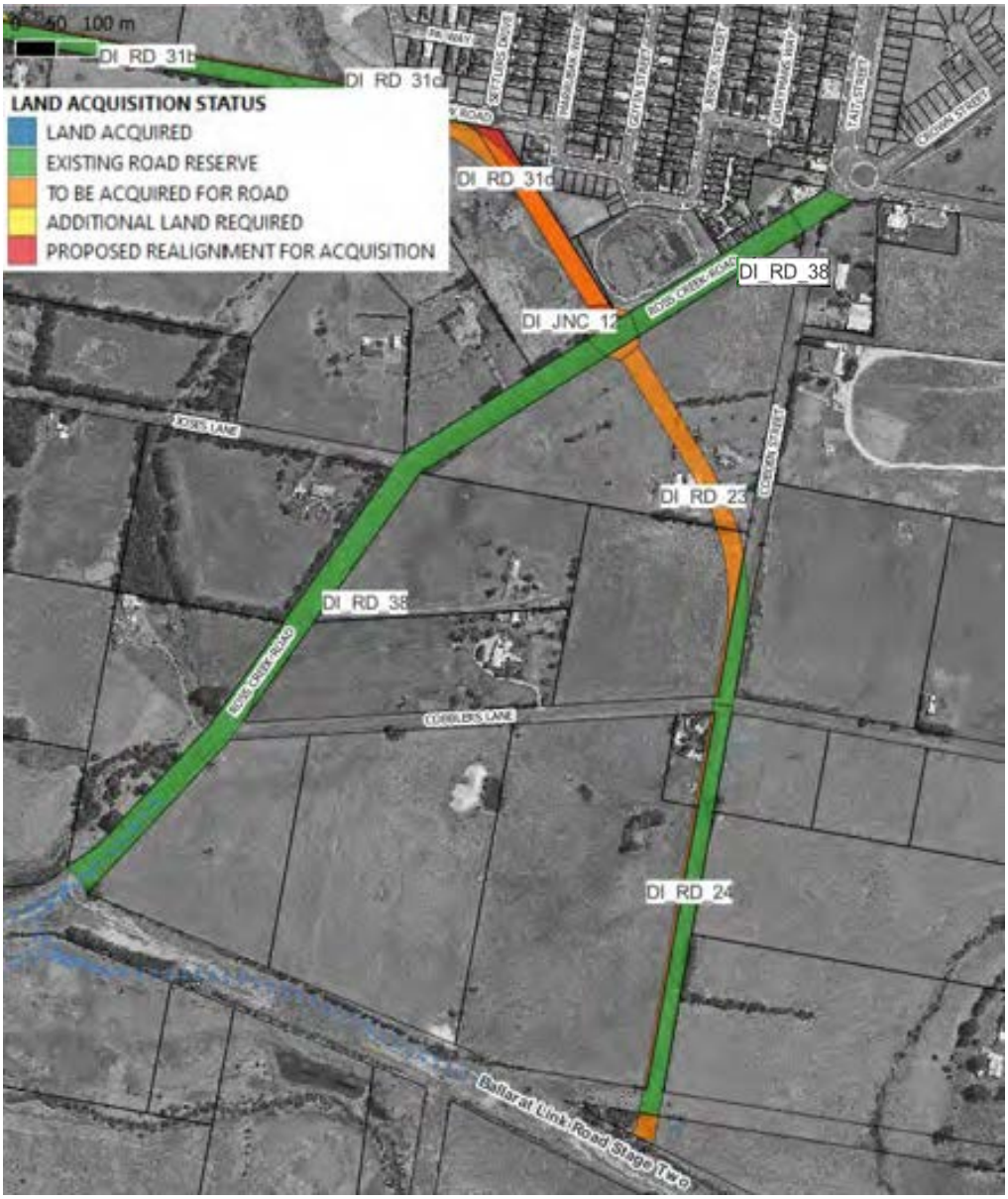


Figure 47 – DI_RD_23, DI_RD_24, & DI_RD_38 proposed alignment (orange), existing road reserve (green), proposed re-alignment (red)

DI_RD_24 Cobden Street (South)/Diamonds Road Widening

This section of Cobden Street starts at the end of DI_RD_23 through to the Ballarat Link Road. It includes the widening (and possible renaming) of Diamonds Road at the southern end (Figure 48).

Table 58 - MCA for DI_RD_24

Group	ID	Item	Comments	Risk
Growth Demand	1	Population Projections	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	
	2	Land Uptake	Development adjacent to the proposed junction is at UGZ (15-20 lots/hectare)	
	3	Rezoning/ Modification to Land Use	No significant changes to date	
	4	Actual vs Planned Growth Patterns	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	
Development Activity	5	Modelled vs Actual Traffic Movements	The trigger for the construction of this section is the Ballarat Link Road. This road was identified as one of the connecting roads.	
	6	Staged Development	Development adjacent to the proposed road would allow the road to be built to the required cross section	
Project scope & cost estimate	7	Concept vs Actual Design	LR2 cross section is considered adequate for the proposed road and the modelled traffic volumes Roundabout construction will be required when Cobblers Lane/Miles Street is similarly upgraded	
	8	Land Acquisition	PSP & DCP accounts for the extra width required for the 24 m road reserve	
	9	Construction Costs	No significant changes to the proposed road have been identified to date, Ballarat Link Road intersection treatment is not listed in the DCP to any detail	
Delivery to Council's Strategic Aims	10	Active vs Car-dependant transport	This section of road will have footpaths, shared paths, and cycle lanes adjacent and intersecting that will connect into the wider network.	
Project Deliverability	11	Ease of Delivery	This project is considered moderate risk	

Figure 48 – DI_RD_24 existing road (green) and future widening (orange)

Figure 34 shows the next development area(s) being adjacent to DI_RD_24 and is also facing Miles Street, Cobblers Lane, Ross Creek Road, and the Ballarat Link Road. The development of these areas is seen to not impact the alignment of nor the current DCP road classification LR2.

Land Acquisition

There are six properties affected by this proposed road, as detailed in Table 60.

Table 59 – Land acquisition associated with DI_RD_24

Address	Property ID	Original		Revised		Change	
		Area Excised	Excised Land Value	Area Excised	Excised Land Value	Area Excised	Excised Land Value
Cobblers Lane	99	0.26	122,710	0.13	60,230	0.13	62,480
39 Miles Street	103	0.13	51,300	0.13	51,300	0.00	0
54 Cobblers Lane	104	0.10	72,730	0.10	72,730	0.00	0
Miles Street	125	0.04	15,810	0.04	15,810	0.00	0
39 Miles Street	130	0.04	29,280	0.04	29,280	0.00	0
39 Miles Street	154	0.08	25,540	0.08	25,540	0.00	0
	Total	0.65	317,370	0.52	254,890	0.13	62,480

Road Design

As mentioned in the previous section, there is additional traffic modelling required to better understand how the proposed Ballarat Link Road will affect traffic loads along this section and whether the LR2 profile remains the most appropriate cross section profile.

DELIVERY PRIORITISATION

The selected roads and junctions in Table 3 have been analysed to determine their construction sequence to possibly assist with Council's budgeting.

Criteria used to determine the sequencing in additional to indicative timing from the geographic location of development are listed in Table 61.

Table 60 - Prioritisation matrix for PSP roads and junctions

Group	Criteria	Score	Comments/Description
Project timing	1-2 years	5	Serving existing approved development(s)
	3-5 years	2	Developments nearing approval
	6+ years	0	Future/long term development
Precinct needs	"Back-log" project	5	Adjacent development is nearing completion
	Addressing gaps/finalise network	2	Essentially the final link in a sub-precinct
	Unlocking development	0	Allows for future expansion
Delivery method	Council	5	
	Developer	2	
	DoT/DTP	0	Arterial roads are delivered outside of Council and in a manner that Council can only influence

Table 62 lists the individual scores for the outstanding DCP road and intersection projects, identifies land acquisition projects and their construction timing (sorted by construction timing). It should be noted that there are other projects that require implementation in the PSP which are not part of this table or this review.

Table 61 – Prioritisation results for studied DCP roads and intersections, excluding the Ballarat Link Road

PRECINCT	DCP ID	Planned Construct-ion Year	Timing (years)	Precinct Needs	Delivery Method	Final Score	Land Acquisition Project(s)
4	DI_JNC_02	2025	1-2	Backlog project	DTP / Council	12	DI_LA_24
4	DI_RD_03b	2025	1-2	Address gaps/finalise network	Developer	12	DI_LA_24
2	DI_JNC_08	2025	1-2	Address gaps/finalise network	Developer	12	DI_LA_22
2	DI_RD_11	2025	1-2	Address gaps/finalise network	Developer	12	DI_LA_22
2	DI_RD_12	2025	1-2	Unlocking development	Developer	10	DI_LA_22
1	DI_JNC_12	2025	1-2	Unlocking development	Developer	10	DI_LA_18 DI_LA_19
1	DI_RD_31d	2025	1-2	Unlocking development	Developer	10	DI_LA_18
1	DI_RD_23	2030	3-5	Unlocking development	Developer	7	DI_LA_19
2	DI_JNC_04	2030	3-5	Address gaps/finalise network	Council	6	DI_LA_22
2	DI_JNC_05	2030	3-5	Address gaps/finalise network	Council	6	DI_LA_22 DI_LA_23
1	DI_RD_31a	2030	3-5	Address gaps/finalise network	Council	6	DI_LA_17
1	DI_RD_38	2030	3-5	Address gaps/finalise network	Council	6	
1	DI_RD_39	2030	3-5	Address gaps/finalise network	Council	6	
1	DI_RD_24	2035	6+	Unlocking development	Developer	5	DI_LA_20 DI_LA_21
1	DI_RD_31b	2035	6+	Unlocking development	Developer	5	DI_LA_17
1	DI_RD_20	2030	3-5	Unlocking development	Council	4	
1	DI_RD_21	2030	3-5	Unlocking development	Council	4	PAO2
1	DI_RD_31c	2035	6+	Address gaps/finalise network	Council	4	DI_LA_17
1	DI_JNC_11	2035	6+	Unlocking development	Council	2	DI_LA_17 PAO2

NETWORK CONSTRUCTION COSTS AND TIMING

Previous sections discussed the land acquisition requirements, land development growth rates and traffic modelling, this information has been applied to each project to determine their indicative timing. Table 64 and Figure 49 summarises the estimated PSP costs to 2035.

Table 63 lists the original and revised costs for each of the PSP projects in this review, that in summary have increase by 14% overall.

