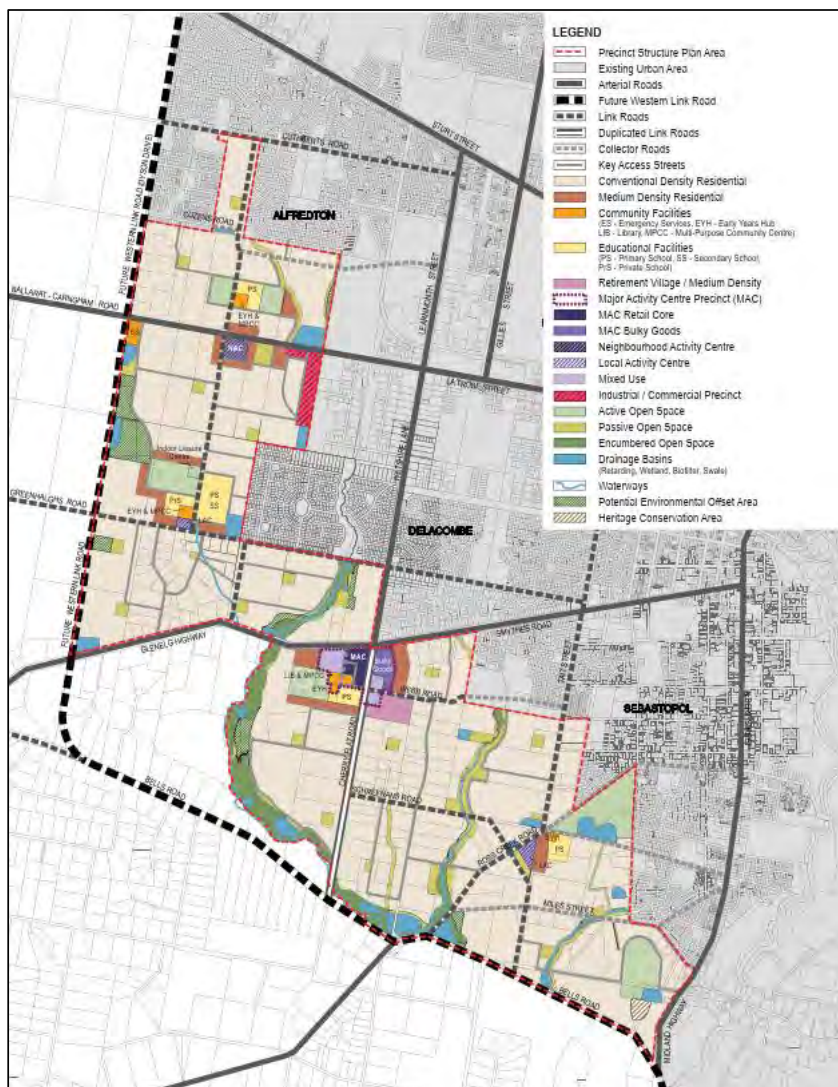
4.1 General

The Ballarat West Precinct Structure Plan (PSP) was prepared by Council and outlines the preferred direction for land use and infrastructure within the growth areas west of Ballarat.

The PSP area abuts the Western Growth area that forms part of the study area, and thus is a key consideration of the context of the Infrastructure Servicing Strategy, noting that transport routes will form key connections between the growth areas and central Ballarat.

A view of the PSP urban structure plan is provided below, indicating largely residential uses, supported by education, Activity Centres, and open space.

Figure 5 PSP Future Urban Structure



4.2 Road Network, Public Transport, Walking and Cycling

Extracts of the PSP maps are shown below, indicating the road network, public transport, walking and cycling network proposed in the vicinity of the site.

Figure 6 PSP Road Network

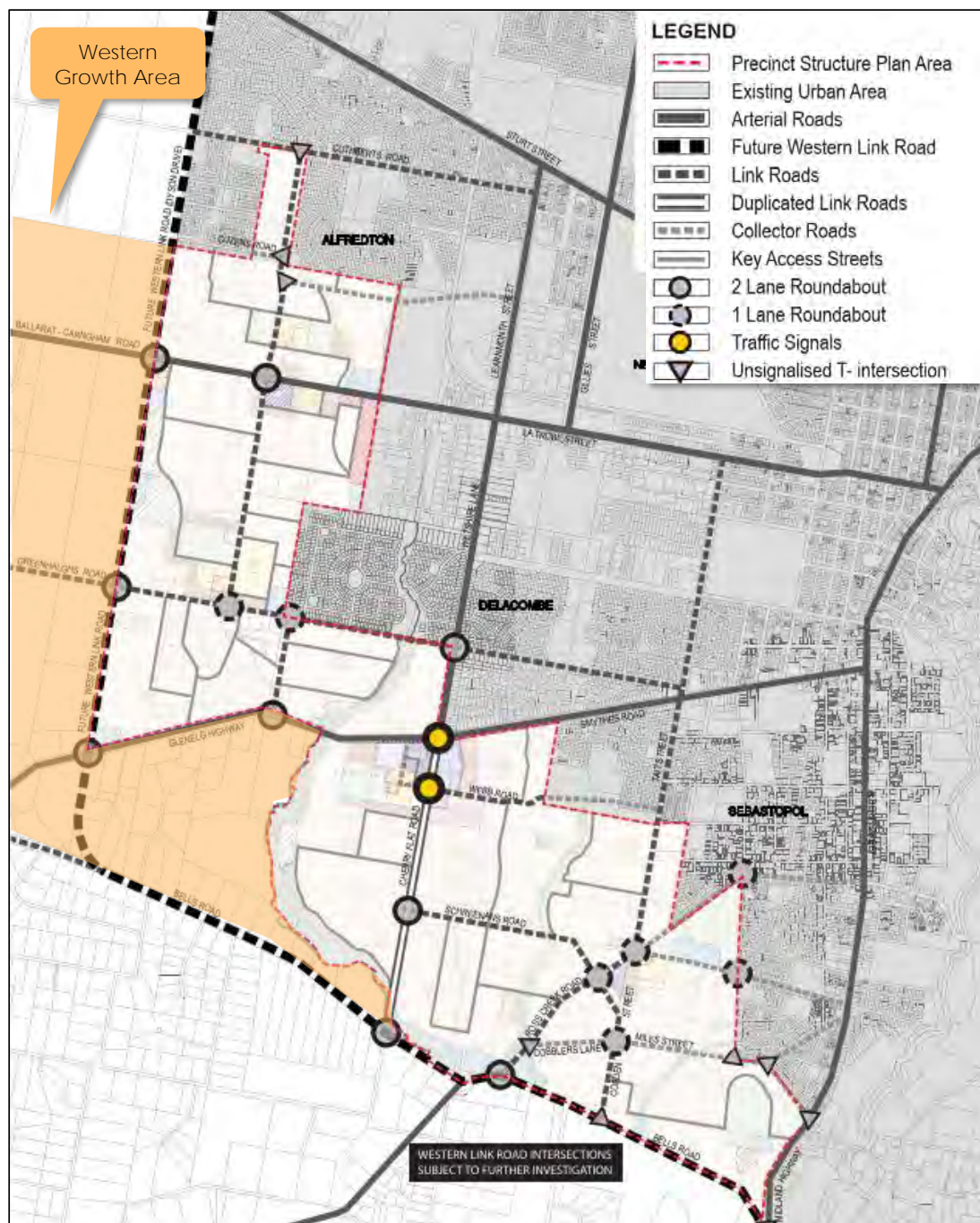


Figure 7 PSP Public Transport Network

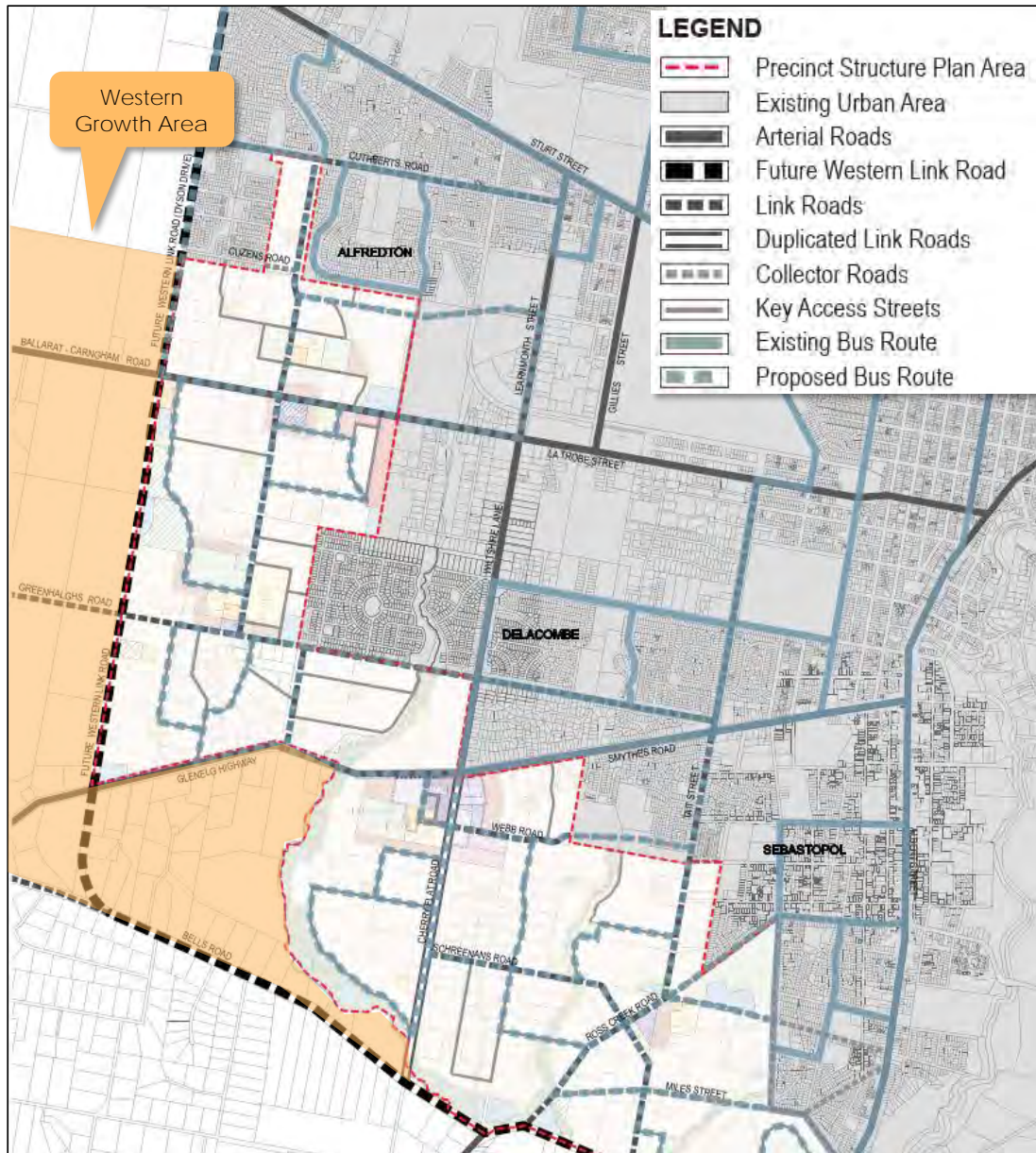
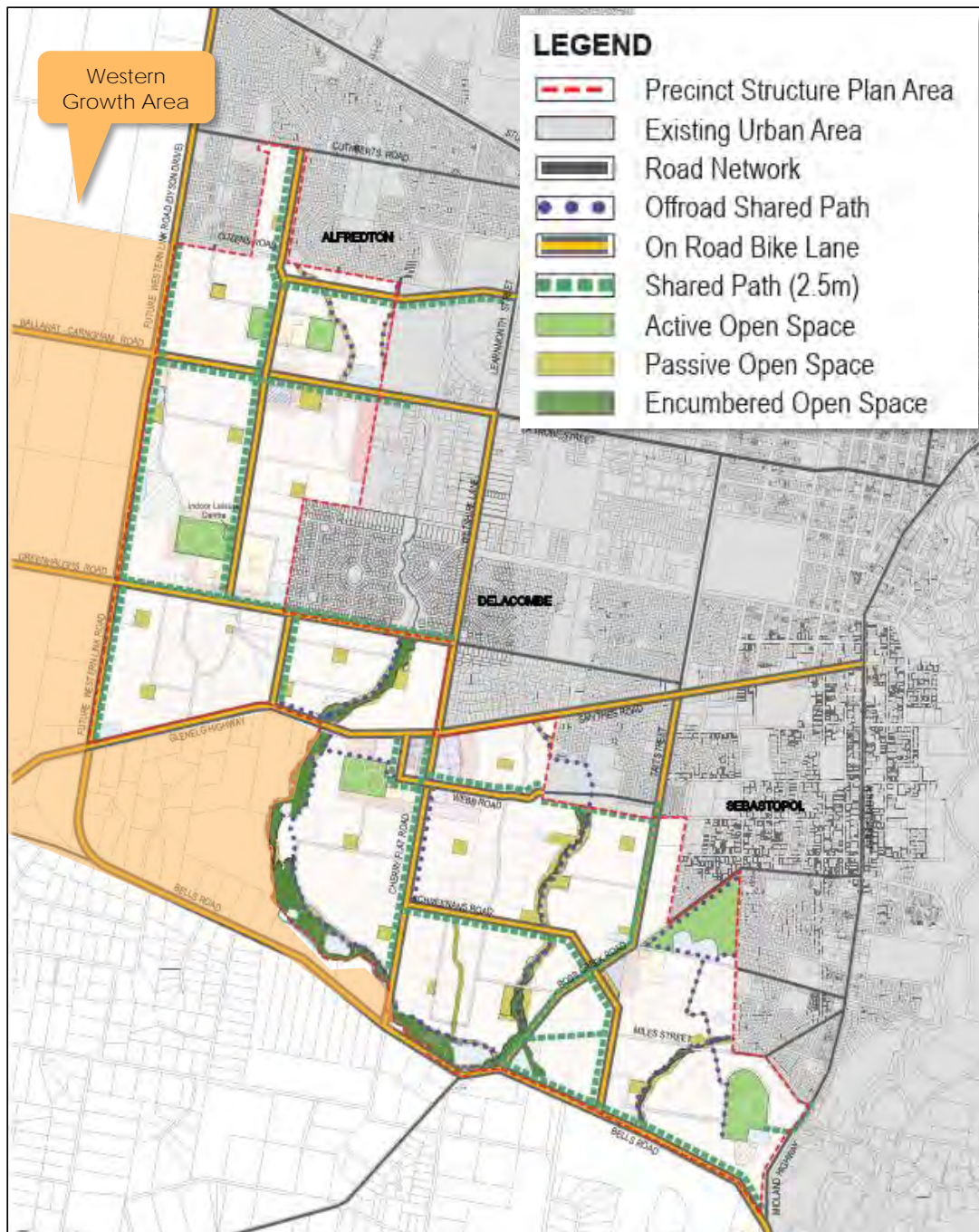


Figure 8 PSP Walking & Cycling Network



4.3 Ballarat West Development Contributions Plan

The Ballarat West Development Contributions Plan (DCP) was prepared by the City of Ballarat, and outlines the projects, framework and financial contribution required to deliver the infrastructure projects necessary for future residents of the PSP area. It includes the land and cost to fund road network upgrades, intersection construction and community facilities.

An extract from the DCP is shown below, showing all the proposed road network upgrades, intersection construction and community facilities. These infrastructure projects will be included in the Infrastructure Contributions Plan, where financial contributions are received from developers to deliver the infrastructure projects necessary for future residents.

The transport projects are identified in Figure 9 below, and the land acquisition is shown in Figure 10.

Figure 9 Development Contributions Plan – Roads and Traffic Management

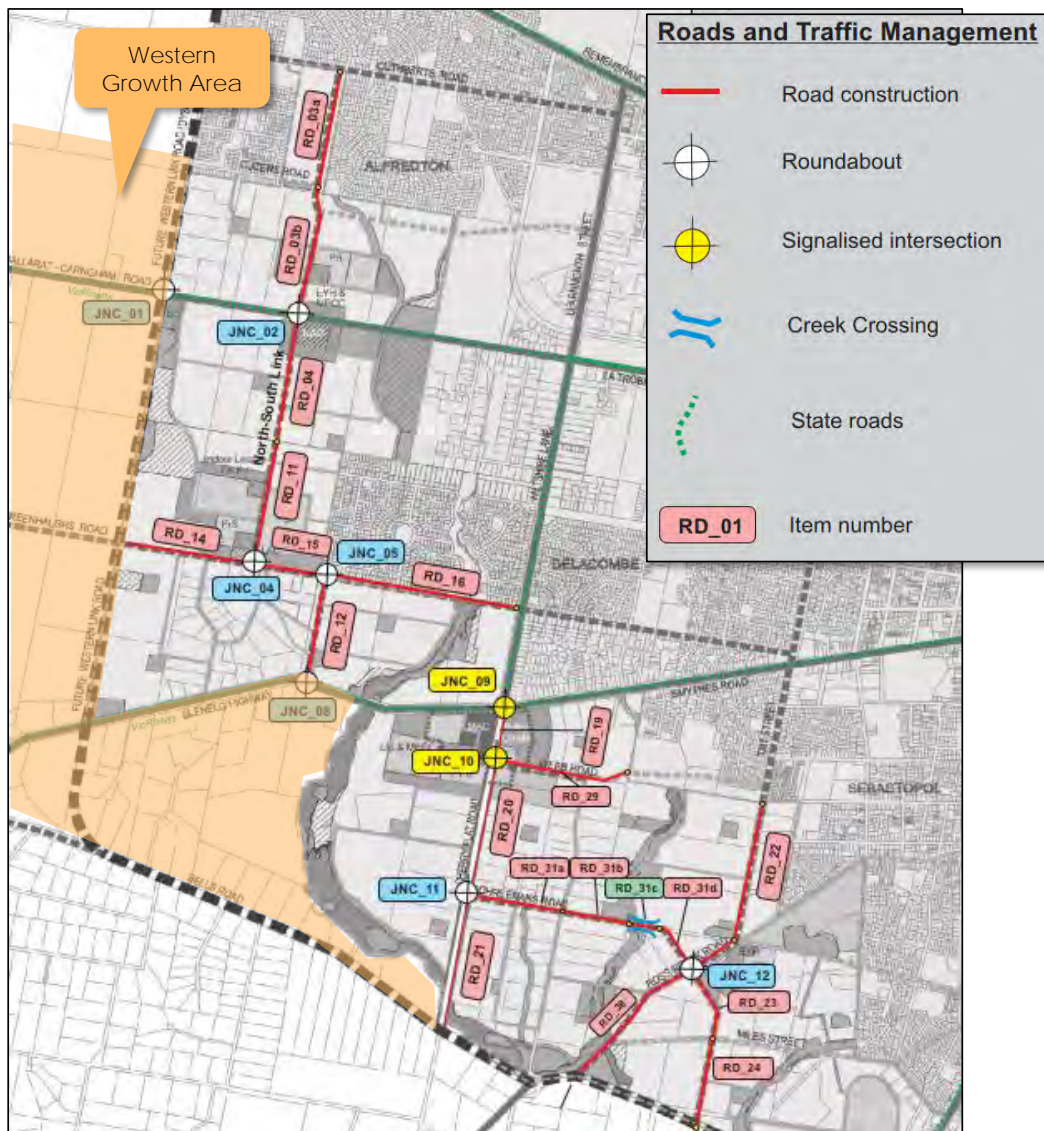
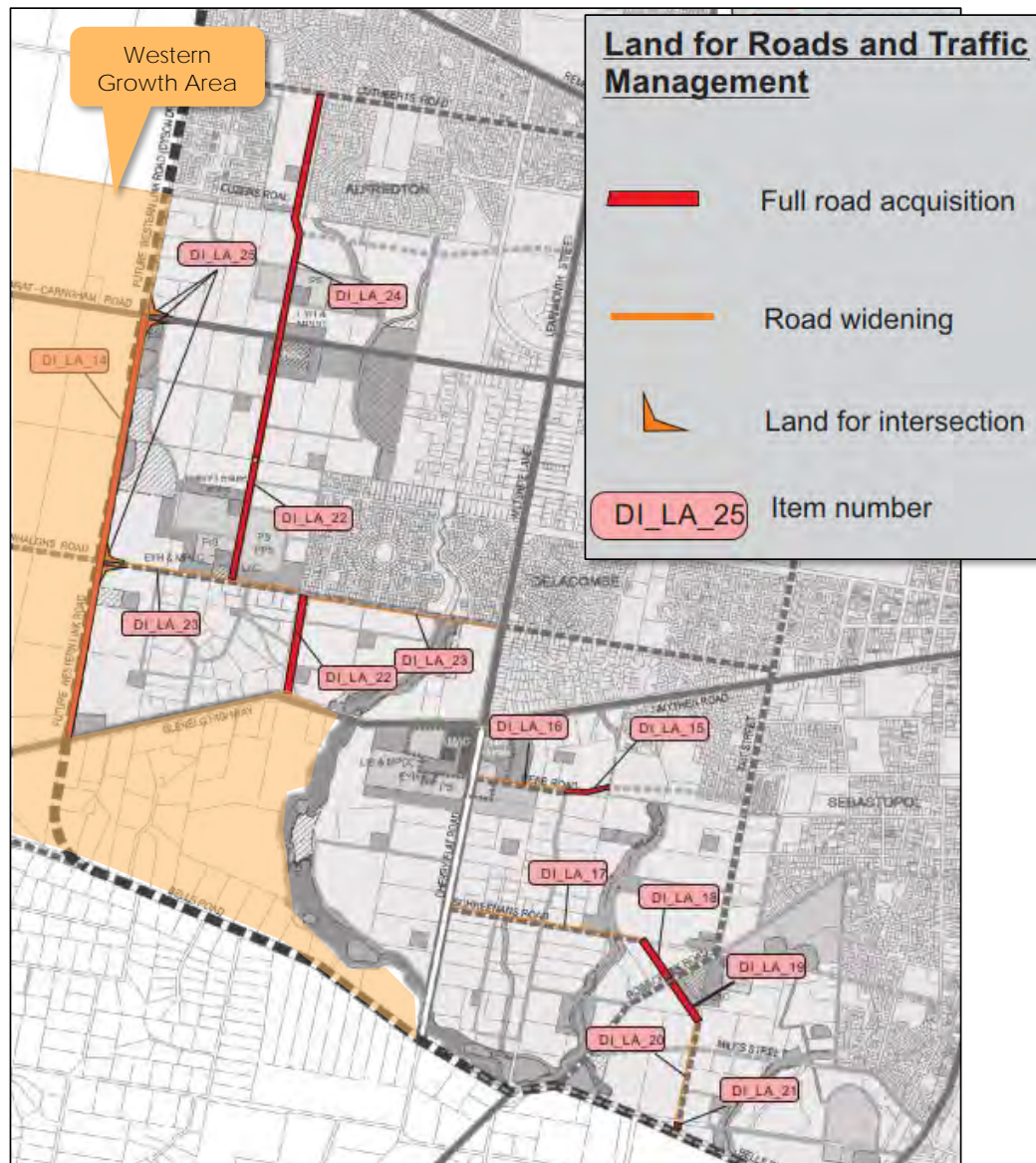


Figure 10 Development Contributions Plan – Land for Roads and Traffic Management



Notable projects in the vicinity of the Western Growth Area include:

- JNC_01: Roundabout at Ballarat-Carngham Road / Dyson Drive;
- JNC_02: Roundabout at Ballarat-Carngham Road / Presentation Boulevard (North-South Link);
- JNC_08: Roundabout at Glenelg Highway;
- JNC_09: Signalised intersection at Glenelg Highway / Wiltshire Lane
- RD_14/16: Upgrade of Greenhalghs Road

5 ROAD NETWORK

5.1 Traffic Volumes and Speeds

In order to establish existing traffic conditions in the vicinity of the site, onemilegrid commissioned a number of 24-hour, 7-day traffic surveys, from Monday 20th March 2023. The surveys aimed to capture daily traffic data, speeds, vehicle classifications and any other relevant information on the local streets within the study area.

The exact location of the tube counters is illustrated in Figure 11 below, with the surveyed weekday daily traffic volumes identified for each location. A summary of each traffic survey is provided in Table 1.

The data suggests that volumes are within the environmental capacity of each road.

Figure 11 Traffic Survey Locations

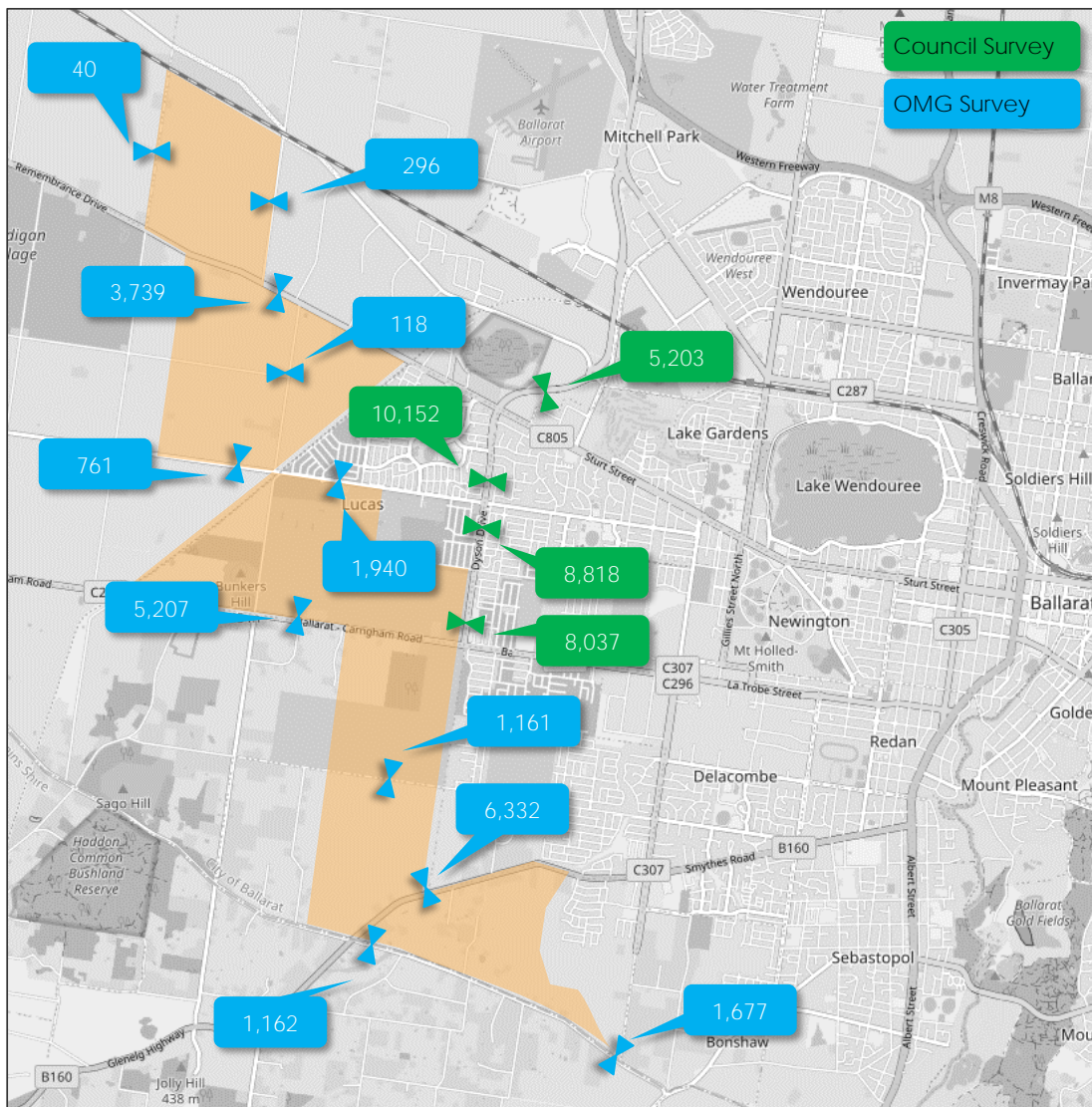


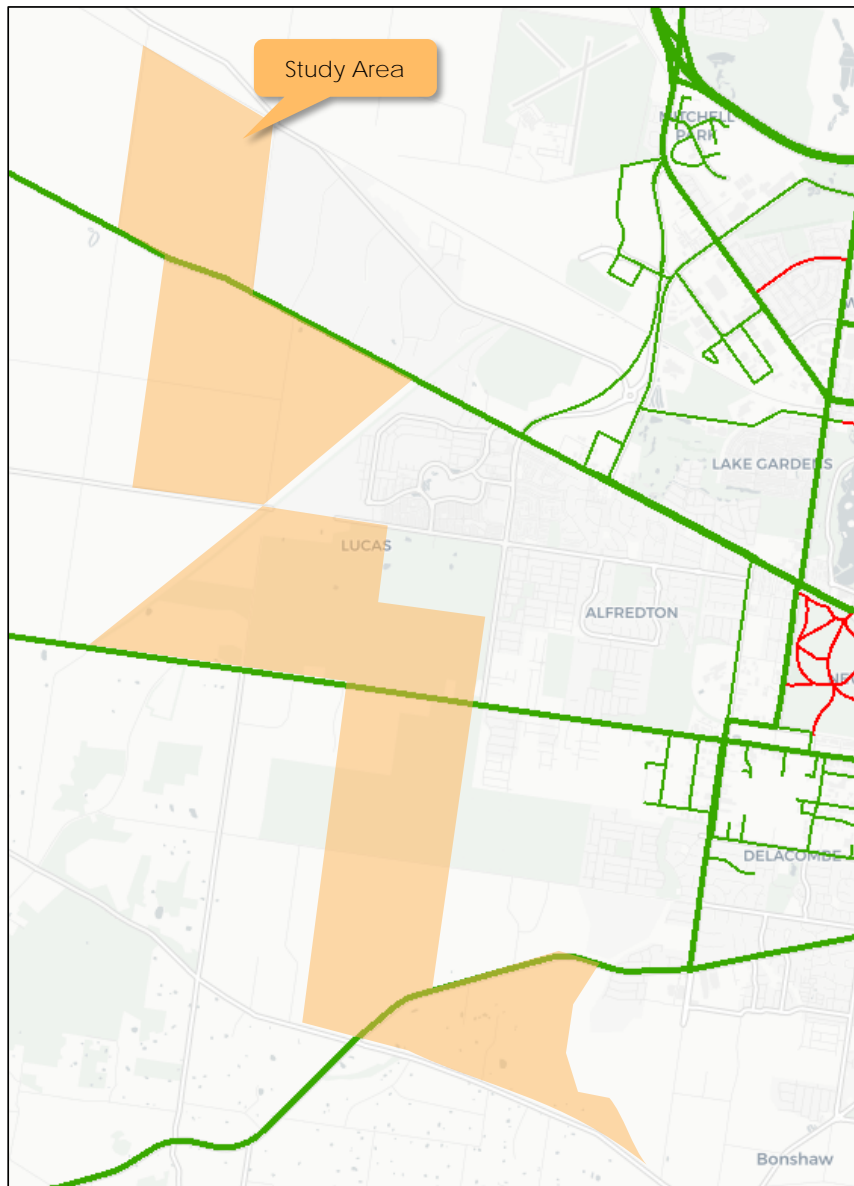
Table 1 Traffic Volume and Speed Surveys

Location	Segment	Direction	Daily Traffic Volume (vpd)	Peak Traffic Volume (vpd)		85 th %ile Speed (km/h)
				AM Peak	PM Peak	
Ballarat Link Road	Between Blind Creek & Remembrance Drive	Northbound	2,679	358	214	81.4
		Southbound	2,524	156	319	83.4
		Combined	5,203	512	506	82.4
Dyson Drive	Between Cuthberts Road & Hunter Street	Northbound	5,124	611	449	55.4
		Southbound	5,027	468	557	55.5
		Combined	10,152	909	941	55.5
Dyson Drive	Between Cuthberts Road & Chase Street	Northbound	4,388	487	386	59.9
		Southbound	4,429	303	474	62.5
		Combined	8,818	790	841	61.3
Dyson Drive	Between Andrianus Street & Anton Drive	Northbound	4,041	400	367	71.2
		Southbound	3,996	328	417	71.6
		Combined	8,037	727	773	71.4
Draffins Road	North of Remembrance Drive	Northbound	19	2	2	86.9
		Southbound	21	1	2	86.5
		Combined	40	3	4	86.8
Dowling Road	North of Remembrance Drive	Northbound	136	11	14	93.0
		Southbound	160	13	15	88.5
		Combined	296	23	30	90.2
Remembrance Drive	East of Dowling Road	Westbound	1,913	94	196	109.7
		Eastbound	1,826	212	155	85.5
		Combined	3,739	307	351	97.6
Finchs Road	South of Remembrance Drive	Northbound	56	10	5	74.7
		Southbound	65	4	12	65.8
		Combined	118	14	17	70.3
Cuthberts Road	West of Finchs Road	Westbound	415	31	59	93.2
		Eastbound	346	53	23	79.3
		Combined	761	84	82	85.8
Cuthberts Road	East of Shortridge Drive	Westbound	1,000	84	103	77.4
		Eastbound	940	115	71	71.4
		Combined	1,940	199	174	74.4
Ballarat-Carngham Road	East of Finchs Road	Westbound	2,504	142	282	99.6
		Eastbound	2,703	312	182	103.7
		Combined	5,207	453	464	101.6
Greenhalghs Road	East of Hayes Drive	Westbound	606	42	73	90.0
		Eastbound	555	55	40	107.8
		Combined	1,161	97	113	98.3
Glenelg Highway	North of Bells Road	Northbound	3,198	330	225	103.5
		Southbound	3,134	140	339	100.4
		Combined	6,332	470	564	102.0
Bells Road	East of Glenelg Highway	Westbound	553	51	62	97.6
		Eastbound	609	82	56	86.7
		Combined	1,162	134	118	91.6
Bells Road	East of Cherry Flat Road	Westbound	2,060	217	181	88.8
		Eastbound	2,359	227	255	90.8
		Combined	4,419	444	435	89.8

5.2 Freight

Figure 12 below identifies approved routes for b-double trucks through the study area. This includes Remembrance Drive, Ballarat-Carngham Road, and Glenelg Highway. These same routes are approved for oversized agricultural vehicles.

Figure 12 Heavy Vehicle Routes



5.3 Road Hierarchy

A summary of the cross-section and operating characteristic of each road within the study area is presented in Table 2 below.