Table 62 - Original and revised PSP project costs

PSP PROJECT	ORIGINAL			REVISED			% CHANGE	TIMING
	TOTAL PROJECT COSTS	COSTS TO DCP	COST TO COUNCIL	TOTAL PROJECT COSTS	COSTS TO DCP	COST TO COUNCIL		
DI_JNC_02	1,558,678	1,091,075	596,528	2,740,856	1,918,599	822,257	-76%	2025
DI_RD_03b	2,457,684	2,457,684	0	2,457,684	2,457,684	0	0%	2025
DI_JNC_05	1,229,044	712,845	584,516	1,574,092	912,973	661,119	-28%	2030
DI_JNC_08	1,236,678	556,505	715,895	1,501,160	675,522	825,638	-21%	2025
DI_RD_11	2,319,881	2,319,881	0	2,620,807	2,620,807	0	-13%	2025
DI_RD_12	1,391,894	1,391,894	0	1,603,652	1,603,652	0	-15%	2025
DI_JNC_11	1,137,035	761,813	394,740	1,307,962	876,334	431,627	-15%	2035
DI_JNC_12	849,827	713,855	146,633	998,821	839,009	159,811	-18%	2025
DI_RD_20	2,897,596	2,897,596	0	2,897,596	2,897,596	0	0%	2030
DI_RD_21	987,391	987,391	0	3,566,092	3,566,092	0	-261%	2030
DI_RD_23	1,396,820	1,396,820	0	1,476,664	1,476,664	0	-6%	2030
DI_RD_24	1,703,989	1,703,989	0	1,666,373	1,666,373	0	2%	2035
DI_RD_31a	1,320,047	1,174,842	170,010	1,320,047	1,174,842	145,205	0%	2030
DI_RD_31b	1,020,036	907,832	122,702	1,020,036	907,832	112,204	0%	2035
DI_RD_31c	10,788,871	9,602,095	1,189,572	10,788,871	9,602,095	1,186,776	0%	2035
DI_RD_31d	951,034	846,420	154,774	951,034	846,420	104,614	0%	2025
DI_RD_38	3,203,901	2,851,472	352,429	3,203,901	2,851,472	352,429	0%	2030
DI_RD_39	774,279	689,109	85,171	886,451	788,941	97,510	-14%	2030
Total	38,408,803	33,785,429	5,020,582	43,766,215	38,405,220	5,360,996	-14%	

As discussed throughout the review, project costs are likely to change as detailed designs and construction costs are compared to the original design intent of the PSP. The DEVELOPMENT CONTRIBUTION PLAN SCOPE CHANGES section discusses the indexation of DCP projects absorbing the cost escalation where revised project costs are within 20% of the original estimate. Of the listed projects above, four (4) projects exceeding this threshold are:

- DI_JNC_02 – changed intersection design to traffic signals.
- DI_JNC_05 – changed intersection design to traffic signals.
- DI_JNC_08 – changes to pavement design standards.
- DI_RD_21 – original estimate only considered 190m of road, not the full 750m.

The period up to 2025 has the highest land acquisition costs and considering the challenges already faced in acquiring land, may further delay some projects into the 2030-2035 period.

Two (2) other projects have proposed changes which are identified for the DCP:

- DI_RD_12 – original estimate only considered 400m of road, not the full 462m.
- DI_RD_38 / DI_RD_39 – original project split and revised with original estimate only considered 850m of road, not the full 1080m.

Table 63 – Total estimated land acquisition and construction costs for the PSP (indexed to 2021)

Construction Year	Land Acquisition Projects	DCP Land Acquisition Costs	Non-DCP Sources Land Acquisition	DCP Construction Costs	Non-DCP Sources Construction Costs	Total Costs
2025	DI_LA_18, DI_LA_19, DI_LA_22, DI_LA_23, DI_LA_24	2,827,224	124,367	10,961,693	1,912,320	15,825,604
2030	DI_LA_17, DI_LA_19, DI_LA_22, DI_LA_23, PAO2	1,109,439	67,969	14,390,893	1,718,069	17,286,369
2035	DI_LA_17, DI_LA_20 DI_LA_21, PAO2	461,698	32,813	13,052,634	1,730,607	15,277,753
Total		4,398,362	225,149	38,405,220	5,306,996	48,389,726

Note: not all portions of the land acquisition project need to be completed at once

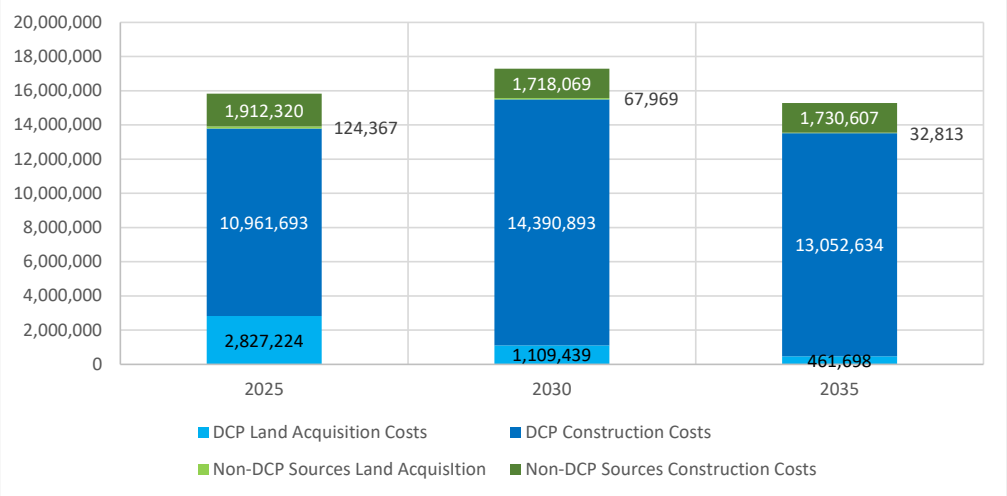


Figure 49 – Chart of total estimated land acquisition and construction costs for the PSP

Figure 51 maps each project listed in Table 64, where in general, the more immediate projects are closer to the activity centres and schools proposed in Ballarat West (marked orange).

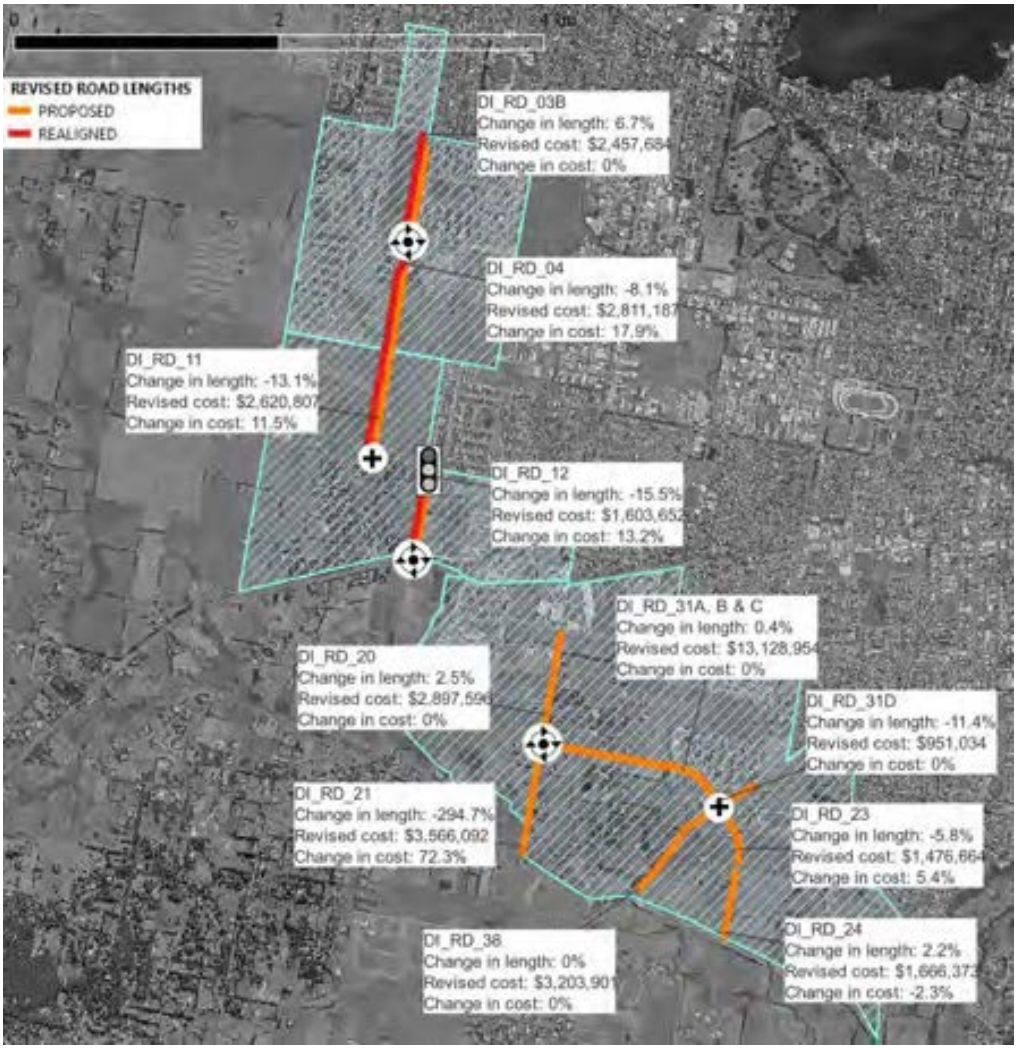


Figure 50 - Revised lengths and costs for studied roads.

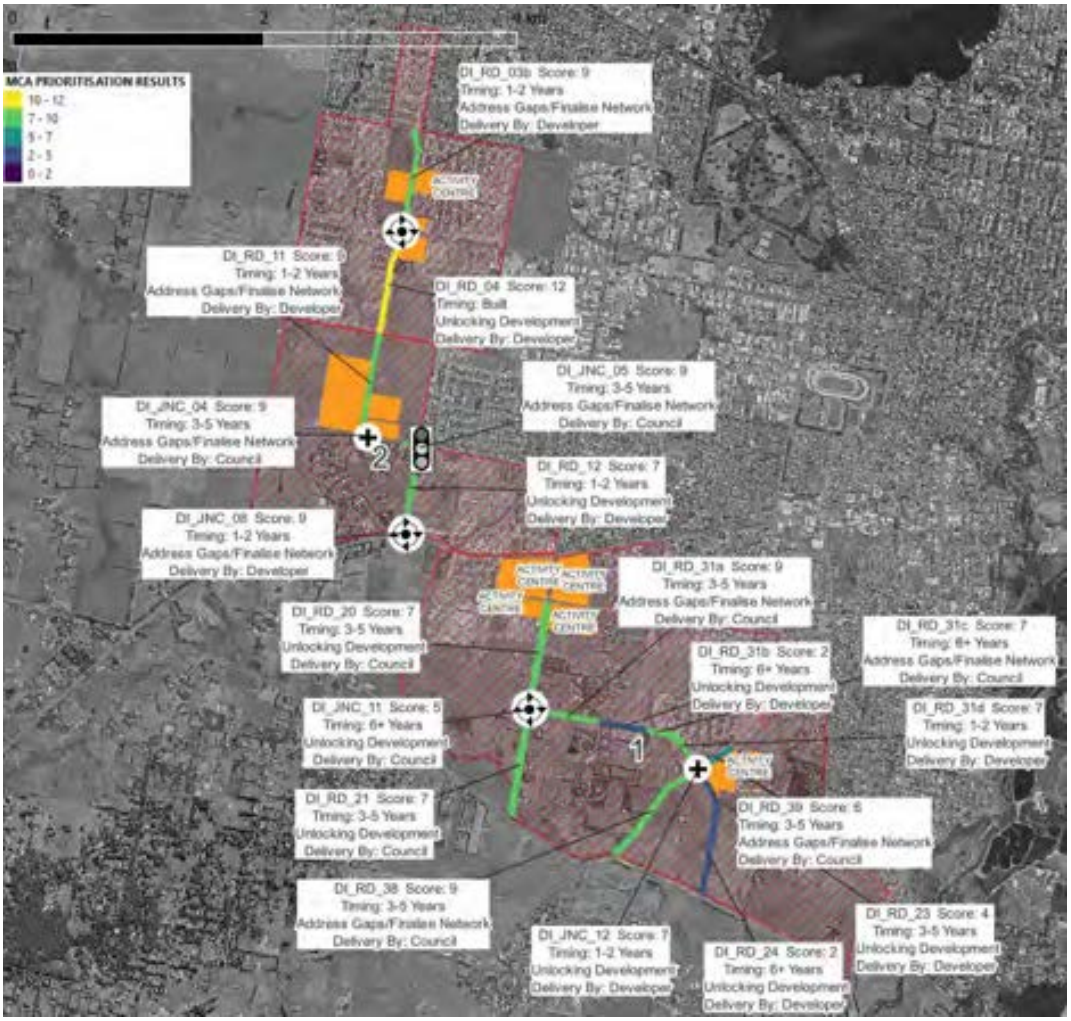


Figure 51 - map of each scored project

FINDINGS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

This study has reviewed 17 road and intersection projects in the Ballarat West Precinct Structure Plan (PSP) area which also form part of the Ballarat West Development Contributions Plan (DCP). The review has:

1. Reviewed the project scopes and consider them appropriate for the precinct development, except for:
    a. DI_JNC_02 – changes in N_S road approach alignments necessitating changing from roundabout to traffic signals.
    b. DI_JNC_05 – change from roundabout to traffic signals given land acquisition challenges.
    c. DI_JNC_08 – changes in pavement design and relocating existing services.
    d. DI_RD_12 – revised road lengths given changes to intersections at each end from 400m to 462m section of road.
    e. DI_RD_21 – revised road length, original estimate only considered duplicating 190m to 750m section of road.
    f. DI_RD_38 / DI_RD_39 – revised road length, original estimate only considered duplicating 850m to 1080m section of road.
2. Determined the most appropriate intersection control solution between a roundabout and a signalised intersection considering the safety and efficiency of pedestrian and cyclists as well as motor vehicles.
3. Verified all selected road length measurements and corrected where applicable.
4. Costed the road and intersection projects considering the scope and the corrected lengths.
5. Identified the current DCP land acquisition projects are adequate to deliver the projects.
6. Reviewed the delivery timing of the selected projects.
7. Confirmed the adopted road cross sections are still appropriate for the project demand/use and have indicated that additional traffic modelling is required certain roads and junctions.