Table 2 Road Network Characteristics

Road Name	Between	Classification	Alignment	Cross-Section	Reservation	Carriageway	Indicative Midblock Capacity (vpd)	Footpath Provision	Bicycle Facilities	Car Parking	Speed Limit
Remembrance Drive	Whites Rd & Finchs Rd	Arterial	NE-SW	Two-way / Two-lane	60m	10m	20,000	None	None	None	100km/h
Remembrance Drive	Finchs Rd & Rail Trail	Arterial	NE-SW	Two-way / Two-lane	60m	10m + 6m	20,000	None	None	None	80km/h
Smarts Hill Road	Whites Rd & Finchs Rd	Local	E-W	Two-way (unsealed)	30m	5m	150	None	None	None	100km/h (default)
Cuthberts Road	Whites Rd & Rail Trail	Local	E-W	Two-way / Two-lane	20m	6m	20,000	None	None	None	100km/h (default)
Cuthberts Road	Rail Trail & Shortridge Dr	Local	E-W	Two-way / Two-lane	25m	10.6m	16,000	North side	North side – On-road	North side - Indented	100km/h (default)
Ballarat-Carngham Road	Rail Trail & Dyson Drive	Arterial	E-W	Two-way / Two-lane	23m	6m	20,000	None	None	None	80-100km/h
Finchs Road	Cuthberts Road & Remembrance Dr	Local	N-S	Two-way (unsealed)	20m	8m	150	None	None	None	80km/h
Finchs Road	Ballarat-Carngham Rd & Cuthberts Rd	Local	N-S	Two-way (unsealed)	20m	8m	150	None	None	None	80km/h
Greenhalghs Road	Hayes Dr & Masada Blvd	Local	E-W	Two-way / Two-lane	20m	7m	20,000	None	None	None	100km/h (default)
Glenelg Highway	Bells Rd & Karingal Park Dr	Arterial	SW-NE	Two-way / Two-lane	60m	10m	20,000	None	None	None	100km/h
Glenelg Highway	Karingal Park Dr & Kensington Blvd	Arterial	SW-NE	Two-way / Two-lane	60-70m	10m	20,000	None	None	None	80km/h
Bells Rd	Hayes Dr & Glenelg Hwy	Local	NW-SE	Two-way / Two-lane	60m	6m	20,000	None	None	None	100km/h (default)
Bells Rd	Glenelg Hwy & Sebastopol-Smythesdale Rd	Local	NW-SE	Two-way / Two-lane	60m	6m	20,000	None	None	None	100km/h (default)
Karingal Park Drive		Local	N-S	Two-way (unsealed)	9m	4m	150	None	None	None	N/A
Lewis Court		Local	N-S	Two-way	20m	5m	1,000	None	None	None	N/A
Cherry Flat Road	Bells Rd & Schreenans Rd	Local	N-S	Two-way / Two-lane	41m	6m	20,000	None	None	None	80km
Blind Creek Road	Dowling Rd & Link Rd	Local	E-W	Two-way / Two-lane	30m	6m	20,000	None	None	None	100km/h (default)



6 PUBLIC TRANSPORT

6.1 Principles

We acknowledge that this project is not intended to fully articulate the future public transport services within the Western and North-Western growth areas. Rather this report is intended to ensure that sufficient physical space is provided to enable them into the future.

Successful cities must provide convenient and meaningful opportunities for residents and workers to select from equally convenient travel modes. Thus, it is important to ensure that public transport is suitably high-frequency (generally accepted to be defined as running with less than 15 minute headways) to remain time-competitive to private vehicle trips, and that services extend from early morning to late-evening all week.

Additionally, services should be delivered early during subdivisions to ensure residents transport choices are not limited as they establish new travel patterns at their new home.

Council's aspirations for public transport detailed within the various strategic documents are presented in Section 3, and include:

- Establishing high-frequency transit corridors along Ballarat-Carngham Road, Glenelg Highway, Remembrance Drive and the Link Road;
- If opportunities arise, railway stations west of Ballarat on the Ararat line should be considered as part of future Precinct Structure Planning. Such stations could form part of the Ballarat Metro rail connection into Ballarat and Wendouree Stations, as well as connections to Melbourne and Geelong. Any future long-term greenfield growth should be assessed for possible rail connections at an early stage as part of integrated land use and transport planning.

Buses are generally the first step in establishing public transport services within growth areas, as they require limited supporting infrastructure, have minimal start-up costs, and remain flexible for route variations as new areas develop.

Best-practice route planning for bus services ensures that the majority of residents are within a 400m walk from bus services, but balances this need for coverage, with often conflicting goals for direct, and time-competitive services between major destinations. Noting this, it is recommended that most lots are within a 400m walk from a bus route, but this additional coverage does not come at the expense of a direct service.

To be efficient and equitable, road managers must favour higher value trips and more space-efficient modes under congested conditions, so travellers will choose more efficient modes, for example, using buses and ridesharing when commuting on congested corridors.

Provision of bus priority lanes has been demonstrated to improve reliability and punctuality of bus services, allowing for more predictable travel times. Research suggests that even a modest (20%) reduction in travel time on a corridor can see a 25% increase in ridership.

Warrants for provision of bus lanes vary among local and international transport authorities. Some contend that priority lanes should be introduced where passenger volumes would be greater than that within the adjacent lane, others suggest that they should be installed where total travel time of all passengers along the corridor reduce after their implementation. On balance, research suggests that they are warranted where they would attract more than 800 peak-hour passengers. For a typical bus at 2/3 capacity, this is around 20 peak-hour services (one-way) or a 3-minute headway.

As development continues and ridership grows, these bus services may be replaced by higher-capacity, mass-transit systems that may include; Bus Rapid Transit, trackless trams, light rail, or even conventional passenger-rail services. It is commonplace to co-locate the alignment of these services with roads, however systems such as the [Adelaide O-Bahn](#) have seen success along dedicated public transport corridors.



6.2 Public Transport Network

In light of the above, the following public transport elements are recommended for incorporation into the infrastructure servicing strategy:

- Provision for a future railway station;
- High-frequency routes along the transit corridors of Ballarat-Carngham Road, Glenelg Highway, Remembrance Drive and the Link Road;
- Secondary bus routes along adjacent major roads to achieve increased coverage; and
- Provision for bus head start infrastructure at all signalised intersections.

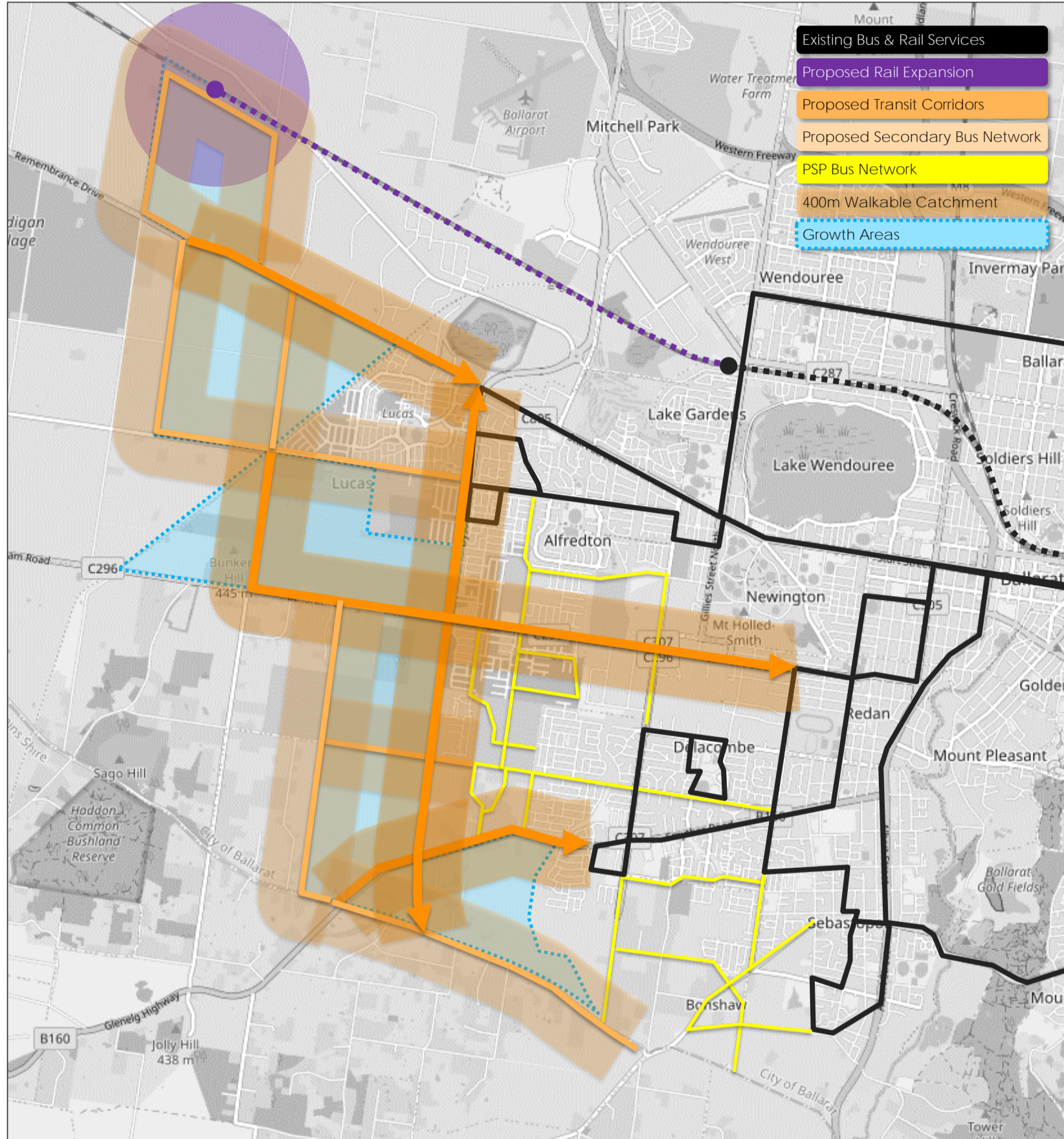
Figure 13 below details the proposed public transport network within the study area.

It is noted that new public transport routes are only shown to the point where they connect with other existing or planned services.

The Department of Transport and Planning (DTP) has not committed to any extensions of public transport.



Figure 13 Future Public Transport Network





7 ACTIVE TRANSPORT

7.1 Principles

Council's various strategic documents identify aspirations for increased cycle usage, with a goal to embed cycling as a fundamental mode of transport within an integrated transport system for Ballarat. Specifically, they seek to ensure the following:

- Establishing a cohesive network of cycling routes between destinations, targeted at novice or everyday riders;
- Introduction of cycling "super-highways" that offer direct routes with cyclist priority measures; and
- A network that maximises coverage and accessibility (more than 90% of urban homes within 500m of a route), providing excellent levels of local access.

A bicycle route is often judged in its entirety by the most stressful portion of the journey. Noting Council's desire for increased ridership, every effort should be made to ensure provision of continuous, low stress, protected and separated cycling routes suitable for use by cyclists of all ages, abilities and confidence levels. A low-stress and comfortable route will ensure cycling is an attractive prospect and will encourage growth in usage by facilitating:

- Maintenance of speed when cycling;
- Safe passing distances by drivers;
- Space to ride two abreast;
- Space to ride clear of hazards (e.g., car doors opening, gutters); and
- Smooth riding surfaces.

In the absence of modal separation, routes should be designed so that the speed of motor vehicles will not be appreciably higher than that of bicycles, enabling cyclists to use the road space safely and comfortably on equal terms. Most design guidelines have general agreement in shared use of an urban carriageway by drivers and cyclists for 85th percentile traffic speeds up to 30km/h and volumes generally up to 1,500-3,000 vehicles per day. This is a typical threshold at which most cyclists will feel comfortable sharing the road with vehicle traffic and aligns with Safe System principles for the energy threshold in crashes with vulnerable road users. This will be the case for local access streets throughout the growth areas.

For higher-order roads (connector streets, link roads and arterials), cycling facilities should be fully separated from vehicle traffic, and be provided priority treatments at intersections with other roads.

Best-practice planning would offer fully-separated pedestrian and cycling facilities on major cycling routes, which are likely to be attractive to commuter cyclists seeking direct and fast connections.

Consistent with Council's walking framework, all streets (with the exception of shared streets such as access places or laneways) should provide footpaths on both sides, of preferably 2m width.

While not aligned with the traditional sense of "active" transport, it is considered that modes such as e-scooters and e-bikes (both personal and shared commercial use) benefit from use of the same active transport infrastructure discussed above. Ballarat is part of the e-scooter trial within Victoria. The relatively high e-scooter usage around the previous growth areas (Lucas and Alfredton) indicate an opportunity to further develop these modes in additional growth areas. Further, recent expansions of the e-scooter trials suggest a future scenario with considerably more use for these vehicles in short trips.



7.2 Active Transport Network

In light of the above, the following elements are recommended for incorporation into the infrastructure servicing strategy:

- Provision of dedicated off-road bicycle paths along arterial routes, separated from pedestrian facilities;
- Provision of alternate cycling and shared path facilities for recreation along waterways and reserves. At the time of writing, these features are not yet identified;
- Retention of the Ballarat-Skipton Rail Trail and improvement as an active transport connection;
- Priority crossings for shared paths and bicycle paths at uncontrolled side-road intersections;
- Signalised pedestrian crossings where signalised intersections are otherwise not provided near major destinations;

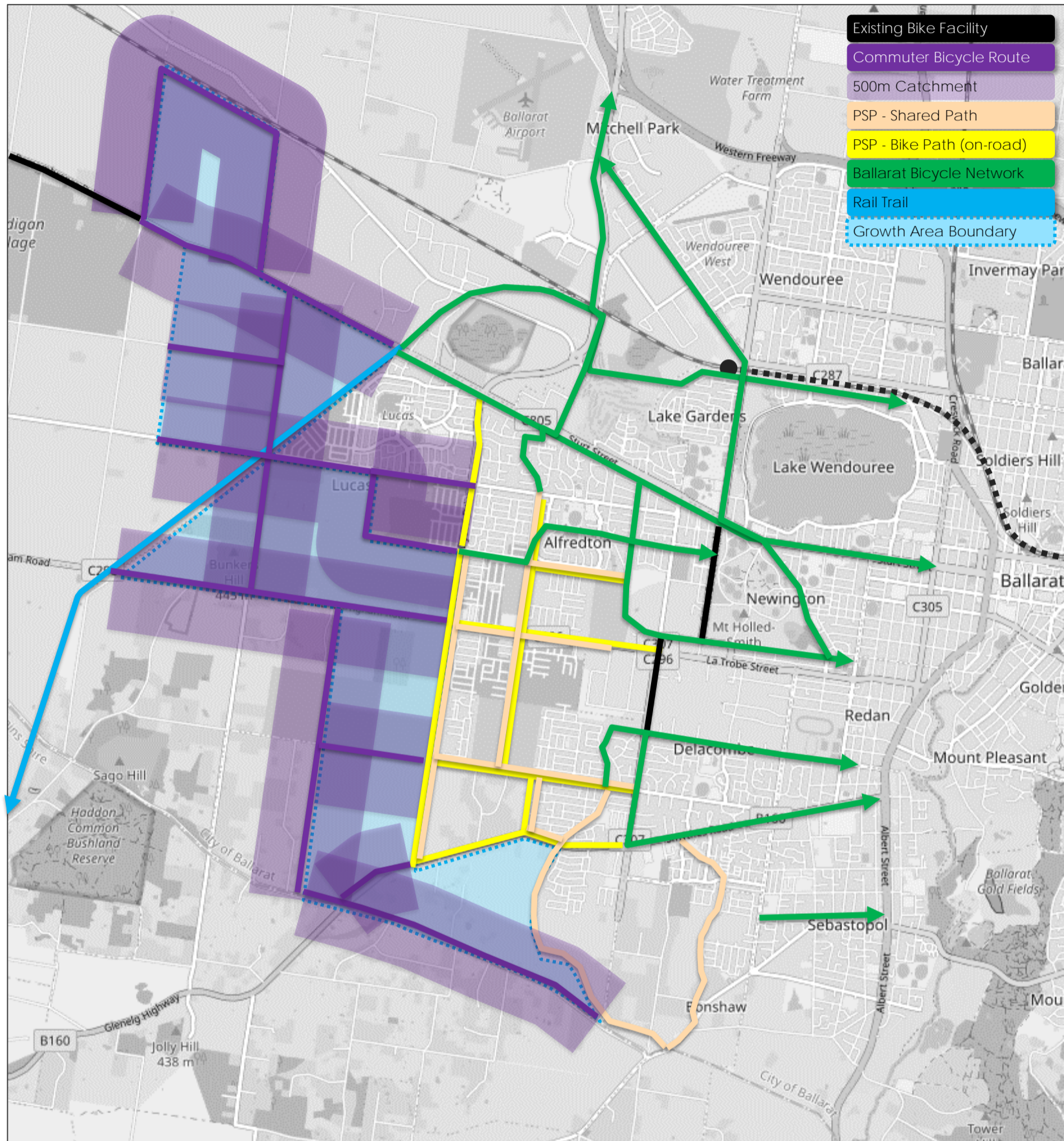
Figure 14 below details the proposed active transport network within the study area.

New active transport links are only shown to the point where they connect with other existing or planned services.

Consideration may be given to the implementation of mobility hubs within the growth areas.



Figure 14 Active Transport Network



8 TRAFFIC

8.1 Principles

Council's aspirations for Ballarat's transport future seeks to maintain a road network generally free of congestion, and aims for compact 10-minute neighbourhoods that allow ease of access and connectivity.

Delivery of well-designed neighbourhoods and transport networks will see an increase in mode share of sustainable transport modes, but there will remain demand for car trips by households into the future. The road network must therefore offer sufficient mid-block capacity to cater for daily traffic flows, and intersections must allow for safe and efficient vehicle movement.

Transport planning convention offers arterial routes at approximately 1.6km spacing (one mile grid), with lower-order link or collector roads evenly spaced between, controlled with signalised or roundabout intersections. This arrangement allows for relatively short and direct trips between origins/destinations and major thoroughfares.

Where possible, existing road reservations should be relied upon for the future road network, to minimise costs of land acquisition and road construction, and ensure the timely delivery of roads that may otherwise be contingent on sequencing of development.

8.2 Traffic Modelling

To inform selection of a suitable road network, high-level traffic modelling has been undertaken for the two growth areas to establish likely changes to traffic volumes within the study area and surrounding roads.

This work includes estimation of trip generation to and from the growth areas, and the distribution of these across the existing and future road network, having regard to the ultimate origin and destinations (e.g. central Ballarat or BWEZ) and the fastest or most convenient route.

Lot yields have been provided by Taylors to assist, as follows.

Table 3 Development Yields – Number of Lots

Growth Area	Net Developable Area	Indicative Lot Yield	
		Low (15 dw / ha)	High (20 dw / ha)
Western Growth Area	896 ha	12,902	17,203
North-Western Growth Area	500 ha	7,200	9,600
Totals	1,396 ha	20,102	26,803

For context, the high-yield growth scenario would represent a population increase of approximately 60% from the current Ballarat population.

For analysis purposes, the following assumptions have been relied upon:

- The growth areas will incorporate largely residential land uses; and
- Daily traffic generation rate of 7 trips per dwelling per day.

It is noted that the default rate commonly utilised in evaluation of growth areas transport infrastructure is 9 trips per dwelling per day, which is considered a conservatively high estimate of traffic generation. This is likely to result in an oversupply of traffic infrastructure. Should the growth areas achieve targets of high mode share for walking, cycling and public transport trips, we anticipate this reduced rate will be readily achievable. The provision of suitable sustainable transport options at the time of occupation of these growth areas is essential to this.

Based on the above, the growth areas are expected to generate between 145,000 and 193,000 total vehicle trips per day.

It has been assumed that 11% of trips are internal to the growth areas, reflecting trips such as recreation, education or shopping trips undertaken close to home. Further, it is assumed that the majority of trips are distributed towards central Ballarat.

It is noted that this analysis has been undertaken in isolation from ongoing growth associated with the Ballarat West PSP development, as this is beyond the scope of this review.

The modelling results assume the completion of the following pieces of road infrastructure:

- Duplication of Ballarat-Carngham Road (as a four-lane arterial);
- Completion of the Link Road (as a four-lane arterial to Glenelg Highway and two-lane arterial further south) along the Bells Road alignment; and
- Completion of all roads and intersections within the Ballarat West PSP.

The additional daily traffic volumes within and surrounding the growth areas are illustrated in Figure 15 below.

Note – The "Link Road" cross-section classification as described within the following figures and discussion should not be confused with the road name "Link Road" (the Ballarat West Link Road).

Figure 15 Traffic Volume Growth – Low Yield

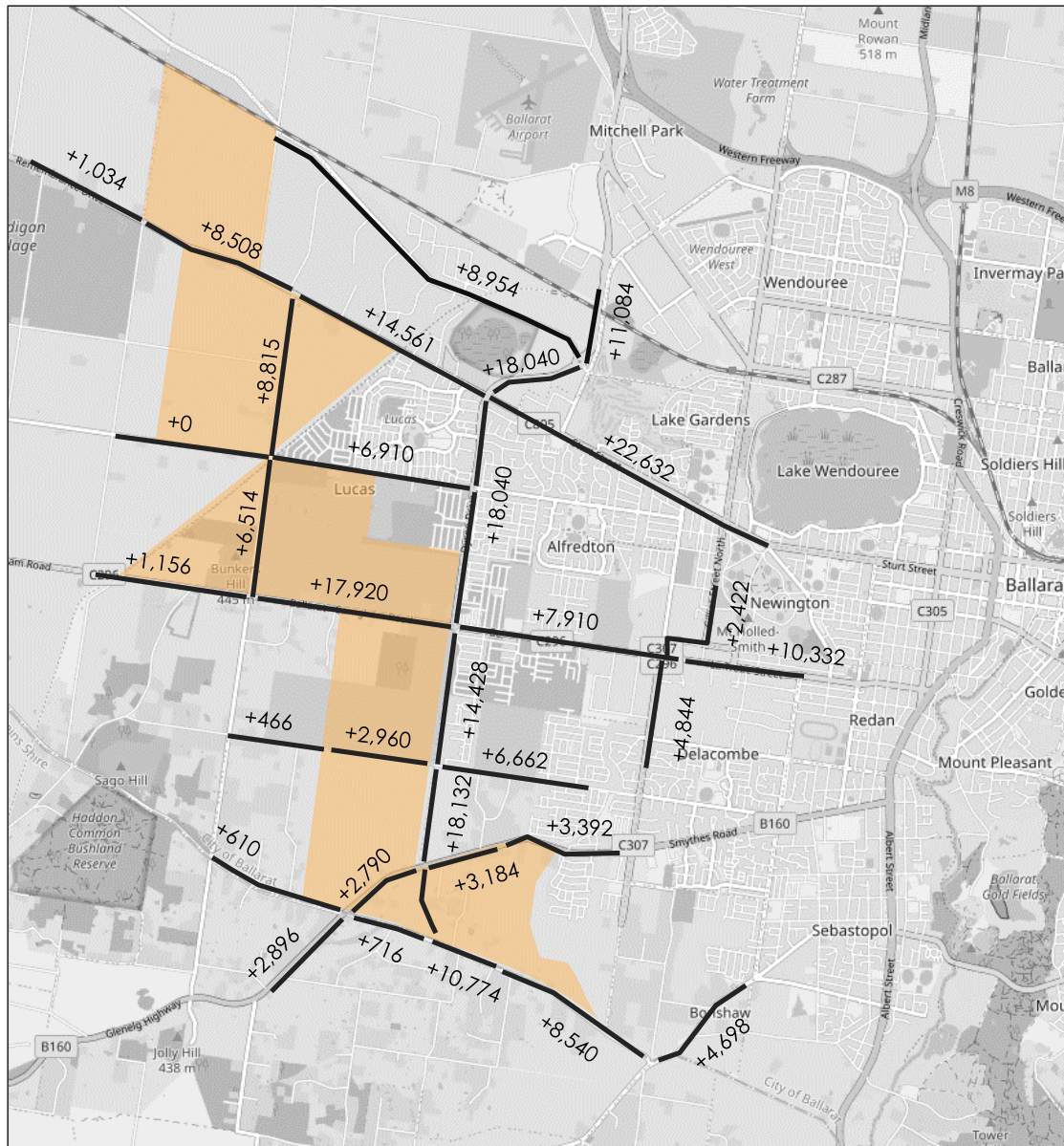
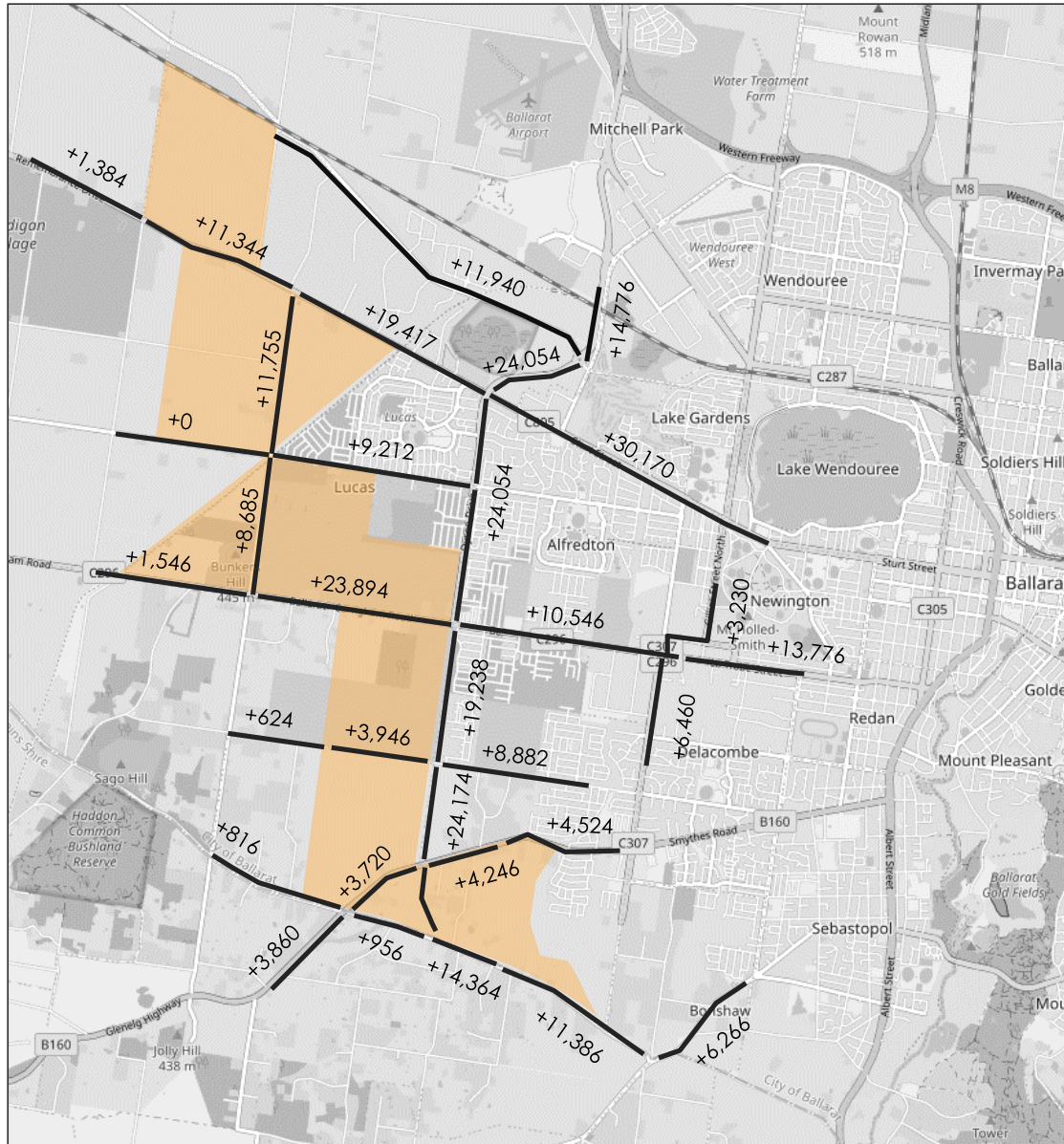


Figure 16 Traffic Volume Growth – High Yield



The above data suggests considerable growth in traffic volumes along major routes servicing the growth areas, including Remembrance Drive / Sturt Street into central Ballarat, the Link Road, and Ballarat-Carngham Road, regardless of the growth scenario.

Modest levels of growth are also expected to the south-west and north-west. While traffic volumes are expected to remain within capacity for these roads, there may be some potential impact top farming areas.

When combined with existing flows, future traffic volumes are likely to exceed the existing capacity of many roads within and adjacent to the growth areas. The following are "rule of thumb" typical capacities for major roads:

- Collector Street: 7,000 vpd, ~18m minimum reservation;
- Link Road: 15,000 vpd, ~25m minimum reservation;
- Single carriageway (two-lane, two-way): 20,000 vpd, ~25m minimum reservation;
- Dual carriageway (four-lane, two-way): 40,000 vpd, ~34m minimum reservation; and
- Triple carriageway (six-lane, two-way): 60,000 vpd, ~40m minimum reservation.



Table 4 Future Road Network

Road Name	Location	Low Yield				High Yield			
		Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition	Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition
Remembrance Drive	West of Draffins Rd	2,000	Arterial – 2 lane	No	None	2,500	Arterial – 2 lane	No	None
Remembrance Drive	Draffins Rd & Finchs Rd	12,000	Arterial – 2 lane	No	None	15,000	Arterial – 2 lane	No	None
Remembrance Drive	Finchs Rd & Dyson Dr	18,500	Arterial – 2 lane	Yes	None	23,000	Arterial – 4 lane	Yes	None
Remembrance Drive	East of Dyson Dr	34,500	Arterial – 4 lane	Yes	None	42,000	Arterial – 6 lane	Yes	None
Finchs Road	Cuthberts Rd & Remembrance Dr	9,000	Link Road	Yes	Yes	12,000	Link Road	Yes	Yes
Finchs Road	Ballarat-Carngham Rd & Cuthberts Rd	6,500	Link Road	Yes	Yes	8,500	Link Road	Yes	Yes
Cuthberts Road	West of Finchs	1,000	Collector Street	Yes	None	1,000	Collector Street	Yes	None
Cuthberts Road	East of Finchs	9,000	Link Road	Yes	None	11,000	Link Road	Yes	None
Ballarat-Carngham Road	West of Finchs Rd	1,500	Arterial – 2 lane	No	None	1,500	Arterial – 2 lane	No	None
Ballarat-Carngham Road	Finchs Rd & Dyson Dr	23,000	Arterial – 4 lane	Yes	Yes (PAO)	29,000	Arterial – 4 lane	Yes	Yes (PAO)
Ballarat-Carngham Road	Dyson Dr & Wiltshire Ln	11,500	Arterial – 2 lane	Yes	Yes (PAO)	14,000	Arterial – 2 lane	Yes	Yes (PAO)
Latrobe Street	East of Wiltshire Ln	21,500	Arterial – 4 lane	Yes	None	25,000	Arterial – 4 lane	Yes	None
Learmonth Street	North of Ballarat-Carngham Rd	16,500	Arterial – 2 lane	No	None	17,000	Arterial – 2 lane	No	None
Wiltshire Lane	South of Ballarat-Carngham Rd	18,000	Arterial – 2 lane	No	None	19,500	Arterial – 2 lane	No	None
Link Road	North of Blind Creek Rd	16,000	Arterial – 2 lane	No	None	20,000			
Link Road (Dyson Drive)	Remembrance Dr & Blind Creek Rd	18,000	Arterial – 2 lane	No	None	22,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	Remembrance Dr & Ballarat-Carngham Rd	28,000	Arterial – 4 lane	Yes	None	34,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	Ballarat-Carngham Rd & Greenhalghs Rd	14,500	Arterial – 2 lane	No	None	19,000	Arterial – 2 lane	Yes	None
Link Road (Dyson Drive)	Greenhalghs Rd & Glenelg Hwy	18,000	Arterial – 2 lane	No	None	24,000	Arterial – 4 lane	Yes	None
Greenhalghs Road	West of Hayes Dr	500	Rural Access	No	None	500	Rural Access	No	None
Greenhalghs Road	Hayes Dr & Link Rd	4,000	Collector Street	Yes	None	5,000	Collector Street	Yes	None
Greenhalghs Road	East of Link Rd	8,500	Link Road	Yes*	None	11,000	Link Road	Yes*	None
Bells Road	West of Glenelg Hwy	2,000	Link Road	Yes	None	2,000	Link Road	Yes	None
Bells Road	Glenelg Hwy & Link Rd	1,000	Link Road	Yes	None	1,000	Link Road	Yes	None
Bells Road	Link Road & Doble Rd	5,500	Arterial – 2 lane	No	None	7,000	Arterial – 2 lane	No	None
Bells Road	Doble Rd & Ross Creek Rd	11,000	Arterial – 2 lane	No	None	14,500	Arterial – 2 lane	No	None
Bells Road	East of Ross Creek Rd	10,000	Arterial – 2 lane	No	None	13,000	Arterial – 2 lane	No	None
Glenelg Highway	Southwest of Bells Rd	8,000	Arterial – 2 lane	No	None	9,000	Arterial – 2 lane	No	None
Glenelg Highway	Bells Rd to Link Rd	9,000	Arterial – 2 lane	No	None	10,000	Arterial – 2 lane	No	None
Glenelg Highway	Link Rd to Masada Blvd	9,500	Arterial – 2 lane	No	None	10,500	Arterial – 2 lane	No	None
Glenelg Highway	East of Masada Blvd	8,500	Arterial – 2 lane	No	None	9,500	Arterial – 2 lane	No	None
Ross Creek Road	North of Bells Rd	5,500	Link Road	No	None	7,500	Link Road	No	None
Blind Creek Road	West of Link Road	10,000	Link Road	Yes	None	13,000	Link Road	Yes	None