ADDITIONAL TRAFFIC MODELLING

Part of this study has been to identify whether additional traffic modelling, by ESR, is required to confirm the PSP's original assumptions still apply, this is to ensure the future road network caters for the projected traffic volumes (i.e., vehicle, pedestrians, cyclists, e-scooters etc).

ESR reviewed all available data, with reference to the 2020 Ballarat Integrated Transport Action Plan. This document includes a technical reference with future traffic volume forecasts for Ballarat, defined in the report "Victorian Integrated Transport Model (VITM) – City of Ballarat Phase 4: Preferred Scenario", by AECOM Australia, dated 02/03/16.

Based on ESR's findings, further traffic modelling is not warranted given, the main findings of the report are:

1. Apparent double-counting of traffic, especially at the Delacombe Town Centre and possibly at the smaller NAC/LACs.
2. The changing of individual intersection designs would not significantly change how the overall network operates.

DETAILED DESIGNS

It is recommended that detailed designs delivered by Council for the following roads and junctions:

1. Cherry Flat Road:
    a. Continuing the duplication of DI_RD_20 to Schreenans Road,
    b. Junction of Cherry Flat Road and Schreenans Road and
    c. Design DI_RD_21
2. Ross Creek Road (between Morgan Street and Joses Lane) – to support the development on the northern side Ross Creek Road.
3. Schreenans Road bridge (DI_RD_31c) – it was assumed that a single span bridge is required, however there are other design options that may reduce the cost of this crossing. This should also consider DI_RD_31d and any changes in alignment proposed with development.

It is recommended that Council advocates for DTP to complete the Carngham Road Duplication/Presentation Boulevard/N-S Collector Road design based on traffic signalisation using the 70km/h design speed.

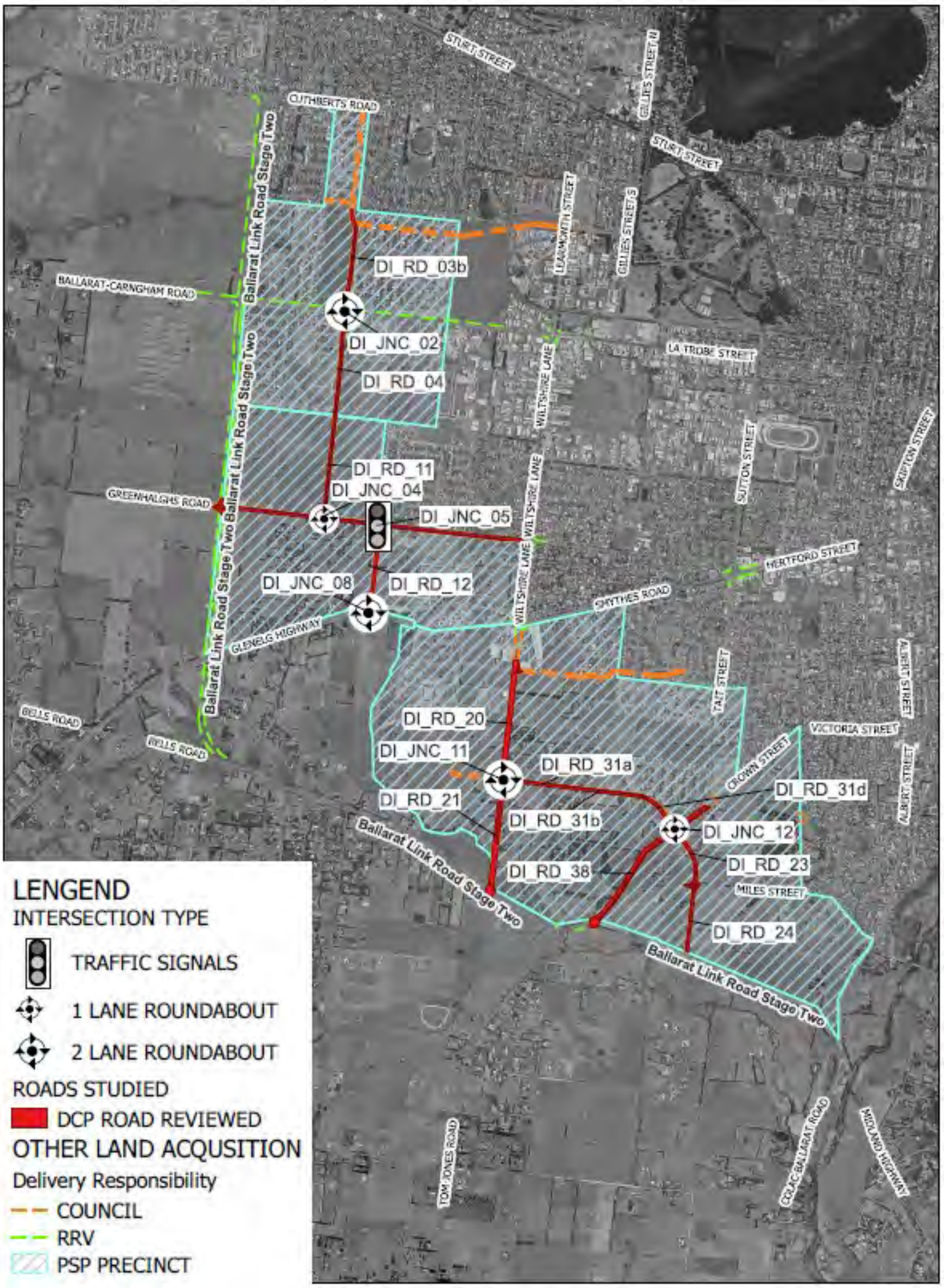
NETWORK CONSTRUCTION COSTS AND TIMING

Previous sections discussed the land acquisition requirements, land development growth rates and traffic modelling, this information has been applied to each project to determine their indicative timing. Table 64 and Figure 49 summarises the estimated PSP costs to 2035.

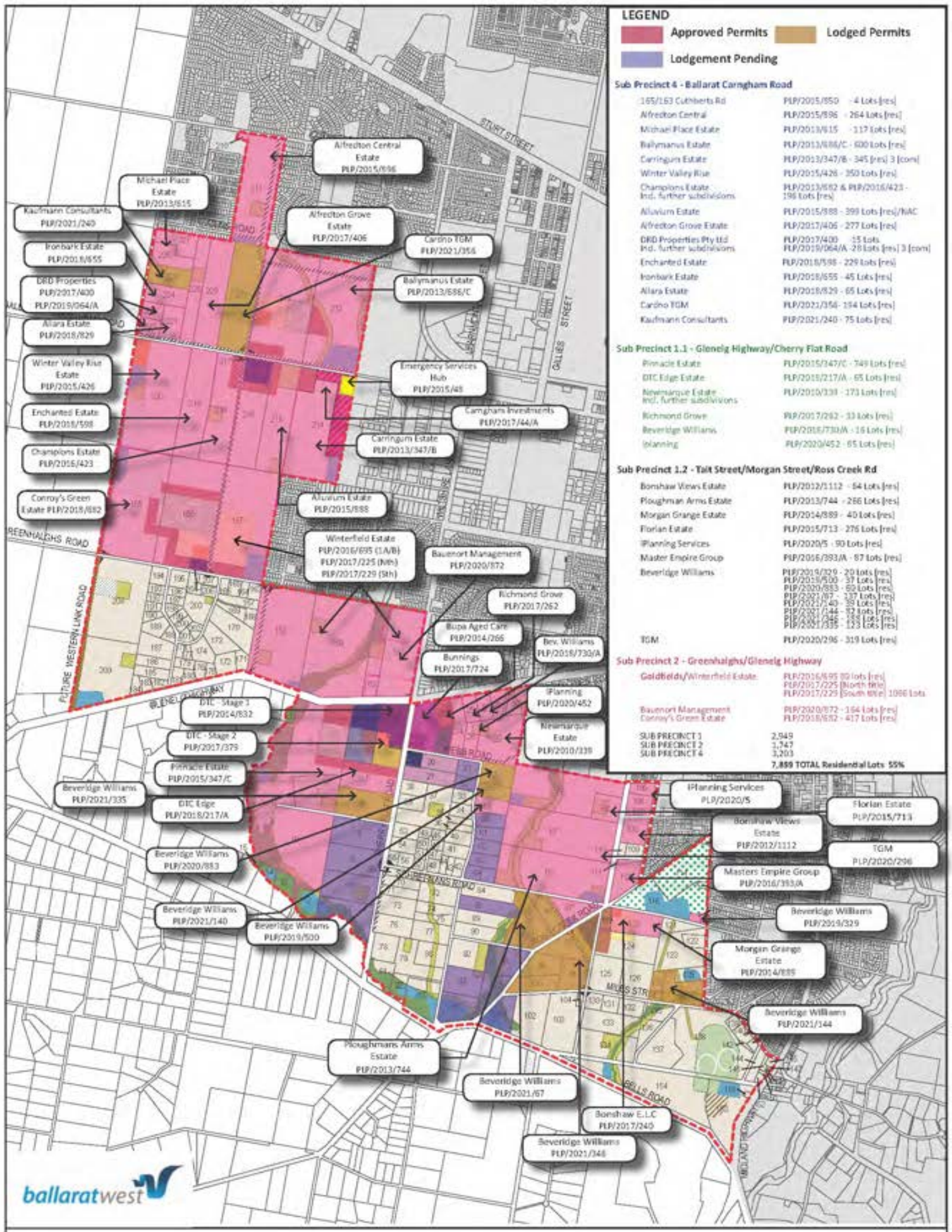
The DEVELOPMENT CONTRIBUTION PLAN SCOPE CHANGES section discusses the PSP will absorb the cost escalation where revised project costs are with 20% of the original estimate.

APPENDICES

APPENDIX A. PROPOSED ROADS ASSESSED



APPENDIX B. Development Status within Ballarat West Precinct Structure Plan



BALLARAT WEST PRECINCT STRUCTURE PLAN PLANNING PERMITS
June 2021

APPENDIX C. ESR Report

BALLARAT WEST PRECINCT STRUCTURE PLAN REVIEW

Transport Assessment Report

DRAFT

ESR Transport Planning Pty Ltd PO Box 146, Smythesdale VIC 3351
P: 0427 044 324 | E: drewm@esrtp.com.au | www.esrtp.com.au

DOCUMENT CONTROL

Date: 22/03/23
Filename: 230322-Ballarat West Transport Review
Our Ref: N0300
Author: Drew Matthews

CONTACT

ESR Transport Planning Pty Ltd ABN 86 128 037 429
PO Box 146, Smythesdale VIC 3351
P: 0427 044 324
E: drewm@esrtp.com.au
www.esrtp.com.au

PREPARED FOR

CITY OF BALLARAT

DISCLAIMER

Contents

1 Introduction

1.1 Overview

The Ballarat West Precinct Structure Plan (PSP) was gazetted on 1 November 2012. It provides a comprehensive framework for the future development of the Ballarat West Growth Area. Prepared alongside the PSP was a Development Contributions Plan (DCP) defining developer funded infrastructure. The City of Ballarat (Council) periodically reviews the PSP and DCP.