* To be upgraded within Ballarat West PSP area



Figure 17 Traffic Network – Low Yield

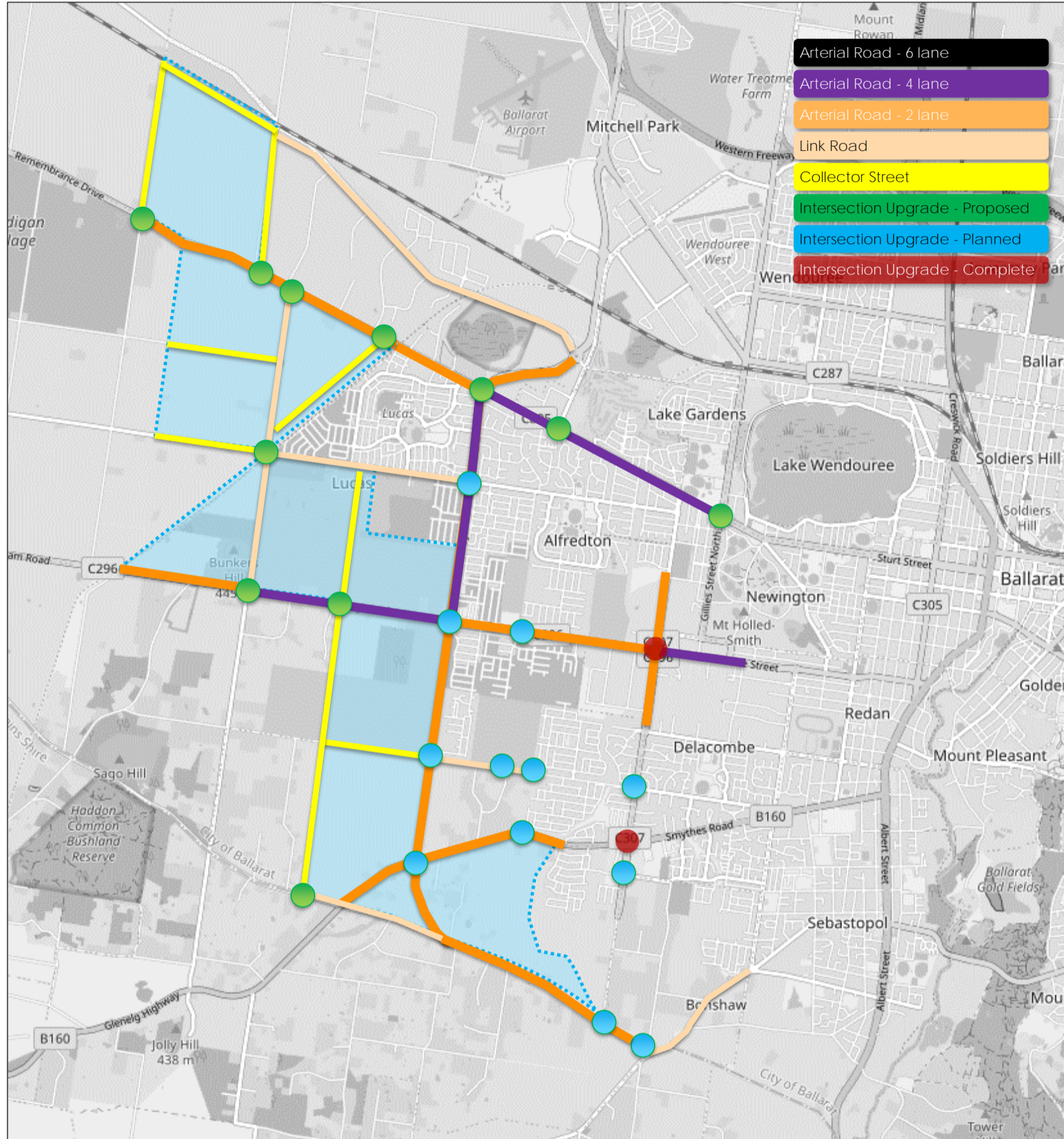
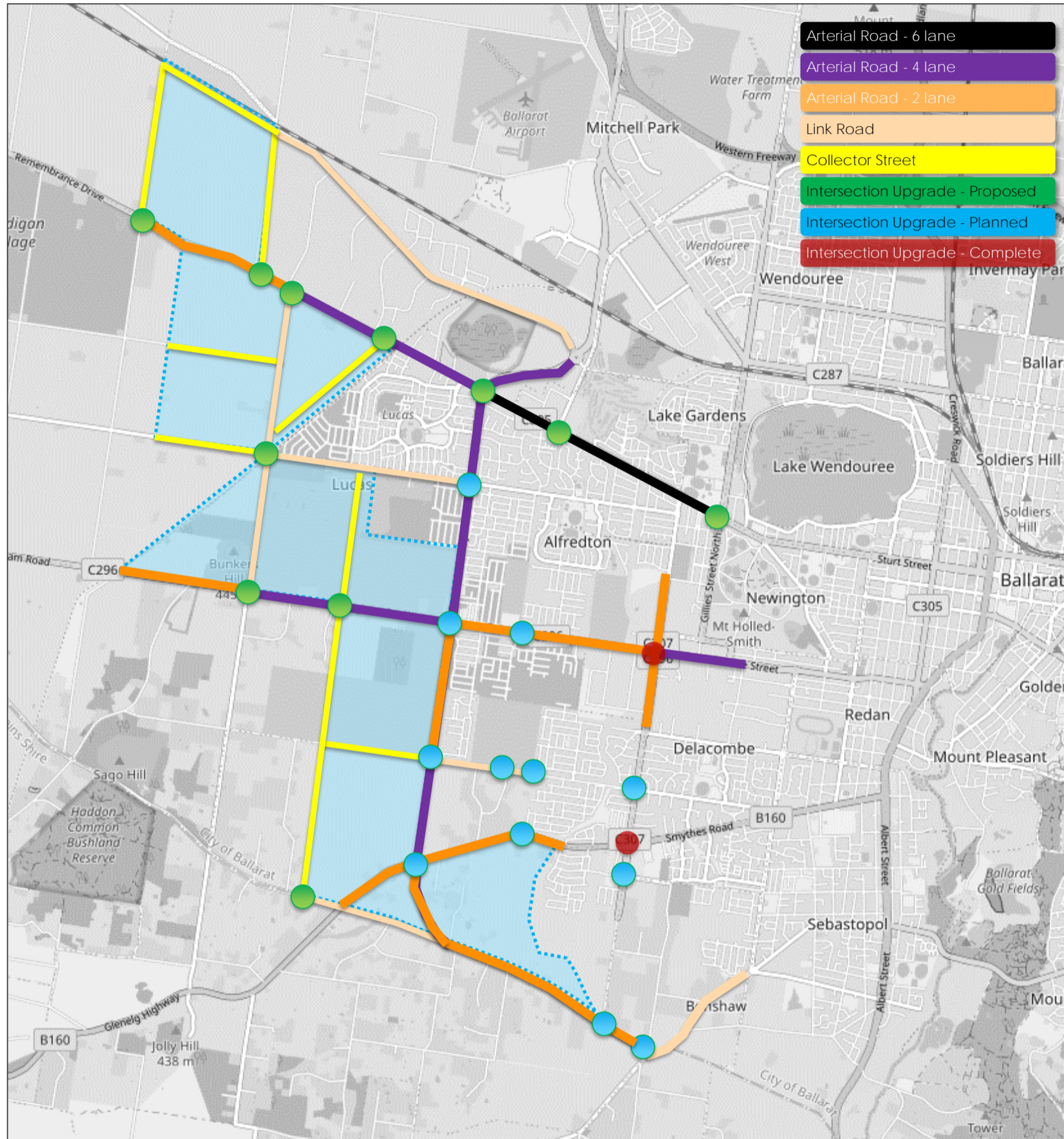




Figure 18 Traffic Network – High Yield





8.3 Discussion

Notable observations from the modelling include:

- The low-yield scenario of 15dw/h (plus non-residential uses) results in approximately 18,300 vpd in the section of Remembrance Drive west of the Link Road, suggesting no upgrade on this section would be required. Modelled traffic volumes in the high-yield scenario will exceed the capacity of the existing cross-section (20,000 vpd), east of Finchs Road, indicating approximately 23,000 vpd. The density threshold across both growth areas is approximately 16.5 dw/h, which equates to in the order of 7,900 dwellings within the north-western growth area, and 14,200 within the western area.
- It is anticipated that Remembrance Drive may be readily upgraded to a 4-lane cross-section up to Ring Road, as illustrated within Figure 19 and Figure 20 below.
- In low or high-growth scenarios, the section of Remembrance Drive / Sturt Street south-east of Link Road will require a 4-6 lane cross-section. A four-lane cross-section may be achieved per the sketch below. A 6-lane cross-section will necessitate removal of the existing trees as shown in Figure 20, though can be accommodated within the existing reservation. This should be considered in context with environmental and heritage considerations.
- Further south-east along Remembrance Drive / Sturt Street, it appears as though the north-westbound carriageway could be modified to provide two 3.5m traffic lanes, however it is expected that traffic along the outer edges of the pavement may impact the health of the trees. Additionally, placing traffic closer to these trees will likely necessitate crash protection with guardrail of some description.
- Latrobe Street (east of Wiltshire Lane) is expected to exceed its daily traffic capacity, necessitating an upgrade to a 4-lane cross-section;
- The duplication of Ballarat-Carngham Road east of Link Road is not considered necessary, with a 2-lane cross-section sufficient for future traffic flows. Estimates of future volumes suggesting a 4-lane cross-section would be required between Finchs Road and Dyson Drive;
- The unconstructed portions of the Link Road will need either a 2-lane or 4-lane cross-section;
- Both Greenhalghs Road and Cuthberts Road are projected to have sufficient capacity for future growth in both scenarios. The impacts of continuing development within the PSP area should be confirmed.
- New intersections of Connector/Connector, Connector/Arterial or Arterial/Arterial roads will require upgrade to signalised or roundabout control to ensure they remain functioning at appropriate safety and capacity levels. Various existing intersections will also require capacity upgrades to match into expanded approach roads, and may require localised flaring or acquisition to cater for turn lanes and paths where matching into widened cross-sections.
- In broad terms, the preceding modelling estimates indicate that the planned level of development can be catered for, subject to the provision of supporting transport infrastructure.
- Additional development capacity could be potentially realised within the north-western precinct, should a formalised rail crossing and road connection be provided to Wiggins Road / Airport Road. It is noted however that this will be required to be grade-separated, at considerable expense.
- Further technical investigations will need to be undertaken as part of PSP preparation to determine constraints associated with the proposed road network, including consideration of cultural heritage, amenity and vegetation.
- Further development and provision of sustainable transport options (e.g. mobility hubs) may assist with minimising traffic infrastructure requirements.



Figure 19 Remembrance Drive: Finchs Road to Link Road – Existing (top) and proposed (bottom)

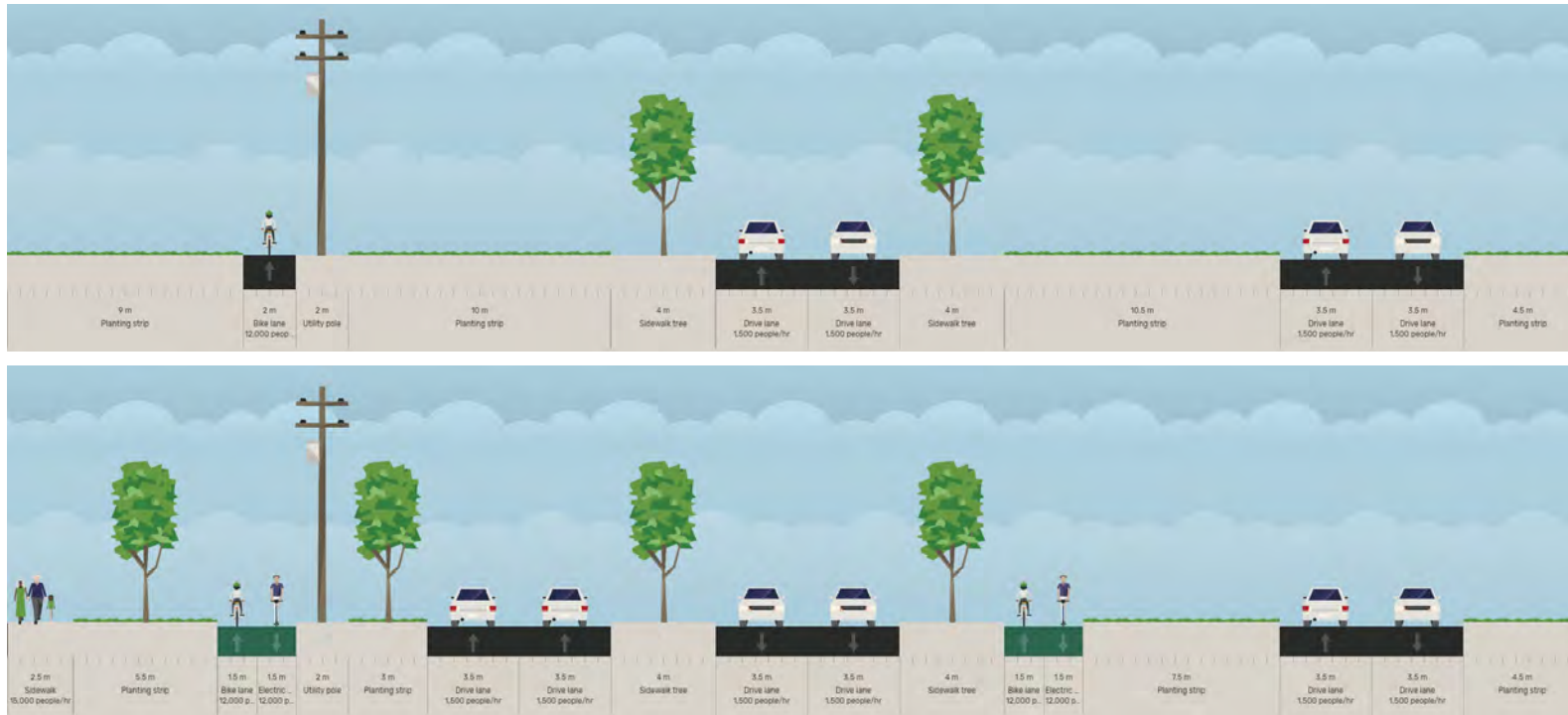
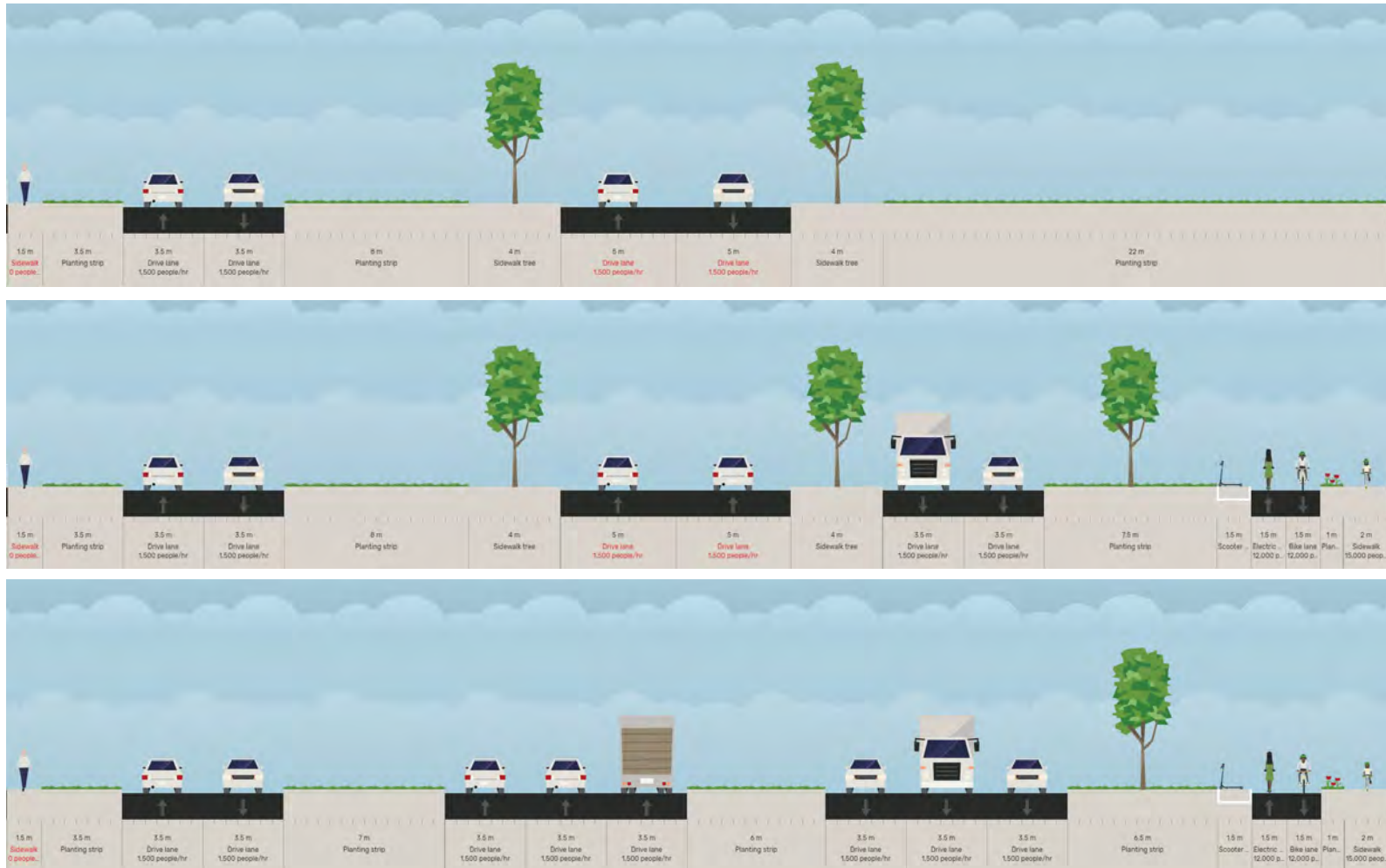




Figure 20 Remembrance Drive: Link Road to Ring Road – Existing (top), 4-lane (middle), 6-lane (bottom)



The above analysis and conclusions are drawn from a conventional "predict and provide" approach to modelling. The development of these growth areas is a long-term prospect, and likely represents a land supply for in excess of 30 years. This long-term development horizon suggests likely changes in household trip generation, and ongoing reductions in car trips. Should the growth areas succeed in achieving many of Council's aspirations for increased active and public transport use, there will naturally be reduced reliance on private vehicle trips, and lesser requirements for supporting road infrastructure.

Additionally, there are both "push" and "pull" factors that influence travel mode choice. Introduction of improved sustainable transport services and facilities "pull" more trips by improving the relative attractiveness of these modes. "Push" factors include elements like traffic congestion or parking pricing that offer a disincentive to private vehicle trips, and are an important travel demand management tool. There is presently limited congestion in Ballarat during commuter peak periods, but with ongoing development from the PSP and growth areas, this is expected to increase.

8.4 Sensitivity Testing

In addition to the above analysis, we have been requested to evaluate the development capacity and traffic impacts to the growth areas if the Link Road extension to Bells Road is never able to be delivered. This assessment is outlined below, which considers both the fully developed growth areas, and an evaluation of development capacity up to typical capacity thresholds for key road links.

The modelling results assume the completion of the following pieces of road infrastructure:

- Duplication of Ballarat-Carngham Road (as a four-lane arterial);
- Completion of all roads and intersections within the Ballarat West PSP.

The additional daily traffic volumes within and surrounding the growth areas are illustrated in Figure 15 below.

Figure 21 Traffic Volume Growth – Low Yield (No Link Road)

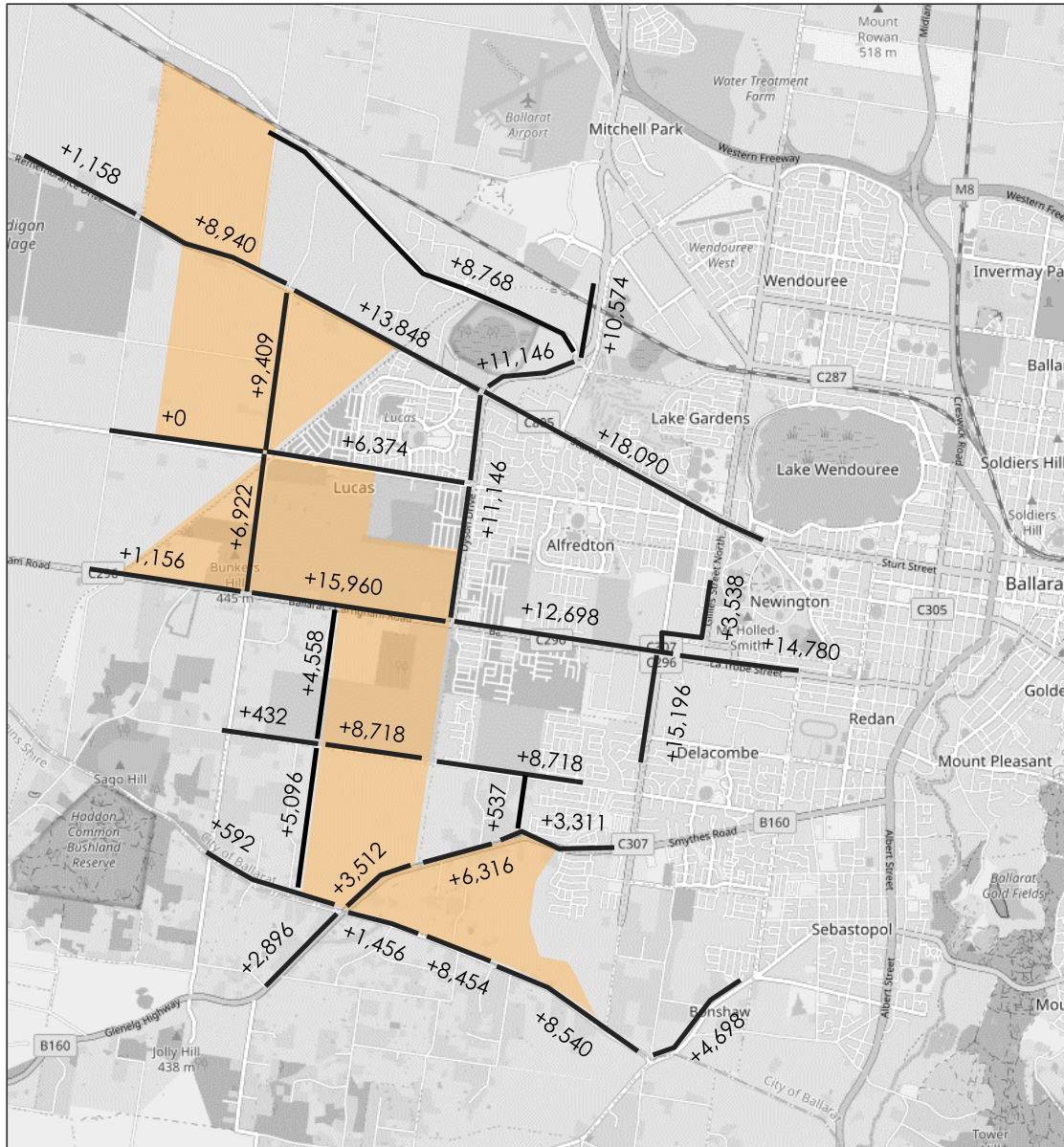


Figure 22 Traffic Volume Growth – High Yield (No Link Road)

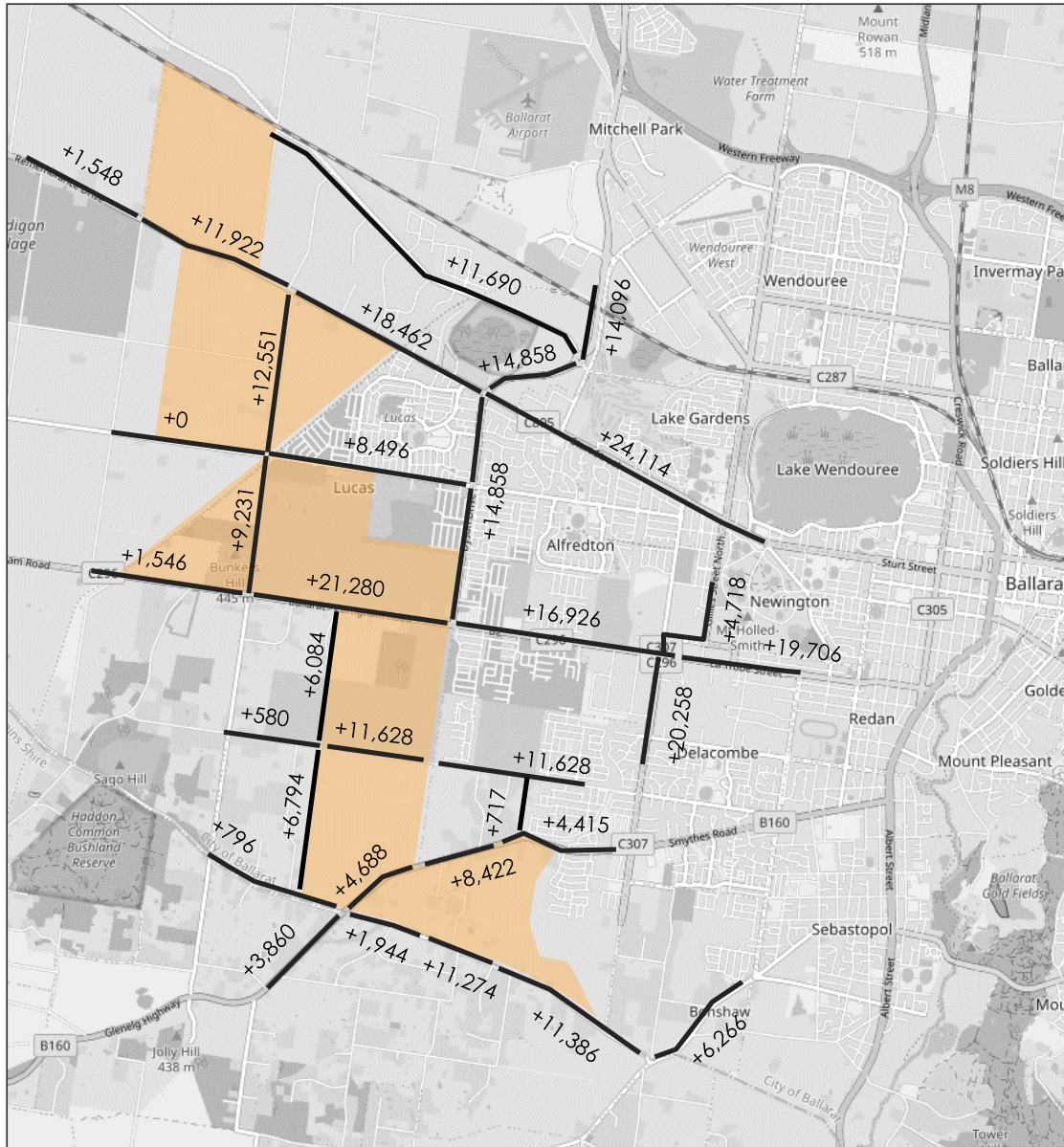




Table 5 Future Road Network (No Link Road)

Road Name	Location	Low Yield				High Yield			
		Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition	Approximate Future Traffic Volumes	Future Classification	Upgrade Required	Land Acquisition
Remembrance Drive	West of Draffins Rd	2,000	Arterial – 2 lane	No	None	2,500	Arterial – 2 lane	No	None
Remembrance Drive	Draffins Rd & Finchs Rd	12,500	Arterial – 2 lane	No	None	15,500	Arterial – 2 lane	No	None
Remembrance Drive	Finchs Rd & Dyson Dr	17,500	Arterial – 2 lane	No	None	22,000	Arterial – 4 lane	Yes	None
Remembrance Drive	East of Dyson Dr	30,000	Arterial – 4 lane	Yes	None	36,000	Arterial – 4 lane	Yes	Yes
Finchs Road	Cuthberts Rd & Remembrance Dr	9,500	Link Road	Yes	Yes	12,500	Link Road	Yes	Yes
Finchs Road	Ballarat-Carngham Rd & Cuthberts Rd	7,000	Link Road	Yes	Yes	9,000	Link Road	Yes	Yes
Cuthberts Road	West of Finchs	1,000	Collector Street	Yes	None	1,000	Collector Street	Yes	None
Cuthberts Road	East of Finchs	8,500	Link Road	Yes	None	10,500	Link Road	Yes	None
Ballarat-Carngham Road	West of Finchs Rd	1,500	Arterial – 2 lane	No	None	1,500	Arterial – 2 lane	No	None
Ballarat-Carngham Road	Finchs Rd & Dyson Dr	21,000	Arterial – 4 lane	Yes	Yes (PAO)	26,500	Arterial – 4 lane	Yes	Yes (PAO)
Ballarat-Carngham Road	Dyson Dr & Wiltshire Ln	16,000	Arterial – 2 lane	No	Yes (PAO)	20,500	Arterial – 4 lane	Yes	Yes (PAO)
Latrobe Street	East of Wiltshire Ln	26,000	Arterial – 4 lane	Yes	None	30,500	Arterial – 4 lane	Yes	None
Learmonth Street	North of Ballarat-Carngham Rd	17,500	Arterial – 2 lane	No	None	18,500	Arterial – 2 lane	No	None
Wiltshire Lane	South of Ballarat-Carngham Rd	28,000	Arterial – 4 lane	Yes	None	33,500	Arterial – 4 lane	Yes	None
Link Road	North of Blind Creek Rd	15,500	Arterial – 2 lane	No	None	19,000	Arterial – 2 lane	No	None
Link Road (Dyson Drive)	Remembrance Dr & Blind Creek Rd	17,000	Arterial – 2 lane	No	None	21,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	R*embrance Dr & Ballarat-Carngham Rd	21,500	Arterial – 4 lane	Yes	None	25,000	Arterial – 4 lane	Yes	None
Link Road (Dyson Drive)	Ballarat-Carngham Rd & Greenhalghs Rd	-	-	-	-	-	-	-	-
Link Road (Dyson Drive)	Greenhalghs Rd & Glenelg Hwy	-	-	-	-	-	-	-	-
Greenhalghs Road	West of Hayes Dr	500	Rural Access	No	None	500	Rural Access	No	None
Greenhalghs Road	Hayes Dr & Link Rd	10,000	Link Road	Yes	Yes	13,000	Link Road	Yes	Yes
Greenhalghs Road	East of Link Rd	10,500	Link Road	Yes*	No	13,500	Link Road	Yes*	No
Bells Road	West of Glenelg Hwy	2,000	Link Road	Yes	None	2,000	Link Road	Yes	None
Bells Road	Glenelg Hwy & Link Rd	1,500	Link Road	Yes	None	2,000	Link Road	Yes	None
Bells Road	Link Road & Doble Rd	3,000	Link Road	No	None	4,000	Link Road	No	None
Bells Road	Doble Rd & Ross Creek Rd	8,500	Link Road	No	None	11,500	Link Road	No	None
Bells Road	East of Ross Creek Rd	10,000	Link Road	No	None	13,000	Link Road	No	None
Glenelg Highway	Southwest of Bells Rd	8,000	Arterial – 2 lane	No	None	9,000	Arterial – 2 lane	No	None
Glenelg Highway	Bells Rd to Link Rd	10,000	Arterial – 2 lane	No	None	11,000	Arterial – 2 lane	No	None
Glenelg Highway	Link Rd to Masada Blvd	12,500	Arterial – 2 lane	No	None	15,000	Arterial – 2 lane	No	None
Glenelg Highway	East of Masada Blvd	8,500	Arterial – 2 lane	No	None	9,500	Arterial – 2 lane	No	None
Ross Creek Road	North of Bells Rd	5,500	Link Road	No	None	7,500	Link Road	No	None
Blind Creek Road	West of Link Road	10,000	Link Road	Yes	None	12,500	Link Road	Yes	None
N/S Collector	Ballarat-Carngham Rd & Greenhalghs Rd	4,500	Collector Street	Yes	Yes	6,000	Collector Street	Yes	Yes
N/S Collector	Greenhalghs Rd & Glenelg Hwy	5,000	Collector Street	Yes	Yes	7,000	Collector Street	Yes	Yes
Innsbruck Road	Greenhalghs Rd & Glenelg Hwy	1,000	Link Road	Yes*	No	1,000	Link Road	Yes*	No

* To be upgraded within Ballarat West PSP area



Figure 23 Traffic Network – Low Yield (No Link Road)

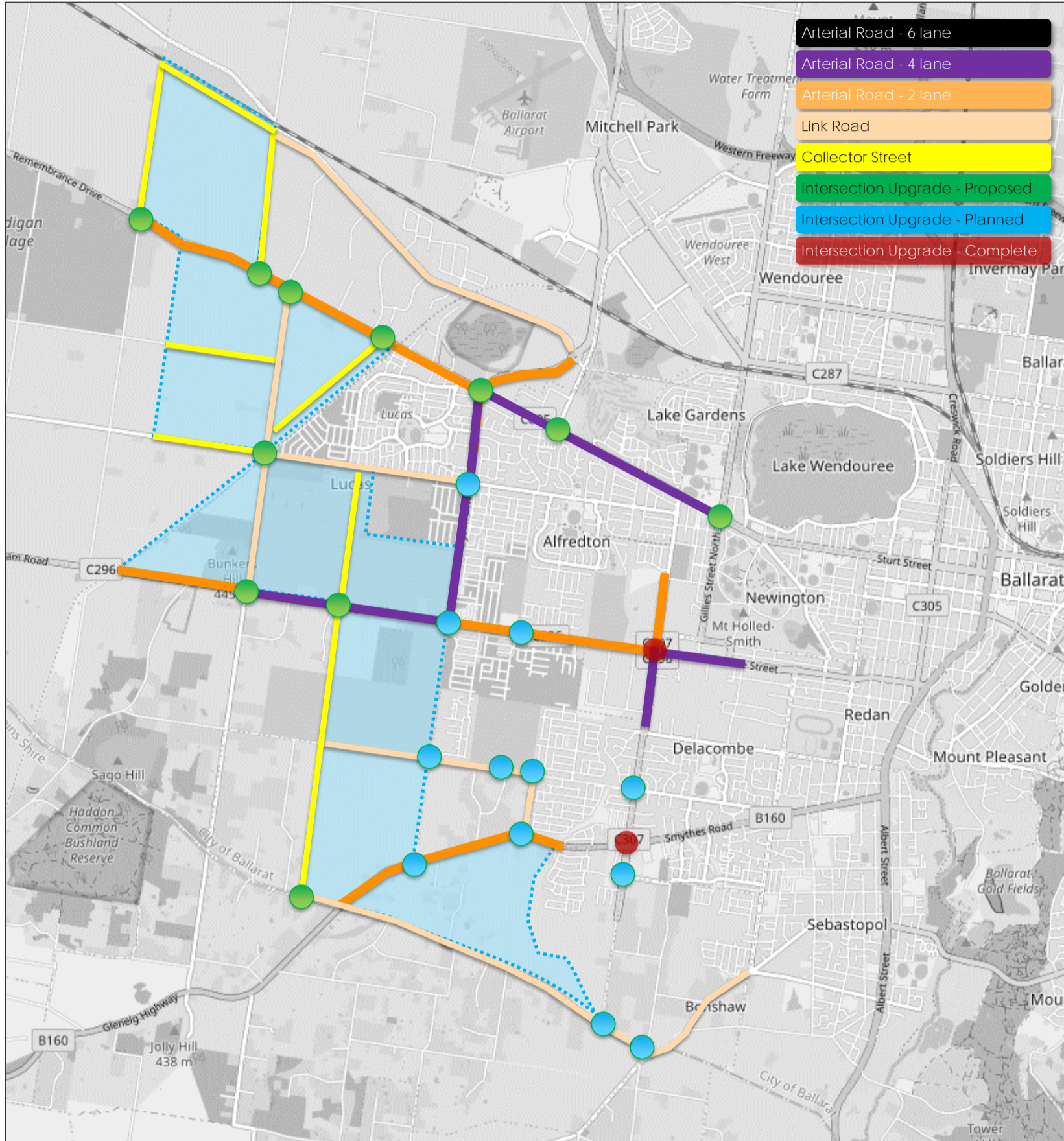
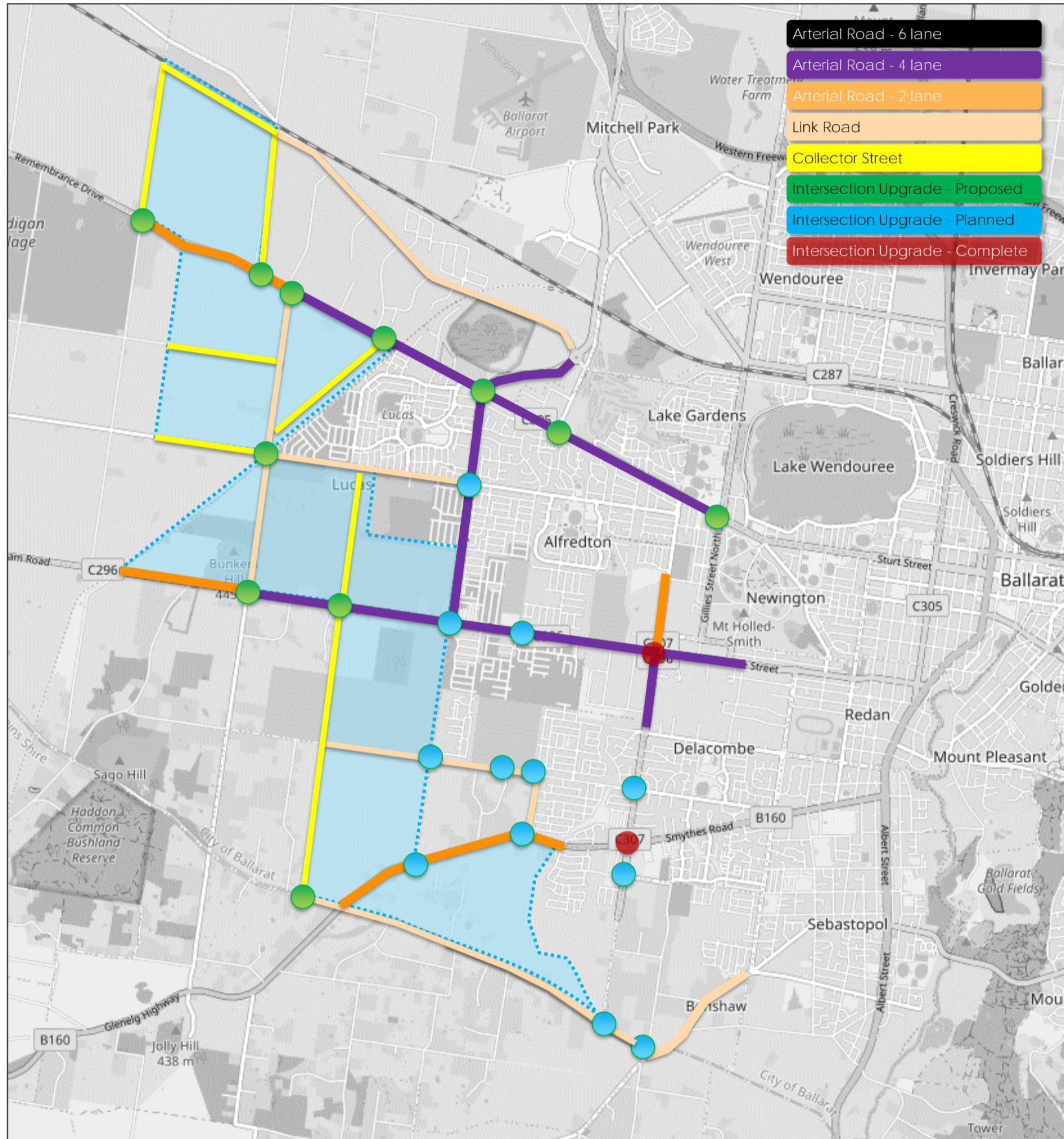