ESR Transport Planning has been engaged to inform a PSP review regarding transport infrastructure.

Our study scope has included reviewing traffic forecasting that informed the PSP, the road network layout and cross sections, as well as intersections. The review considers infrastructure within or adjacent the PSP Growth Area and is focussed on road network infrastructure. This review is made in the context that much of the Growth Area development has already occurred, and therefore modifying planned road infrastructure should only be in response to significant issues or for significant benefits.

Technical analysis and assessments are set out in report Sections 2, 3 and 4. Recommendations are set out in Section 5.

1.2 Referenced Information

Documents

- Aecom Australia, 02/03/16, *Victorian Integrated Transport Model - City of Ballarat Phase 4: Preferred Scenario*.
- Austroads, 2020, *Guide to Traffic Management Part 3: Transport Study and Analysis Methods*.
- Ballarat Planning Scheme.
- City of Ballarat, 2021 (v7), *Road Management Plan*.
- Local Government Infrastructure Design Association, 2019, *Infrastructure Design Manual*.
- SMEC Australia, 20/12/11, *Ballarat West Precinct Structure Plans Future Traffic Estimates and Road Infrastructure Requirements*.
- Victorian State Government, June 2019, *Victoria in Future 2019 (VIF2019) Population and Household Projections*.

Drawings / Data / Information

- Australian Bureau of Statistics, Census QuickStats (www.abs.gov.au).
- City of Ballarat, Data Exchange, (www.data.ballarat.vic.gov.au)
- SMEC Australia, 19/12/11, *General Arrangement Drawings*.
- Online maps from Google, Nearmap, VicPlan, VicEmergency and Public Transport Victoria.
- Traffic volume data from the Department of Transport (www.data.vic.gov.au).
- Traffic volume data from the City of Ballarat.

1.3 Terms

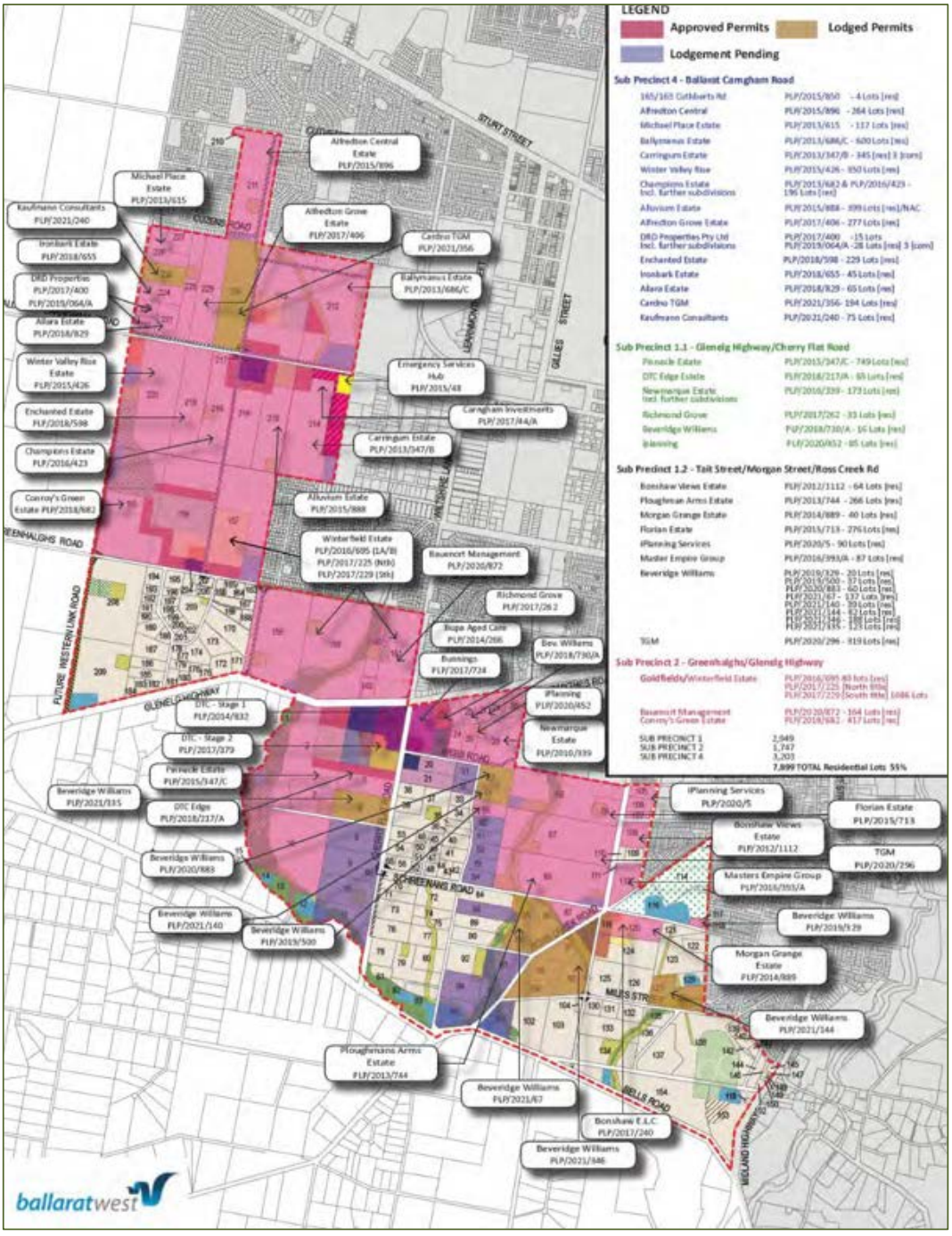
- DCP Development Contributions Plan

- DOS degree of saturation
- dwl dwelling
- IDM Infrastructure Design Manual
- LGA local government area
- MAC Major Activity Centre
- NAC Neighbourhood Activity Centre
- PSP Precinct Structure Plan
- PT public transport
- px persons
- VITM Victorian Integrated Transport Model
- vpd vehicle movements per day
- vph vehicle movements per hour

1.4 Growth Area Development Status

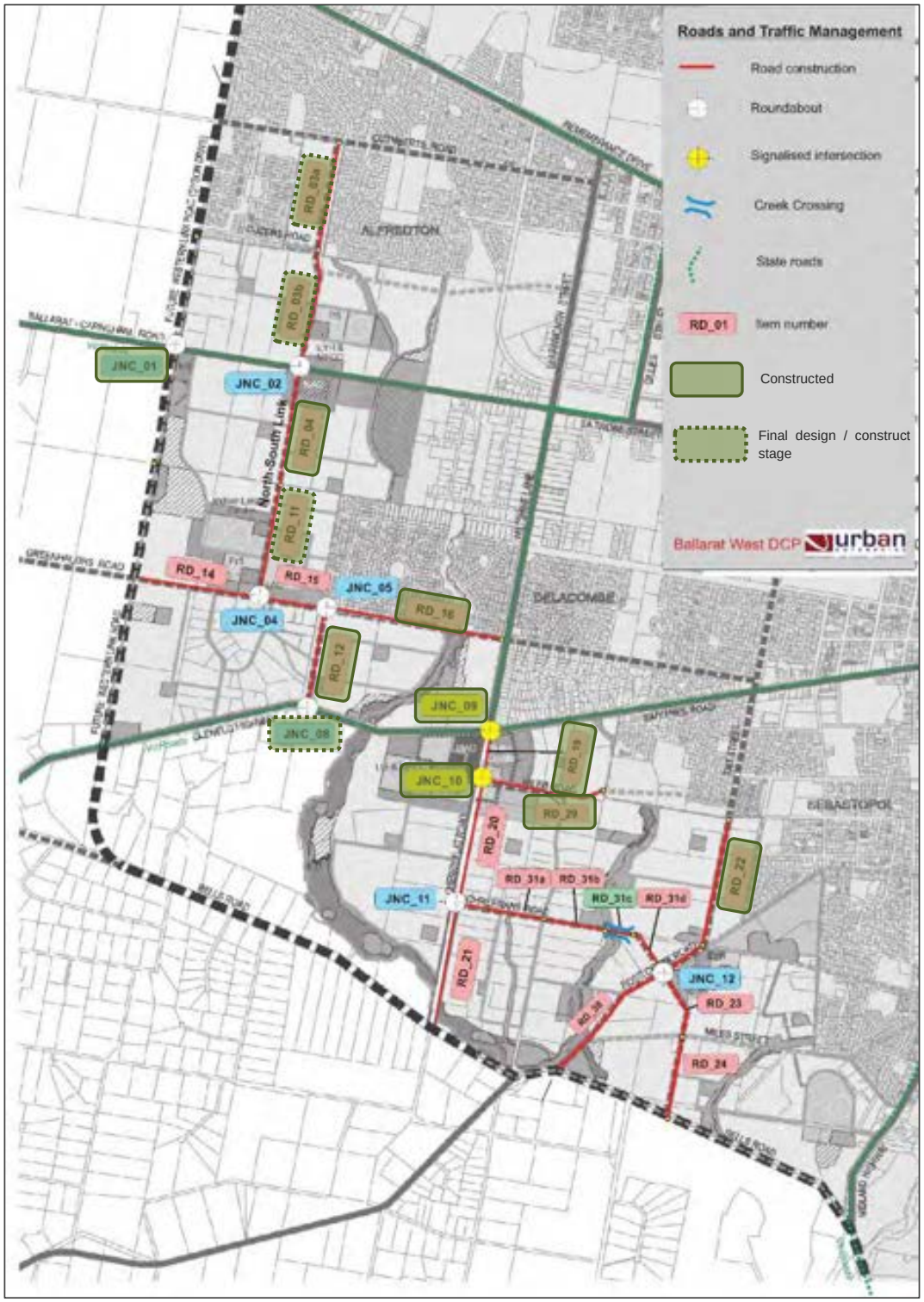
Figure's 1.1 and 1.2 define land development that has occurred or is in planning stages, along with DCP projects that have been delivered or are in final design / construction stages.

Figure 1.1 Status of Growth Area Development



Source: City of Ballarat, June 2021.

Figure 1.2 Status of DCP Road and Intersection Projects



2 Traffic Volume Forecasts

2.1 Overview

The PSP was informed by a transport study incorporating traffic volume forecasting prepared by SMEC Australia in 2011 (report: '*Ballarat West Precinct Structure Plans Future Traffic Estimates and Road Infrastructure Requirements*', 20/12/11).

Since that time, traffic volume forecasting has been undertaken as part of the Ballarat Integrated Transport Action Plan, prepared by Aecom Australia in 2016 (report: '*Victorian Integrated Transport Model - City of Ballarat Phase 4: Preferred Scenario*', 02/03/16).

2.2 Purpose of Traffic Forecasting

Strategic models such as the Victorian Integrated Transport Model (VITM) are high level tools typically used to analyse travel demand changes throughout a large area, such as Ballarat. The ability of a strategic model to accurately predict traffic volumes in a local neighbourhood is dependent on the complexity of the model and extent of model calibration for that precinct. Most often, a broad area is modelled and volumes are not regarded as an accurate prediction of future traffic along all road segments, but rather the differences between scenarios provide insight to assist transport and land use planners.

2.3 Input Parameters

Table 2.1 has been prepared to compare input parameters used by SMEC with the Aecom forecasting and current (2023) expectations. A focus of the comparison is residential trip generation given it's the predominate trip generator in the Growth Area.