Figure 24 Traffic Network – High Yield (No Link Road)





Notable observations from the modelling include:

- The removal of the southern portion of the Link Road places a greater reliance on alternative north-south road connections and linking routes. Ballarat-Carngham Road, Wiltshire Lane and Greenhalghs Road in particular are required to accommodate higher traffic volumes relative to the equivalent Link Road scenario;
- Traffic volumes along Remembrance Drive still necessitate upgrades to either 4-lane or 6-lane cross-sections. As identified above, a 4-lane cross-section may be relatively easily accommodated west of the Link Road, however upgrades east of the Link Road would necessitate alterations to the existing tree planting;
- Subject to resolving the upgrade requirements on Remembrance Drive, the planned levels of development can be accommodated.

We have determined development thresholds (number of developed lots) at which point critical roads must be upgraded to provide additional mid-block capacity. These are outlined below in Table 6

Table 6 Road Upgrade Thresholds

		Road Upgrade	Threshold
Remembrance Drive	Finchs Rd & Dyson Dr	2 lanes > 4 lanes	15,600 lots
Remembrance Drive	East of Dyson Dr	2 lanes > 4 lanes	9,400 lots
Ballarat-Carngham Road	Finchs Rd & Dyson Dr	2 lanes > 4 lanes	18,700 lots
Ballarat-Carngham Road	Dyson Dr & Wiltshire Ln	2 lanes > 4 lanes	25,400 lots
Latrobe Street	East of Wiltshire Ln	2 lanes > 4 lanes	12,000 lots
Wiltshire Lane	South of B-C Rd	2 lanes > 4 lanes	9,400 lots
Link Road (Dyson Drive)	R'brance Dr & Blind Creek Rd	2 lanes > 4 lanes	25,400 lots
Link Road (Dyson Drive)	R'brance Dr & B-C Rd	2 lanes > 4 lanes	17,400 lots

8.5 Development Sequencing

In addition to the above analysis, we have also undertaken a review of potential sequencing of development, to understand how this may impact on the timing and need for transport infrastructure.

Assuming that the Link Road is not completed prior to any land development occurring within the study area, we have established that any half of the southern or northern portions of the Western and North-Western growth areas may be fully developed without requiring road cross-section upgrades external to the study area. Capacity constraints on Cuthberts Road immediately west of the Link Road may need to be reviewed with ongoing development in this area. There would naturally be a requirement though for provision of roads and intersections servicing the precinct directly.

Should the North-Western precinct develop first in its entirety (approximately 9,600 lots), then the upgrade warrants for Remembrance Drive (east of Dyson Drive) would be met (by 500 vehicles per day).

Should the Western precinct develop first in its entirety (approximately 17,200 lots), then upgrades to Latrobe Street (east of Wiltshire Lane) and Wiltshire Lane (south of Ballarat-Carngham Road) would be met, exceeding capacity by approximately 3,500-4,000 vehicles per day.

If the Link Road is constructed at the time of development, development thresholds and upgrades are generally the same, with the exception of the Western growth precinct. Should the northern portion of this area develop first (7,700 lots), warrants would be met for Latrobe Street duplication, and Ballarat-Carngham Road (between Finchs Road and Link Road) due to increased reliance on



Link Road for north-south connections. Should the southern portion develop first (9,500 lots), there are no requirements for transport upgrades at all across the study area and surrounds (except for direct connections and internal roads).

We emphasise that the above conclusions assume all roads and upgrades contemplated within the BWSP are completed. At such time that any PSPs for the growth areas are prepared, or precincts developed it is recommended that further modelling specific to those areas is undertaken.

8.6 Cost Apportionment

onemilegrid has been requested to provide comment on the basis or need for contributions from the study areas towards funding of the Link Road construction.

The principles of establishing contributions towards communally used infrastructure were established at the Administrative Appeals Tribunal of Victoria (Eddie Barron Constructions Pty Ltd v Shire of Pakenham (1991)) and are summarised below:

- 1) Need – The need created by the development and the measures, to satisfy the need must be adequately identified
- 2) Equity – The payment or levy must be a fair and reasonable apportionment of the cost of implementing the need satisfaction measures
- 3) Accountability – The responsible authority should implement procedures to ensure that the money collected cannot be used for any purpose other than that for which it was levied and which clearly show how, when and where the money collected is spent
- 4) Nexus – There must be a reasonable nexus between the development and the need satisfaction measures

While the transport network may function without the southern portion of the Link Road, there is greater reliance on alternative, less direct access routes, and there is clearly a *need* for the infrastructure.

An established methodology for calculating an *equitable* contribution towards infrastructure upgrades is based on the relative contribution of each party towards future traffic volumes. This ensures that any 'agent of change' is not unreasonably imposed the entire costs of mitigating measures because (for example) they are the last to develop. Modelling results presented in Table 4 indicate daily traffic volumes of between 14,500 and 24,000 on new sections of the Link Road, in isolation of changes in existing traffic movements from completion of the road, and also excluding any traffic growth associated with ongoing development in the Ballarat West PSP area. Further analysis will need to be undertaken to determine the relative proportions of traffic flow associated with the study area.

In terms of *accountability*, it is envisioned that there will be a legal arrangement whereby any contributions must be directed towards the transport infrastructure. This is beyond the scope of our review.

The generally accepted tests of *nexus* are that:

- 1) The condition must fairly and reasonably relate to the proposed development
- 2) The condition must reasonably be directed to the achievement of a planning objective or at least have that effect

There is a direct link between development within the study area, and the performance of the surrounding transport network, and that the upgrades benefit both the broader community and residents and visitors to the growth areas.



9 CONCLUSION

onemilegrid has been engaged by Taylors on behalf of Ballarat City Council to assist with traffic and transport aspects of an Infrastructure Servicing Strategy for the Western and North-Western Growth Areas of Ballarat. This strategy is intended to identify key issues or constraints associated with future development of the area and plan for necessary infrastructure to support future residents.

It is envisioned that this document is primarily an assessment of the general feasibility of further land development, which will eventually be followed by further assessment and analysis as part of a Precinct Structure Planning process.

Having regard to the preceding report, we can draw the following conclusions:

- Council has prepared a considerable body of strategic documentation that outlines its desire for a healthy and sustainable city. These provide clear direction on the provision of active and public transport facilities within established and growth areas of the city.
- The growth areas are located in close proximity to the Ballarat West Precinct Structure Plan area, that is undergoing development. Traffic growth and infrastructure provided in the PSP area will naturally influence traffic conditions on major access routes to the growth areas that are the focus of this review.
- Provision of high-quality public transport services to the growth areas will be essential to **achieving many of Council's transport goals**. Provision should be made for the following public transport elements as part of the Infrastructure Servicing Strategy:
 - ✦ A future railway station.
 - ✦ High-frequency routes along the transit corridors of Ballarat-Carngham Road, Glenelg Highway, Remembrance Drive and the Link Road.
 - ✦ Secondary bus routes along adjacent major roads to achieve increased coverage.
 - ✦ Provision for bus head start infrastructure at all signalised intersections.
- Similarly, active transport infrastructure should be considered in the transport infrastructure needs of the growth areas, and should generally include:
 - ✦ Provision of dedicated off-road bicycle paths along arterial routes, separated from pedestrian facilities.
 - ✦ Provision of alternate cycling and shared path facilities for recreation along waterways and reserves.
 - ✦ Retention of the Ballarat-Skipton Rail Trail and improvement as an active transport connection.
 - ✦ Priority crossings for shared paths and bicycle paths at uncontrolled side-road intersections.
 - ✦ Signalised pedestrian crossings where signalised intersections are otherwise not provided near major destinations.
 - ✦ Potential for mobility hubs at key locations.
- Traffic modelling has been undertaken to assess the potential demand for vehicle trips within the growth areas and along key feeder routes. This assessment has not considered the cumulative impacts of undeveloped land within the BWSP area, but has assumed that the BWSP road network is fully delivered.
- The modelling assumes a traffic generation rate lower than typically adopted, on the assumption that the growth areas will be serviced by a dense, high-quality network of sustainable transport options.
- Considerable traffic growth is expected in many locations, but modelling estimates indicate that the planned level of development can be catered for, subject to the provision of supporting transport infrastructure triggering requirements for upgraded traffic infrastructure.



- Sufficient space is largely available to facilitate these upgrades within existing or planned road reservations, with the exception of Remembrance Drive, where upgrades may necessitate the removal of important trees within the reservation under some development scenarios.
- Further technical investigations will need to be undertaken as part of PSP preparation to determine constraints associated with the proposed road network, including consideration of cultural heritage, amenity and vegetation. Additionally, further review of sustainable transport options and travel demand management tools may assist with minimising traffic infrastructure requirements however these are beyond the scope of this review.
- Should the southern portion of the Link Road not be completed, the network may still cater for development, albeit with increase infrastructure requirements elsewhere across the network;
- Development thresholds (no. of lots) have been determined to identify when key infrastructure elements would need to be delivered.
- The sequence of lane development will influence the need for supporting traffic infrastructure, but (subject to this infrastructure being provided), there is no preference for a preferred development sequence from a transport perspective.
- There is likely to be a reasonable case for contributions from the growth areas towards construction of the Link Road.
- As further planning for the growth areas development occurs, there is likely to be need for more detailed traffic analysis, including identification for intersection upgrades and triggers, which is typically undertaken during the conventional PSP process.

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



16 APPENDIX E – TRAFFIC & TRANSPORT INFRASTRUCTURE LIST

North Western Growth Area

Item	Growth Area	Precinct	Resp'ble Authority	Road Classification VPA List	Intersection Classification VPA List	Indicative Estimate (\$)	Funding Means	DCP Estimate	Comments
Low Yield - Road Projects									
Draffins Road Upgrade (Between Remembrance Dr & Railway Interface Road) from rural 2 lane road to Collector Road	NW	5	Council	Collector Road		\$11.10M	Developer		
Dowling Road Upgrade (Between Remembrance Dr & Railway Interface Road) from rural 2 lane road to Collector Road	NW	5	Council	Collector Road		\$10.20M	Developer		
Railway Interface Road (Between Draffins Rd & Dowling Rd) new Collector Road	NW	5	Council	Collector Road		\$8.79M	Developer		
Remembrance Drive Upgrade (Between Ballarat Link Road & Skipton Rail Trail (Future Rd)) Upgrade from local 2 lane to 2 lane arterial.	NW	4 & 5	Council	Secondary Arterial		\$9.60M	DCP	\$9.60M	
Remembrance Drive Upgrade (Between Ring Road & Ballarat Link Road) Upgrade from 2 lane to 4 lane arterial.	NW	4 & 5	Council	Primary Arterial		\$9.70M	DCP	\$9.70M	
Remembrance Drive Upgrade (Between Gillies Street & Ring Road) Upgrade from 2 lane to 4 lane arterial.	NW	4 & 5	Council	Primary Arterial		\$21.95M	DCP	\$21.95M	
Remembrance Drive Upgrade (Between Dowling Rd & Draffins Rd) Upgrade from rural 2 lane to 2 lane arterial.	NW	4 & 5	Council	Secondary Arterial		\$11.68M	DCP	\$11.68M	
Remembrance Drive Upgrade (Between Finchs Rd & Dowling Rd) Upgrade from rural 2 lane to 2 lane arterial.	NW	4 & 5	Council	Secondary Arterial		\$3.92M	DCP	\$3.92M	
Remembrance Drive Upgrade (Between Finchs Rd & Skipton Rail Trail Interface Rd) Upgrade from rural 2 lane to 2 lane arterial.	NW	4 & 5	Council	Secondary Arterial		\$10.80M	DCP	\$10.80M	
Finchs Road – Btwn Cuthberts Rd & Remembrance Dr. Upgrade from unsealed road to 2 lane collector road.	NW	4	Council	Link Road		\$11.70M	Developer		
Cuthberts Road - West of Finchs. Upgrade from 2 lane country road to 2 lane collector road.	NW	4	Council	Collector Road		\$8.70M	Developer		
Ballarat Link Road Upgrade (Between Remembrance Drv & Blind Creek Rd) to 2 lane arterial.	NW	4 & 5	Council	Secondary Arterial		\$9.60M	DCP	\$9.60M	
Blind Creek Road Upgrade (Between Dowling Rd & Ballarat Link Rd) from 2 lane rural to link road.	NW	5	Council	Link Road		\$27.18M	DCP	\$27.18M	
Smarts Hill Road (Between Finchs Rd & Precinct Boundary) construction of Collector Road	NW	4	Council	Collector Road		\$8.50M	Developer		
Skipton Rail Trail Interface Road (Between Finchs Rd & Remembrance Dr) construction of Collector Road	NW	4	Council	Collector Road		\$11.60M	Developer		
Low Yield - Intersection Projects									
Remembrance Drive - Ballarat Ring Road - T intersection	NW	4 & 5	Council		Primary / Secondary T signalised	\$5.50M	Part DCP / State Gov	\$2.75M	Minimal upgrade required on this intersection. Is already 4 lane on west side and 2 lanes west bound approaching intersection. Really on east bound departing intersection that needs work.
Remembrance Drive / Ballarat Link Road - Cross Intersection	NW	4 & 5	Council		Primary / Secondary Cross signalised	\$8.58M	Part DCP / State Gov	\$4.29M	