Table 2.1 Traffic Volume Forecasting Input Parameters

DESCRIPTION	SMEC 2011	AECOM 2016	CURRENT EXPECTATIONS
Existing (Base) Year	none	2013	
Future Years	2031	2021, 2031, 2041	
Geographic Extents	Ballarat West Growth Area	City of Ballarat Local Government Area (LGA)	
Existing Land Use	N/A	98,393 px / 39,672 dwl	Census data (LGA) px: 93,501 (2011) 101,686 (2016) 113,763 (2021)
Future Land Use (General)	+11,099 dwl (based on 15 lots / Ha) / +26,640 px	+12,700 dwl / +30,490 px / 128,886 px (2031) +18,630 dwl / +44,720 px / 143,115 px (2041)	Victoria in Future: 135,438 px (2031) 145,926 px (2036) +17,475 dwl / +41,940 px (2011-2031) Recent development permits and plans are in the range of 17-18 lots / Ha. It is understood new PSP guidelines set a target for 20 lots / Ha. Approximately 40% of Growth Area lots delivered, with a further 20% permitted or under construction. Additional Ballarat growth is planned within a Northern Growth Area which is to be rezoned with accompanying PSP and DCP, as well as North-western and Western Growth Areas for which strategic plans are to be prepared. The North-western and Western Growth Areas will contribute to higher traffic within the Ballarat West Growth Area (particularly along east-west routes). Refer Figure 2.2. Residential developments are anticipated south of the Ballarat West Growth Area within the Golden Plains LGA.
Future Land Use (at Locations)	No dwelling growth assumed for area of Masada Blvd (Model 2, Zone 19) with existing low density rural residential		Potential for ~980-1,300 dwellings (15-20 lots / Ha)
	No dwelling growth assumed for area of Webb Rd (Model 1, Zone 9) with existing low density rural residential		Residential estate development occurring, potential for ~900-1,200 dwellings (15-20 lots / Ha)
Traffic Generation Rates	9 vpd / dwelling, dwellings only + other land use trip generation	8.7 vpd / dwelling, all car trips + commercial vehicle trips / employee (based on reported 3.68 trips / person (98.2% car, 1.8% PT)	9 vpd is a typically adopted dwelling rate

DESCRIPTION	SMEC 2011	AECOM 2016	CURRENT EXPECTATIONS
Network	Model consisted of arterial and link / trunk collector roadways, with a layout consistent with the PSP.	Very similar model layout for the Growth Area to SMEC	Growth Area development has generally occurred consistent with the PSP planned network layout

Notes:
vpd = vehicle movements per day
[1] To determine dwellings (dwl) versus population, 2.4 persons (px) per dwelling adopted (source: 2021 Census).

Key outcomes:

- SMEC forecasting was based on 26,640 new residents in the Growth Area over the 20 years to 2031, this compares with actual population growth for the entire Ballarat LGA of 20,260 in the 10 years to 2021, and the Victoria in Future state government estimates for the entire Ballarat LGA of 41,940 in the 20 years (2011-2031). Whilst areas other than the Growth Area will accommodate some of the expected growth, it is likely SMEC forecasting represents an underestimate of eventual population growth.
- The SMEC forecasting likely significantly underestimates trip generation within the Masada Boulevard and Webb Road localities.
- From the SMEC reported summary of trip generation for all land uses, it appears the model may double count some trips, given some trips are shared between land uses (e.g. trip from a dwelling to nearby shopping / employment) and therefore should not be assigned onto the road network twice. A key location is likely to be surrounding the Delacombe Town Centre.

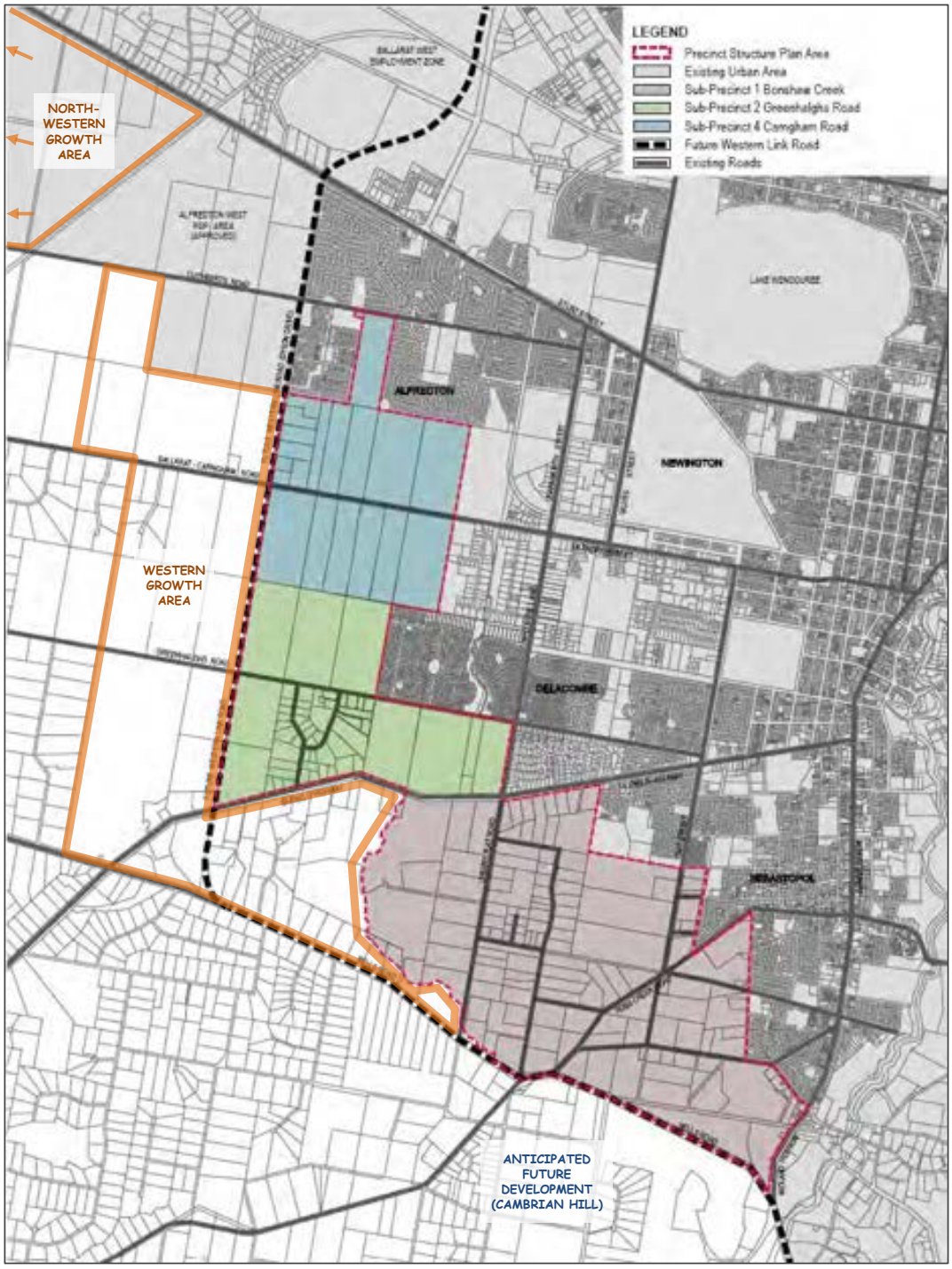
Figure 2.1 SMEC Traffic Generation by Land Use

Data source: SMEC 2011, Appendix D

Key outcomes:

- The vast majority of traffic is attributed to residential land use.
- The next highest traffic generators are 'major activity centre' (Delacombe Town Centre) followed by 'industrial'.

Figure 2.2 Nearby Future Growth Areas



2.4 Forecasting Results

Road Segments

Table 2.2 has been prepared to compare SMEC forecast daily traffic volumes for numerous road segments against existing traffic volumes (data collected in recent years) and the AECOM ultimate growth forecasts (2041).

Please note that AECOM data is only available for relatively few roadway segments in the Growth Area, so the table below is not a comprehensive assessment.

Table 2.2 Comparison of Traffic Volume Forecasts

Road Name	Segment	Existing VPD (two-way)	SMEC 2031 VPD (two-way)	VITM 2041 VPD (two-way) [1]	SMEC Difference (VPD)	SMEC Difference (%)	
Albert St	south of Hertford St	28,000	35,750	27,200	8,550	31%	
Albert St	south of Victoria St	19,000	25,000	15,000	10,000	67%	
Dyson Dr	south of Sturt St		20,500	18,400	2,100	11%	
Learmonth St	north of Winter St	14,000	20,500	7,000	13,500	193%	[1]
Wiltshire Ln	Greenhalghs Rd - Glenelg Hwy	8,600	18,750	12,400	6,350	51%	
Ballarat Link Rd	west of Cherry Flat Rd		18,750	3,000	15,750	525%	[1]
Wiltshire Ln	south of Ballarat-Carngham Rd	13,000	17,000	15,800	1,200	8%	
North South Road 1	north of Greenhalghs Rd		16,000	7,400	8,600	116%	[2]
Cuthberts Rd	west of Learmonth St	10,000	15,750	14,200	1,550	11%	
Ballarat-Carngham Rd	North South Road 1 - Wiltshire Ln		15,250	13,800	1,450	11%	
Ascot Gardens Dr	east of Cherry Flat Rd	3,700	15,000	4,200	10,800	257%	[2]
Cherry Flat Rd	north of Schreenans Rd	3,500	14,000	10,800	3,200	30%	
Dyson Dr	north of Ballarat-Carngham Rd		13,750	11,800	1,950	17%	
Greenhalghs Rd	North South Road 1 - Wiltshire Ln	1,800	13,000	6,400	6,600	103%	[3]
Tait St	south of Ascot Gardens Dr	3,000	12,500	7,400	5,100	69%	
North South Road 1	south of Curthberts Rd		12,000	4,400	7,600	173%	[3]
Victoria St	west of Albert St	6,000	11,000	10,400	600	6%	
Dyson Dr	north of Greenhalghs Rd		10,750	7,600	3,150	41%	
Ballarat-Carngham Rd	east of Dyson Dr		10,250	9,600	650	7%	
Cuthberts Rd	east of Dyson Dr		10,250	6,800	3,450	51%	
Glenelg Hwy	west of Wiltshire Ln	5,000	8,250	12,200	-3,950	-32%	
Glenelg Hwy	east of Dyson Dr	5,000	8,250	7,200	1,050	15%	
Grant St	north of Miles St	1,600	7,750	3,200	4,550	142%	[3]
Sturt St	east of Dyson Dr		7,500	9,800	-2,300	-23%	
Schreenans Rd	east of Cherry Flat Rd		7,000	2,400	4,600	192%	[3]
Ross Creek Rd	Schreenans Rd - Bells Rd	2,900	4,500	8,000	-3,500	-44%	

VPD = vehicle movements per day

Data sources: SMEC 2011, Appendix F. AECOM 2016, Figure 48 (one-way volumes doubled).

[1] Difference attributed to AECOM volumes much lower than reasonable expectations.

[2] Difference attributed to SMEC volumes much lower than reasonable expectations.

[3] Difficult to define a reason for the difference, considered reasonable to expect future volumes between these forecasts.

Key outcomes:

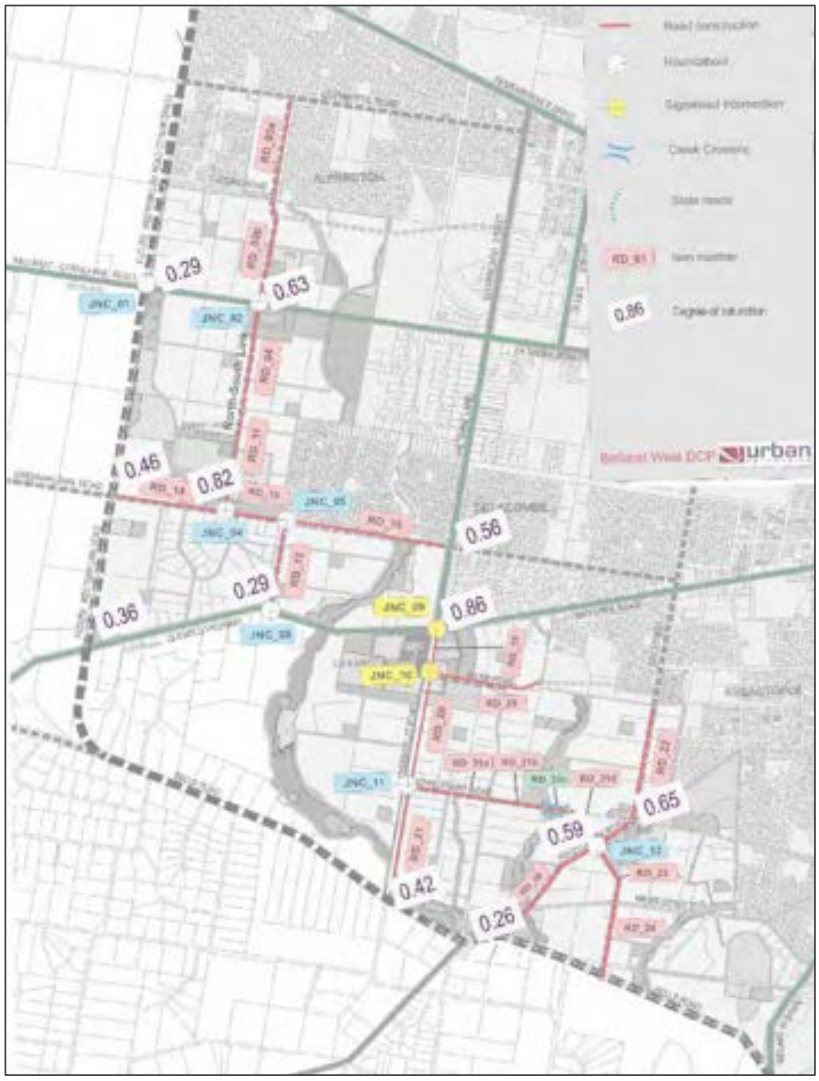
- For the most part, the SMEC forecast volumes are higher than those by AECOM. This provides some confidence that PSP roadway planning based on SMEC forecasts isn't underestimating future traffic needs. However, it is noted that some of the AECOM forecast volumes are considerably lower than reasonable expectations.
- The locations where SMEC volumes indicate a lower functional classification than AECOM are Ross Creek Road (last row of table) and the Glenelg Highway at Wiltshire Lane.
- Although SMEC adopted low density land use within the Masada Boulevard and Webb Road localities, indicating there may be an underestimation of trip generation, SMEC volumes in these areas are significantly higher than AECOM.

Intersection Volumes

SMEC forecasting was used to estimate intersection volumes that were for PSP intersection planning. The daily volume forecasts were converted to peak hour volumes using a 9% peak to daily ratio. There was no specification of the time of the peak hour, where typically intersection designs would be assessed for morning (AM) and afternoon (PM) peak periods. And it does not appear that assessments were made regarding the directional bias that occurs during AM and PM peaks. Figure 2.3 summarises the intersection analysis results for degree of saturation (DOS)[1].

[1] A regularly used performance measure is the degree of saturation (DOS) which is the ratio of arrival traffic volumes to capacity. DOS values above 0.9 are typically considered poor performance while values less than 0.6 are typically considered excellent performance.

Figure 2.3 Intersection Analysis Degree of Saturation Results



Data sources: SMEC 2011, Table 9.

Key outcomes:

- Only 4 analysed intersections have DOS results exceeding 0.6:
  - Glenelg Highway / Wiltshire Lane / Cherry Flat Road (0.86)
  - Greenhalghs Road / North-South Road (0.82)
  - Ross Creek Road / Tait Street / Morgan Street (0.65)
  - Ballarat-Carngham Road / North-South Road (0.63)
- Whilst there may be concern regarding the lack of AM and PM directionality assessed, the mostly low DOS results alleviate such concerns for many intersections.
- DCP junctions JNC_05, JNC_10, JNC_11 were not analysed.

2.5 Forecasting Review Conclusion

Given all of the above, the SMEC forecasts appear to be conservative in terms of trip generation and resultant traffic volumes, comparatively against AECOM forecasts and our reasonable expectations. So whilst there is new information indicating a significantly greater number of dwellings will eventuate in the Growth Area, the forecasts are considered to remain a useful input to road planning decisions. (Remembering that given its very nature, traffic forecasting cannot be described as correct or incorrect).

It is important that engineering judgement is adopted to define adequate road infrastructure, rather than relying solely on traffic forecasts to indicate adequacy or otherwise. And it appears this was the case when the PSP was prepared, with a conservative approach adopted. This is demonstrated by PSP intersection layouts that for most cases provide operating performance well beyond satisfactory when measured against the forecast volumes.

It is also noted that in the specific local areas where the SMEC forecasting didn't assume dwelling growth, which is erroneous compared to current expectations[2], the local road network has a layout providing similar traffic dispersal to other localities within the Growth Area.

Therefore, this forecasting review does not provide evidence of any specific inadequacy of the PSP road network.

[2] Masada Blvd (Model 2, Zone 19), and Webb Rd (Model 1, Zone 9).

3 Road Hierarchy and Cross Sections

3.1 Overview of Roadway Classifications

The City of Ballarat classify municipal urban road types as follows:

Classification	Definition
Link Roads	Roads other than Arterial roads that link significant destinations[1] and are designed for efficient movement of people and goods between and within regions. Also provide property access[2]. Link roads may consist of a number of roads which form a route.
Collector Roads	Roads other than arterial or link roads that connect a substantial number of local roads and streets to higher order roads, or to significant destinations, and provide property access and movement of traffic within local areas.
Sealed Primary Access Roads	Roads other than arterial, link or collector roads, that provide access to the street address of occupied properties[3].
Unsealed Primary Access Roads	
Sealed Secondary Access Roads	Roads other than arterial, link, collector or primary access roads that provide access to properties other than to the street address, or access to non-occupied abutting properties[4].
Unsealed secondary Access Roads	

Source: City of Ballarat, Road Management Plan.

Arterial roads are typically under the management of the Department of Transport and Planning.

Road network planning guidelines for urban residential areas specify that ideally arterial roads be provided at approximately 1.6km spacing's (one mile grid) and Link / Collector Streets approximately half way between (i.e. 800m).

Guidelines for roadway capacity specify that a 2-lane urban roadway can accommodate daily traffic volumes in the order of 15,000 - 20,000 vpd without experiencing high delays during commuter peak periods[3]. However, without flaring at intersections to provide additional lanes, it is typically intersections which form a lower capacity constraint in urban road networks.

In residential areas, it is desirable for roadways to accommodate traffic activity below an indicative maximum volume that is specified by type of roadway. Indicative maximum volumes are well below theoretical capacity, and take into account the implications of traffic activity on residential amenity and efficient intersection operation.

For residential subdivisions, the Planning Scheme and Infrastructure Design Manual (IDM) classify Collector and Access roadways as follows:

[3] Interrupted flow capacity = 900 vph lane (Austroads Guide to Traffic Management Part 3), with 10% peak to daily ratio = 18,000 vpd.

Table 3.1 Indicative Maximum Volumes by Roadway Type

ROADWAY TYPE	PLANNING SCHEME	IDM
Collector Street (level 2)	3000 - 7000 vpd	6000 - 12000 vpd
Collector Street (level 1)	3000 vpd	2500 - 6000 vpd
Access Street (level 2)	2000 - 3000 vpd	0 - 2500 vpd
Access Street (level 1)	1000 - 2000 vpd	-

[1] Two divided carriageways.

The PSP classifies road types, and assigns cross sections as follows:

Table 3.2 PSP Classifications and Cross Section Allocation

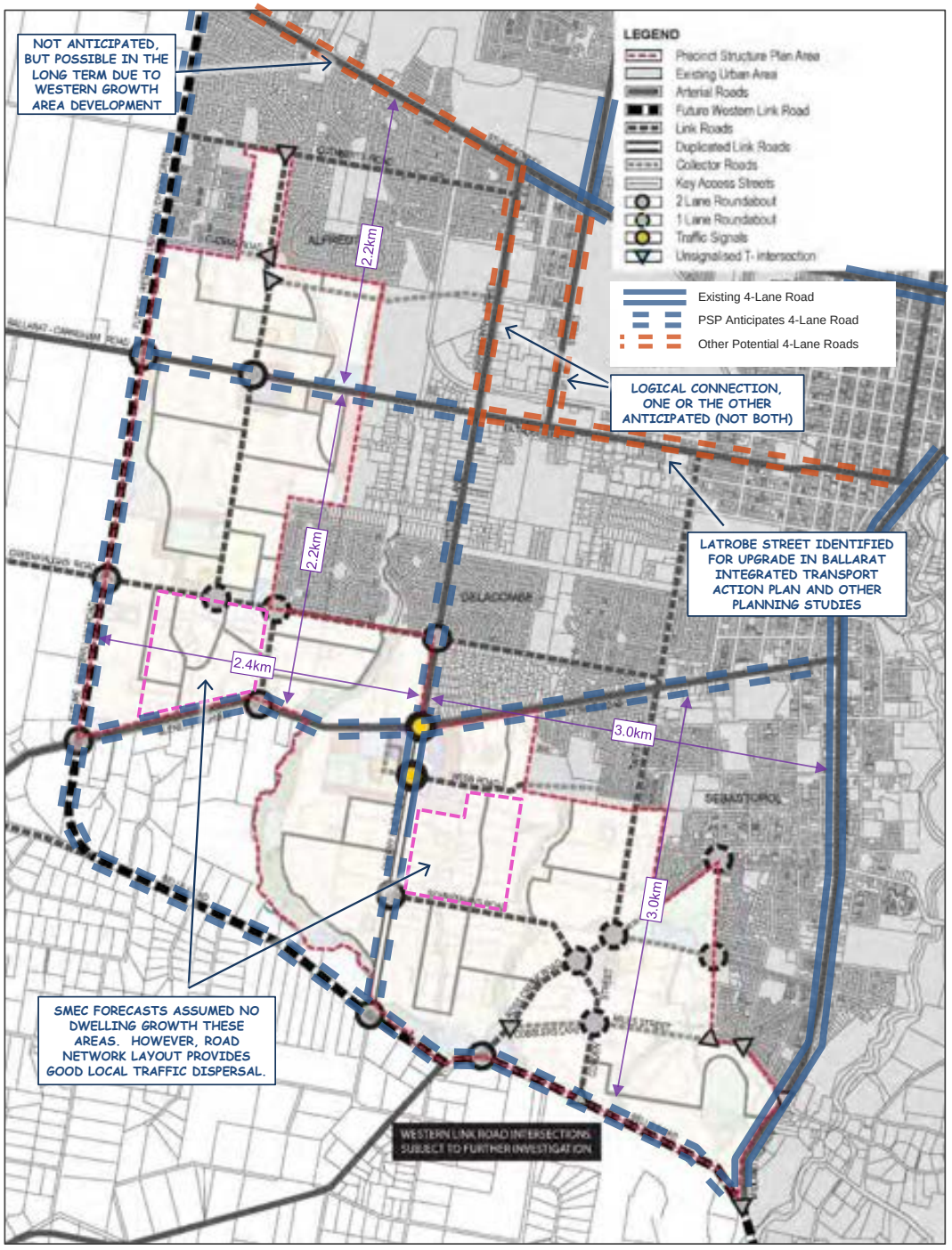
CLASSIFICATION	CROSS SECTIONS
Arterial Roads	(unspecified)
Future Western Link Road Link Roads Duplicated Link Roads	LR1 -> DLR2 LR2 & LR3 LR2 -> DLR1/2
Collector Roads Key Access Streets	CS1 & CS2 (unspecified)

It is noted that a Duplicated Link Road (DLR) has a higher functionality than a Link Road (LR), and could therefore be listed above it within PSP documentation.