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Item	Growth Area	Precinct	Resp'ble Authority	Road Classification VPA List	Intersection Classification VPA List	Indicative Estimate (\$)	Funding Means	DCP Estimate	Comments
Sturt Street / Gillies Street - Cross intersection	NW	4 & 5	Council		Primary / Existing Secondary Cross signalised	\$8.58M	Part DCP / State Gov	\$4.29M	
Remembrance Drive / Skipton Rail Trail Interface Road - T Intersection	NW	4	Council		Secondary /Connector Blvd T signalised	\$4.39M	DCP	\$4.39M	
Remembrance Drive / Finchs Road - T intersection	NW	4	Council		Primary /Connector Blvd T signalised	\$4.80M	DCP	\$4.80M	
Remembrance Drive / Dowling Road - T Intersection	NW	5	Council		Secondary /Connector Blvd T signalised	\$4.39M	DCP	\$4.39M	
Remembrance Drive / Draffins Road / Whites Road - Cross intersection	NW	5	Council		Secondary /Connector Blvd Cross signalised	\$5.33M	DCP	\$5.33M	
Bicycle Lanes			Council				DCP		
Bus Routes and Stops			Council				DCP		
						\$216.59M		\$134.67M	
High Yield - Road Projects									
Draffins Road Upgrade (Between Remembrance Dr & Railway Interface Road) from rural 2 lane road to Collector Road	NW	5	Council	Collector Road		\$11.10M	Developer		
Dowling Road Upgrade (Between Remembrance Dr & Railway Interface Road) from rural 2 lane road to Collector Road	NW	5	Council	Collector Road		\$10.20M	Developer		
Railway Interface Road (Between Draffins Rd & Dowling Rd) new Collector Road	NW	5	Council	Collector Road		\$8.79M	Developer		
Remembrance Drive Upgrade (Between Ballarat Link Road & Skipton Rail Trail (Future Rd)) Upgrade from local 2 lane to 2 lane arterial.	NW	4 & 5	Council	Primary Arterial		\$12.00M	Part DCP / State Gov	\$12.00M	Also seek Stage Gov funding
Remembrance Drive Upgrade (Between Ring Road & Ballarat Link Road) Upgrade from 2 lane to 6 lane arterial.	NW	4 & 5	Council	Primary Arterial		\$12.13M	Part DCP / State Gov	\$12.13M	Also seek Stage Gov funding
Remembrance Drive Upgrade (Between Gillies Street & Ring Road) Upgrade from 2 lane to 6 lane arterial.	NW	4 & 5	Council	Primary Arterial		\$27.44M	Part DCP / State Gov	\$27.44M	Also seek Stage Gov funding
Remembrance Drive Upgrade (Between Dowling Rd & Draffins Rd) Upgrade from rural 2 lane to 2 lane arterial.	NW	4 & 5	Council	Secondary Arterial		\$11.68M	DCP	\$11.68M	
Remembrance Drive Upgrade (Between Finchs Rd & Dowling Rd) Upgrade from rural 2 lane to 2 lane arterial.	NW	4 & 5	Council	Secondary Arterial		\$3.92M	DCP	\$3.92M	
Remembrance Drive Upgrade (Between Finchs Rd & Skipton Rail Trail Interface Rd) Upgrade from rural 2 lane to 4 lane arterial.	NW	4 & 5	Council	Primary Arterial		\$13.50M	DCP	\$13.50M	
Finchs Road – Btwn Cuthberts Rd & Remembrance Dr. Upgrade from unsealed road to 2 lane collector road.	NW	4	Council	Link Road		\$11.70M	Developer		
Cuthberts Road - West of Finchs. Upgrade from 2 lane country road to 2 lane collector road.	NW	4	Council	Collector Road		\$8.70M	Developer		
Ballarat Link Road Upgrade (Between Remembrance Dr & Blind Creek Rd) to 2 lane arterial.	NW	4 & 5	Council	Primary Arterial		\$12.00M	DCP	\$12.00M	
Blind Creek Road Upgrade (Between Dowling Rd & Ballarat Link Rd) from 2 lane rural to link road.	NW	5	Council	Link Road		\$27.18M	DCP	\$27.18M	
Smarts Hill Road (Between Finchs Rd & Precinct Boundary) construction of Collector Road	NW	4	Council	Collector Road		\$8.50M	Developer		
Skipton Rail Trail Interface Road (Between Finchs Rd & Remembrance Dr) construction of Collector Road	NW	4	Council	Collector Road		\$11.60M	Developer		
High Yield - Intersection Projects									

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Item	Growth Area	Precinct	Resp'ble Authority	Road Classification VPA List	Intersection Classification VPA List	Indicative Estimate (\$)	Funding Means	DCP Estimate	Comments
Remembrance Drive / Ballarat Ring Road - T intersection	NW	4 & 5	Council		Primary / Secondary T signalised	\$6.50M	Part DCP / State Gov	\$3.25M	Minimal upgrade required on this intersection. Is already 4 lane on west side and 2 lanes west bound approaching intersection. Really on east bound departing intersection that needs work.
Remembrance Drive / Ballarat Link Road - Cross Intersection	NW	4 & 5	Council		Primary / Primary Cross signalised	\$9.00M	Part DCP / State Gov	\$4.50M	
Sturt Street / Gillies Street - Cross intersection	NW	4 & 5	Council		Primary / Existing Secondary Cross signalised	\$8.80M	Part DCP / State Gov	\$4.40M	
Remembrance Drive / Skipton Rail Trail Interface Road - T Intersection	NW	4	Council		Primary / Connector Blvd T signalised	\$4.80M	DCP	\$4.80M	
Remembrance Drive / Finchs Road - T intersection	NW	4	Council		Primary / Link Rd T signalised	\$5.00M	DCP	\$5.00M	
Remembrance Drive / Dowling Road - T Intersection	NW	5	Council		Primary / Connector Blvd T signalised	\$4.39M	DCP	\$4.39M	
Remembrance Drive / Draffins Road / Whites Road - Cross intersection	NW	5	Council		Primary / Connector Blvd Cross signalised	\$5.33M	DCP	\$5.33M	
Bicycle Lanes			Council				DCP		
Bus Routes and Stops			Council				DCP		
						\$234.26M		\$151.52M	

Western Growth Area

Item	Growth Area	Precinct	Resp'ble Authority	Road Classification VPA List	Intersection Classification VPA List	Indicative Estimate (\$)	Funding Means	DCP Estimate	Comments
Low Yield - Road Projects									
Finchs Road – Btwn Ballarat-Carngham Rd & Cuthberts Rd. Upgrade from unsealed road to 2 lane collector road.	W	3	Council	Link Road		\$10.02M	Developer		
Cuthberts Road - Btw Finchs Rd & North-South Collector. Upgrade from 2 lane country road to 2 lane collector road.	W	3	Council	Link Road		\$3.30M	DCP	\$3.30M	Collector Road external to the Growth Area
Cuthberts Road - Btw North-South Collector & Dyson Dr. Upgrade from 2 lane country road to 2 lane collector road.	W	3	Council	Link Road		\$11.25M	DCP	\$11.25M	Road upgrade outside of growth area
Ballarat-Carngham Road – Btwn Finchs Rd & North-South Collector Rd. Upgrade from 2 lane country road to 4 lane arterial.	W	3	Council	Primary Arterial		\$12.25M	DCP	\$12.25M	
Ballarat-Carngham Road – Btwn North-South Collector Rd & Dyson Dr. Upgrade from 2 lane country road to 4 lane arterial.	W	2 & 3	Council	Primary Arterial		\$12.00M	DCP	\$12.00M	
Ballarat-Carngham Road - Btwn Dyson Dr & Wiltshire Ln. Upgrade from 2 lane country road to 2 lane arterial.	W	2 & 3	Council	Secondary Arterial		\$19.68M	DCP	\$19.68M	
Ballarat-Carngham Road - Btwn Finchs Rd & Skipton Rail Trail. Upgrade from 2 lane country road to 2 lane arterial.	W	3	Council	Secondary Arterial		\$12.36M	DCP	\$12.36M	
Latrobe Street – East of Wiltshire Lane. Upgrade short section from 2 lane arterial to 4 lane arterial.	W	2 & 3	Council	Primary Arterial		\$10.30M	Part DCP / State Gov	\$5.15M	
Wiltshire Lane Upgrade (Btw La Trobe St & Whitelaw Ave) upgrade to 4 lane arterial road.	W	2 & 3	Council	Primary Arterial		\$9.80M	Part DCP / State Gov	\$4.90M	

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Item	Growth Area	Precinct	Resp'ble Authority	Road Classification VPA List	Intersection Classification VPA List	Indicative Estimate (\$)	Funding Means	DCP Estimate	Comments
Learnmouth Street Upgrade (Btw La Trobe St & Napier Ave) upgrade to 2 lane arterial road.	W	2 & 3	Council	Secondary Arterial		\$6.88M	Part DCP / State Gov	\$3.44M	
Greenhalghs Road – Btw North-South Collector & Dyson Dr. Upgrade from 2 lane country road to 2 lane collector road.	W	2	Council	Collector Road		\$7.32M	Developer		
Bells Road - West of Glenelg Hwy. Upgrade from 2 lane country road to 2 lane arterial.	W	2	Council	Link Road		\$2.49M	DCP	\$2.49M	
Bells Road – Btw Glenelg Hwy & Lewis Cr. Upgrade from 2 lane country road to 2 lane Link Road.	W	1	Council	Link Road		\$8.04M	DCP	\$8.04M	
Bells Road – Btw Lewis Cr & Cherry Flat Rd. Upgrade from 2 lane country road to 2 lane Link Road.	W	1	Council	Secondary Arterial		\$16.44M	DCP	\$16.44M	
Bells Road – Btw Cherry Flat Rd & Ross Creek Rd. Upgrade from 2 lane country road to 2 lane Link Road.	W	1	Council	Secondary Arterial		\$5.28M	DCP	\$5.28M	
North-South Collector Road (Btw Bells Road & Greenhalghs Rd). Construct new Collector Road.	W	2	Council	Collector Road		\$10.67M	Developer		
North-South Collector Road (Btw Greenhalghs Rd & Ballarat-Carngham Rd). Construct new Collector Road.	W	2	Council	Collector Road		\$9.67M	Developer		
North-South Collector Road (Btw Ballarat-Carngham Rd & Cuthberts Rd). Construct new Collector Road.	W	2	Council	Collector Road		\$9.61M	Developer		
Ballarat Link Road (Dyson Drive) – Btw R'brance Dr & Cuthberts Rd. Upgrade from 2 lane to 4 lane arterial.	W	1, 2 & 3	Council	Primary Arterial		\$11.00M	Part DCP / State Gov	\$5.50M	
Ballarat Link Road (Dyson Drive) – Btw Cuthberts Rd & Ballarat-Carngham Rd. Upgrade from 2 lane to 4 lane arterial.	W	1, 2 & 3	Council	Primary Arterial		\$16.50M	Part DCP / State Gov	\$8.25M	
Ballarat Link Road (Dyson Drive) – Btw Ballarat-Carngham Rd & Greenhalghs Rd. Upgrade to 2 lane arterial.	W	1, 2 & 3	Council	Secondary Arterial		\$13.20M	Part DCP / State Gov	\$6.60M	
Ballarat Link Road (Dyson Drive) – Btw Greenhalghs Rd & Glenelg Hwy. Upgrade to 2 lane arterial.	W	1, 2 & 3	Council	Secondary Arterial		\$9.76M	Part DCP / State Gov	\$4.88M	
Ballarat Link Road (Dyson Drive) – Btw Glenelg Hwy & Bells Rd. Construct new 2 lane arterial.	W	1, 2 & 3	Council	Secondary Arterial		\$8.80M	Part DCP / State Gov	\$4.40M	
Low Yield - Intersection Projects									
Finchs Road / Cuthberts Road - T intersection	W	3	Council		Link Road / Link Road T signalised	\$4.60M	DCP	\$4.60M	
Finchs Road / Ballarat Carngham Road - Cross intersection	W	3	Council		Primary / Secondary Cross signalised	\$6.00M	DCP	\$6.00M	
Ballarat Carngham Road /North-South Collector Road - Cross Intersection	W	2 & 3	Council		Primary / Connector Cross signalised	\$5.78M	DCP	\$5.78M	
Ballarat Carngham Road / Wiltshire Lane - Cross Intersection	W	2 & 3	Council		Primary / Secondary Cross signalised	\$8.58M	DCP	\$8.58M	
Bells Road / North-South Collector Road - T intersection	W	2	Council		Collector / Link Road signalised	\$4.20M	DCP	\$4.20M	
Bicycle Lanes			Council				DCP		
Bus Routes and Stops			Council				DCP		
						\$265.77M		\$175.37M	
High Yield - Road Projects									
Finchs Road – Btw Ballarat-Carngham Rd & Cuthberts Rd. Upgrade from unsealed road to 2 lane collector road.	W	3	Council	Link Road		\$10.02M	Developer		
Cuthberts Road - Btw Finchs Rd & North-South Collector. Upgrade from 2 lane country road to 2 lane collector road.	W	3	Council	Link Road		\$3.30M	DCP	\$3.30M	Collector external to the Growth Area
Cuthberts Road - Btw North-South Collector & Dyson Dr. Upgrade from 2 lane country road to 2 lane collector road.	W	3	Council	Link Road		\$11.25M	DCP	\$11.25M	Collector Road external to the Growth Area

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Item	Growth Area	Precinct	Resp'ble Authority	Road Classification VPA List	Intersection Classification VPA List	Indicative Estimate (\$)	Funding Means	DCP Estimate	Comments
Ballarat-Carngham Road – Btwn Finchs Rd & North-South Collector Rd. Upgrade from 2 lane country road to 4 lane arterial.	W	3	Council	Primary Arterial		\$12.25M	DCP	\$12.25M	
Ballarat-Carngham Road – Btwn North-South Collector Rd & Dyson Dr. Upgrade from 2 lane country road to 4 lane arterial.	W	2 & 3	Council	Primary Arterial		\$12.00M	DCP	\$12.00M	
Ballarat-Carngham Road - Btwn Dyson Dr & Wiltshire Ln. Upgrade from 2 lane country road to 2 lane arterial.	W	2 & 3	Council	Secondary Arterial		\$19.68M	DCP	\$19.68M	
Ballarat-Carngham Road - Btwn Finchs Rd & Skipton Rail Trail. Upgrade from 2 lane country road to 2 lane arterial.	W	3	Council	Secondary Arterial		\$12.36M	DCP	\$12.36M	
Latrobe Street – East of Wiltshire Lane. Upgrade short section from 2 lane arterial to 4 lane arterial.	W	2 & 3	Council	Primary Arterial		\$10.30M	Part DCP / State Gov	\$5.15M	
Wiltshire Lane Upgrade (Btw La Trobe St & Whitelaw Ave) upgrade to 4 lane arterial road.	W	2 & 3	Council	Primary Arterial		\$9.80M	Part DCP / State Gov	\$4.90M	
Learmouth Street Upgrade (Btw La Trobe St & Napier Ave) upgrade to 2 lane arterial road.	W	2 & 3	Council	Secondary Arterial		\$6.88M	Part DCP / State Gov	\$3.44M	
Greenhalghs Road – Btw North-South Collector & Dyson Dr. Upgrade from 2 lane country road to 2 lane collector road.	W	2	Council	Collector Road		\$7.32M	Developer		
Bells Road - West of Glenelg Hwy. Upgrade from 2 lane country road to 2 lane arterial.	W	2	Council	Link Road		\$2.49M	DCP	\$2.49M	
Bells Road – Btwn Glenelg Hwy & Lewis Cr. Upgrade from 2 lane country road to 2 lane Link Road.	W	1	Council	Link Road		\$8.04M	DCP	\$8.04M	
Bells Road – Btwn Lewis Cr & Cherry Flat Rd. Upgrade from 2 lane country road to 2 lane Link Road.	W	1	Council	Secondary Arterial		\$16.44M	DCP	\$16.44M	
Bells Road – Btwn Cherry Flat Rd & Ross Creek Rd. Upgrade from 2 lane country road to 2 lane Link Road.	W	1	Council	Secondary Arterial		\$5.28M	DCP	\$5.28M	
North-South Collector Road (Btw Bells Road & Greenhalghs Rd). Construct new Collector Road.	W	2	Council	Collector Road		\$10.67M	Developer		
North-South Collector Road (Btw Greenhalghs Rd & Ballarat-Carngham Rd). Construct new Collector Road.	W	2	Council	Collector Road		\$9.67M	Developer		
North-South Collector Road (Btw Ballarat-Carngham Rd & Cuthberts Rd). Construct new Collector Road.	W	2	Council	Collector Road		\$9.61M	Developer		
Ballarat Link Road (Dyson Drive) – Btwn R'brance Dr & Cuthberts Rd. Upgrade from 2 lane to 4 lane arterial.	W	1, 2 & 3	Council	Primary Arterial		\$11.00M	Part DCP / State Gov	\$5.50M	
Ballarat Link Road (Dyson Drive) – Btw Cuthberts Rd & Ballarat-Carngham Rd. Upgrade from 2 lane to 4 lane arterial.	W	1, 2 & 3	Council	Primary Arterial		\$16.50M	Part DCP / State Gov	\$8.25M	
Ballarat Link Road (Dyson Drive) – Btw Ballarat-Carngham Rd & Greenhalghs Rd. Upgrade to 2 lane arterial.	W	1, 2 & 3	Council	Secondary Arterial		\$13.20M	Part DCP / State Gov	\$6.60M	
Ballarat Link Road (Dyson Drive) – Btw Greenhalghs Rd & Glenelg Hwy. Upgrade to 2 lane arterial.	W	1, 2 & 3	Council	Primary Arterial		\$12.20M	Part DCP / State Gov	\$6.10M	
Ballarat Link Road (Dyson Drive) – Btw Glenelg Hwy & Bells Rd. Construct new 2 lane arterial.	W	1, 2 & 3	Council	Secondary Arterial		\$8.80M	Part DCP / State Gov	\$4.40M	
High Yield - Intersection Projects									
Finchs Road / Cuthberts Road - T intersection	W	3	Council		Link Road / Link Road T signalised	\$4.60M	DCP	\$4.60M	
Finchs Road / Ballarat Carngham Road - Cross intersection	W	3	Council		Primary / Secondary Cross signalised	\$6.00M	DCP	\$6.00M	
Ballarat Carngham Road /North-South Collector Road - Cross Intersection	W	2 & 3	Council		Primary / Connector Cross signalised	\$5.78M	DCP	\$5.78M	
Ballarat Carngham Road / Wiltshire Lane - Cross Intersection	W	2 & 3	Council		Primary / Secondary Cross signalised	\$8.58M	DCP	\$8.58M	

Our Ref: 24268/E
Ballarat North-Western & Western Growth Areas



Item	Growth Area	Precinct	Resp'ble Authority	Road Classification VPA List	Intersection Classification VPA List	Indicative Estimate (\$)	Funding Means	DCP Estimate	Comments
Bells Road / North-South Collector Road - T intersection	W	2	Council		Collector / Link Road signalised	\$4.20M	DCP	\$4.20M	
Bicycle Lanes			Council				DCP		
Bus Routes and Stops			Council				DCP		
						\$268.21M		\$176.59M	

7. GENERAL BUSINESS - MATTERS ARISING FROM THE AGENDA

8. CLOSE