3.2 Network Layout and Hierarchy Overview

Figure 3.1 shows the PSP road network plan highlighting future 4-lane roadways.

Figure 3.1 Layout of 4-Lane Roadways



Key outcomes:

- The layout of the PSP's 4-lane roadways provides an even spatial distribution for Arterials / Duplicated Link Roads (DLR). Therefore, the Duplicated Link Roads, namely Ballarat Link

Road and Cherry Flat Road will have a functional role within the network more akin to an Arterial road.

- The separation of the PSP's 4-lane roadways are slightly greater than the ideal one-mile grid in Sub-Precinct's 2 and 4, while almost double at 3.0km in Sub-Precinct 1.
- Given the spatial distribution, Key Access Streets will have a functional role within the network more akin to a Collector Street classification.

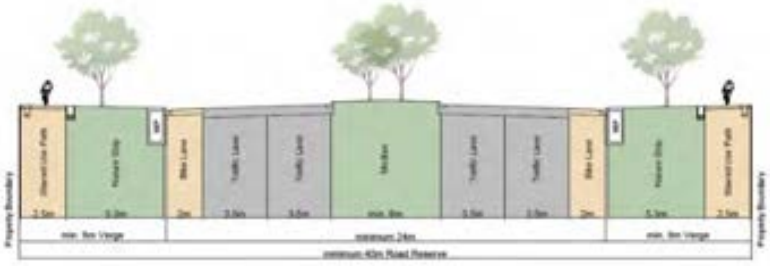
3.3 Cross Sections Overview

Whilst the PSP specifies numerous cross sections, it is noted that the Planning Scheme, Infrastructure Design Manual (IDM), and Austroads publications include extensive cross section design guidance, so it could be considered unnecessary to specify exacting cross sections, unless a roadway has uniquely local requirements. Section 5.9.3 the PSP does include text that network design to be "generally in accordance with the road cross sections in Figure 9-11", and other circumstances for implementing alternative cross section dimensions.

The PSP cross sections are shown below along with review commentary.

DLR1 – Duplicated Link Road with Verge on Both Sides

(CHERRY FLAT ROAD ONLY)



DLR2 – Duplicated Link Road with Service Road on Both Sides

(BALLARAT LINK ROAD AND CHERRY FLAT ROAD)

Comments:

- DLR1 is virtually the same as a DLR2 without service roads (and therefore positioning the shared path within the 8m verge), and is only applicable to Cherry Flat Road.

- Ballarat Link Road is only specified with a DLR2, although not all locations will have developer services roads, such as alongside reserves. In these circumstances the verge (outer separator) should include a shared path (as per DLR1).
- Given the similarities between DLR1 and DLR2, along with the similarities of Notes 1 and 2 to Table 7 regarding access management, the PSP could consolidate these cross sections into one with appropriate notations.
- It is noted that Dyson Drive, which forms the Ballarat Link Road north of Ballarat-Carngham Road, provides approximately 20m width east of the allocated 40m main carriageway land, making the cross section in this area somewhat different to the PSP.
- Service roads aren't typically separated into traffic and parking lanes, and a 5.5m width could be considered a minimum width.

LR1 – Interim Link Road with Service Road on One Side

(BALLARAT LINK ROAD ONLY)

Comments:

- The minimum 7m outer separator doesn't match the 8m specification for the ultimate (DLR1/2) cross section.
- Uncertainty regarding what should be provided left side of the carriageway (the pavement shouldn't extend to a property boundary, a verge is needed).
- Left side of the two-way traffic lanes would be better defined as an interim shoulder bike lane (without kerb), as this area will ultimately become a median.
- Service roads aren't typically separated into traffic and parking lanes, and a 5.5m width could be considered a minimum width.

LR2 – Link Road with On-Road Bike Lane

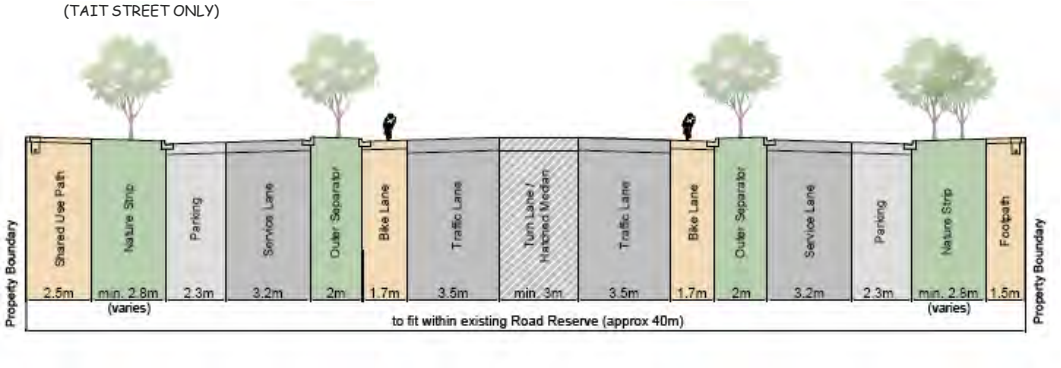
(LR2 & CS2 ARE IDENTICAL)

Comments:

- Ideal to specify parking lane as indented (or kerb outstands at intersections), to improve pedestrian safety and amenity at intersections and other road crossings.
- 3.1m traffic lanes would be sufficient[4], providing a wider verge and reducing pedestrian road crossing distances. Limiting excessive carriageway width could also provide speed management benefits.

LR3 – Duplicated Link Road with Service Road on Both Sides

(TAIT STREET ONLY)



Comments:

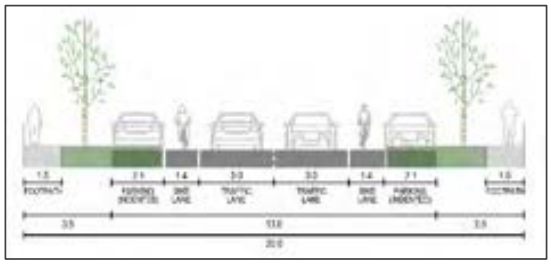
- Use of the title Duplicated Link Road is not strictly correct. A 'duplicated' roadway is a term typically used to describe roadways with separate carriageways divided by a median (not linemarking or turn lanes). It also could lead to confusion given Duplicated Link Road is the title of DLR1 and DLR2.
- Service roads aren't typically separated into traffic and parking lanes, and a 5.5m width could be considered a minimum width.

[4] Including for buses, noting Austroads Road Design Guides specify minimum widths of 3.0m lane + 1.2m bicycle lane when buses and cyclist share a 60kph roadway.

CS1 - Collector Street Constrained

Comments:

- Ideal to specify parking lane as indented (or kerb outstands at intersections), to improve pedestrian safety and amenity at intersections and other road crossings.
- Where parking turnover is low (e.g. residential frontages) a better allocation of road space would be as shown in the figure below.



CS2 - Collector Street Unconstrained

(LR2 & CS2 ARE IDENTICAL)

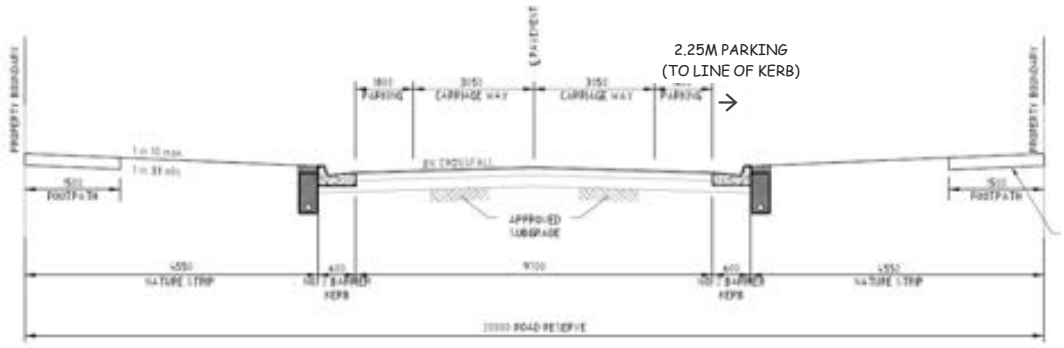
Comments:

- Ideal to specify parking lane as indented (or kerb outstands at intersections), to improve pedestrian safety and amenity at intersections and other road crossings.

- 3.1m traffic lanes would be sufficient[5], providing a wider verge and reducing pedestrian road crossing distances. Limiting excessive carriageway width could also provide speed management benefits.

The PSP lacks detail on the intent of Key Access Streets, and no cross section is defined for this road type. Council has provided a Key Access Street cross section as shown below.

Key Access Street (currently not within PSP, figure provided by City of Ballarat, Jan.2023)



Comments:

- Used extensively to date, examples include Galway Drive, Donegal Drive, Erskine Road, Wedge Tail Drive, Neway Avenue.
- Ideal to specify parking lane as indented (or kerb outstands at intersections), to improve pedestrian safety and amenity at intersections and other road crossings. Note given narrow carriageway lanes, indentation should be less than full parking lane width, such as 2.0m.

Where roadways have a side that generates very few vehicle trips, such as open space reserves (mainly utilised by local residents as active transport destinations), a car parking lane on that side can be excessive and detrimental to speed management objectives. Accordingly, it would be prudent for the PSP to add further information regarding potential local variations to specified cross sections.

Figure 3.2 Kensington Boulevard Alongside Kensington Creek Reserve

[5] Including for buses, noting Austroads Road Design Guides specify minimum widths of 3.0m lane + 1.2m bicycle lane when buses and cyclist share a 60kph roadway.

4 Intersections (and Road Crossings)

4.1 Intersection Control

The PSP shows 2 traffic signal controlled intersections, 9 dual-lane roundabouts, 7 single-lane roundabouts, and other lower traffic volume locations give-way / uncontrolled.

Research indicates fewer vehicular accidents occur at roundabouts compared to other intersections (traffic signals, stop, give-way). There can be a perception that roundabouts are less safe for pedestrians, but accident research does not provide compelling evidence of this. For cyclists, research suggests they are over represented in accidents at roundabouts.

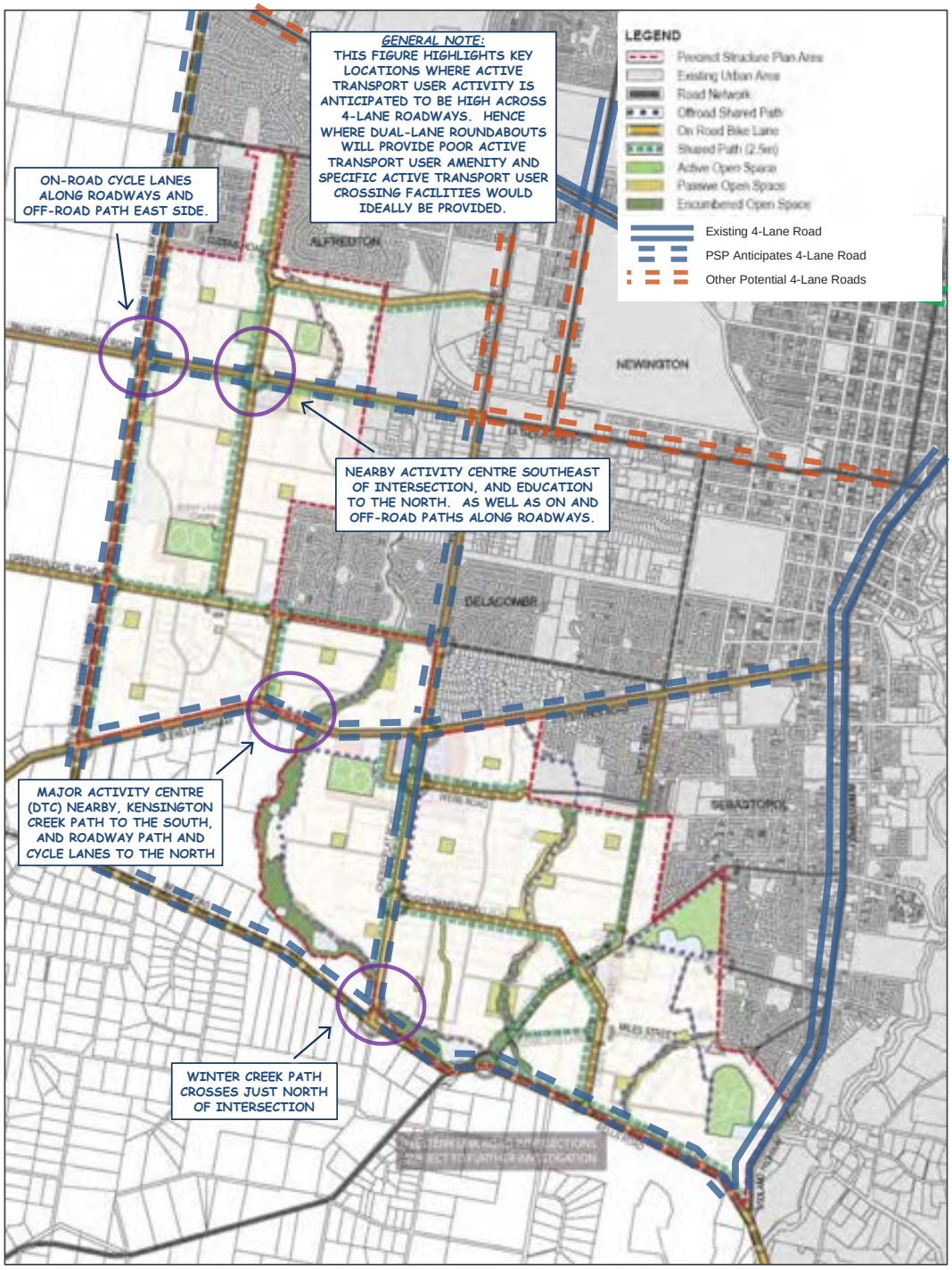
Some pedestrians (particularly the elderly, children, or mobility impaired) suffer reduced accessibility at roundabouts, especially at dual lane roundabouts, given vehicles have priority over pedestrians.

Roundabouts will generally have a greater land area requirement, so it's prudent for the PSP and DCP to set aside sufficient land for a roundabout in the knowledge either a roundabout or signals can be accommodated.

4.2 Active Transport Crossings

When selecting appropriate intersection treatments, it is important to consider the need for such intersections to provide active transport road crossings, particularly at multi-lane intersections. Therefore, Figure 4.1 shows the PSP walking and trails network plan, and how they interact with future 4-lane roadways.

Figure 4.1 Walking and Trails Network as well as Layout of 4-Lane Roadways



The PSP and DCP specify that active transport infrastructure (shared paths / trails) are the responsibility of developers to construct within each development, and this is appropriate. However, the key locations shown in the figure above highlight crossings of roadway infrastructure that are DCP project items. And whilst footpaths will be included as part of intersection

construction, standard dual lane roundabouts will not fulfill a safe and user friendly crossing for active transport users. Therefore, there may be circumstances where implementation of traffic signals as opposed to roundabouts may be a better outcome for all road users. Or in addition to a roundabout, locating crossing facilities nearby (as opposed to at the roundabout) will provide better amenity to active transport users (making it easier to determine gaps in passing traffic). Where high demands for vulnerable road users exists (children, elderly, mobility impaired), a signalised crossing may be necessary.

4.3 Cuthberts Road / North-South Road

The PSP specifies a give-way T-intersection at Cuthberts Road and North-South Road (not DCP funded), and it has now been constructed with the south approach named Sydney Way. Traffic forecasting indicates relatively large traffic volumes along these Link Roads, although the forecasting may be quite conservative. Elsewhere along the North-South Road's length, intersections with Link or Arterial Roads are specified with roundabout control and are DCP funded. A large proportion of traffic utilising Sydney Way could be anticipated to turn right towards Ballarat, and high traffic volumes and delays for a right turn movement at a give-way approach is typically the impetus for a roundabout or traffic signal intersection upgrade. Property boundaries do not provide the large chamfers / splays to accommodate a typically sized roundabout. While traffic signals will have adverse impacts to existing residential property access. Therefore, other traffic management measures may be most appropriate for safe traffic management (e.g. pedestrian operated signals adjacent, or speed management devices).

Given development in this precinct has occurred and the intersection is constructed as per the PSP, no action is required under this PSP review. However, the above has been described to inform ongoing management of the nearby road network.

5 Recommendations

5.1 Preamble

Section 5 of this report outlines specific items or matters where a modification to the PSP and / or DCP are recommended, or should be considered with further input from key stakeholders.

The analysis above has informed these recommendations, yet in some circumstances additional contextual analysis has been included below.

5.2 Road Classifications

***Recommendation 1*: If updating PSP drawings, the 'Duplicated Link Road' should be above 'Link Road' in map legends (to be consistent with the highest to lowest through traffic functionality) .**

***Recommendation 2*: The PSP refers to a 'future Western Link Road'. Stage 1 of this roadway's construction has seen it named 'Ballarat Link Road'. Changing this term accordingly would reduce confusion.**

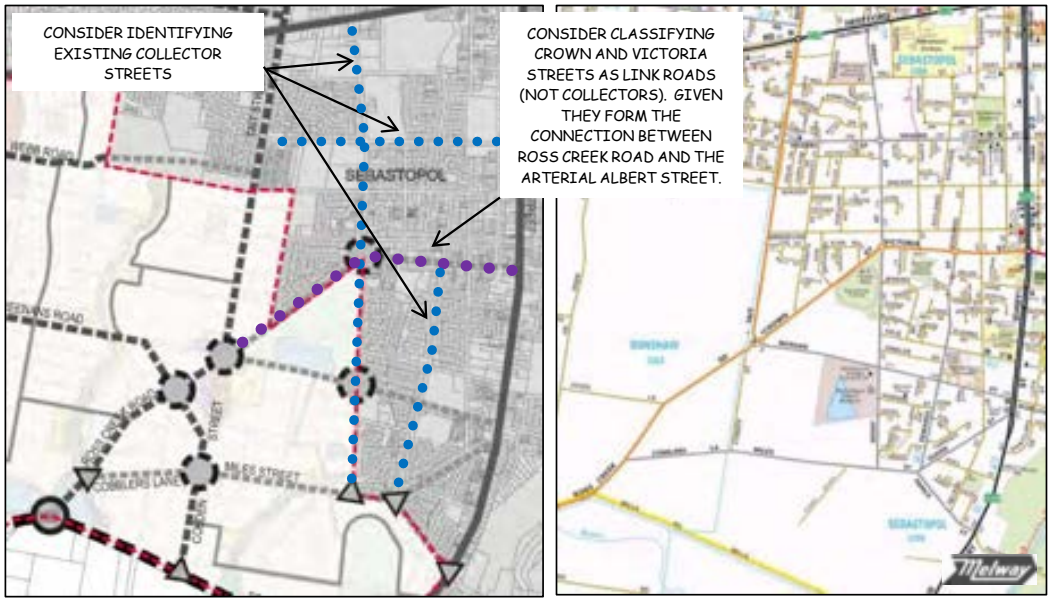
While it may not be for the PSP to nominate roadways transitioning to a future arterial classification, it is noted that Cherry Flat Road is a logical continuation of the Wiltshire Lane arterial roadway. Its designation as an arterial, along with the Ballarat Link Road, would also complete a typical grid of arterial roads (Smythes Road, Albert Street, Ballarat Link Road, Cherry Flat Road).

***Recommendation 3*: In consultation with the Department of Transport and Planning, consider a revision to the PSP adding an indication that Ballarat Link Road and Cherry Flat Road may be reclassified as Arterial Roads following long term development growth.**

Development within the Bonshaw Sub-Precinct will increase travel demands towards Albert Street (Midland Highway) and the east end of Smythes Road (Glenelg Highway), through established neighbourhoods and transport networks within Sebastopol. There is a fine grain Collector Street network in these areas such that increased traffic demands are likely to be well dispersed. The PSP has some identification of these Collector Streets, although, not all are specified as per the examples shown in the figure below.

Furthermore, given they form a continuation of Ross Creek Road, the Crown Street - Victoria Street route may function more like Sub-Arterials / Link Roads, rather than the PSP defined Collector Streets.

Figure 5.1 Sebastopol Road Network Details



***Recommendation 4**: If updating PSP drawings, ensure correct roadway classifications are shown adjacent to the Growth Area.*

***Recommendation 5**: If updating PSP drawings, consider changing Crown Street and Victoria Street to be classified as Link Roads.*

5.3 Road Cross Sections

Section 3.3 of this report outlines a range of commentary regarding PSP cross sections. Whilst wholesale changes could be made to improve the PSP, much of the Growth Area is developed and significant changes at this time could be disruptive to development planning currently underway. Also, functionality differences may be too minor to warrant making significant revisions to the PSP. Whilst all recommendations in Section 3.3 should be considered, those that are considered necessary or having significant benefit are set out as follows.

***Recommendation 6**: Remove reference to LR3 as a "duplicated" cross section, as this is not correct terminology.*

***Recommendation 7**: Modify LR1 cross section, and / or modify Note 1 to Table 7 to clarify interim cross section intent for the Ballarat Link Road.*

***Recommendation 8**: Add a notation to Table 7, or elsewhere in Section 5.9, specifying parking lanes should be indented (or kerb outstands at intersections).*

***Recommendation 9**: Include a Key Access Street cross section into the PSP, as per the design shown in Section 3.3 of this report.*

Tait Street and Ross Creek Road are approximately 1.6km from Albert Street and Cherry Flat Road, and they provide connectivity that would see them likely to function as Sub-Arterial or Link Roads in future. The PSP nominates both Tait Street and Ross Creek Road as Link Roads. Tait

Street is nominated with an LR3 40m cross section incorporating service roads for property access and a central strip to accommodate turn lanes at intersections. However, Ross Creek Road is nominated with an LR2 24m cross section without these features. This cross section poses the risks that intersections will lack the turn lanes necessary to safety and efficiently manage turning traffic demands and that property access will disrupt it's through traffic functionality.

***Recommendation 10*: It would be prudent to nominate Ross Creek Road with a cross section the same or similar to Tait Street. And to include notations similar to those for Tait Street regarding access management (e.g. minimising uncontrolled intersections).**

The PSP defines Miles Street with a CS1 Collector Street cross section (20m without cyclist infrastructure), and Cobblers Lane (the continuation of Miles Street) with a CS2 Collector Street cross section (24m with shared path and on-road bicycle lanes). Both roadways have an existing 20m road reserve. Ideally, Miles Street should have its nominated cross section changed to be consistent with Cobblers Lane. However, in Section 3.3 of this report an alternative 20m CS1 cross section is discussed that includes bicycle lanes.

***Recommendation 11*: Specify Miles Street with a CS2 cross section, or alternatively with the alternative CS1 with bicycle lanes cross section.**

5.4 Junction 02

A roundabout is planned for the intersection of Ballarat-Carngham Road / North-South Road (now named Sydney Way north approach and Presentation Boulevard south approach).

Presentation Boulevard to the south has been constructed and Sydney Way forms part of a permit approved estate. Their alignment is slightly west than envisaged by the PSP. The roundabout construction as planned requires land from neighbouring development, however, property owners to the southeast side of the intersection do not have development intentions, and land acquisition is not part of the DCP. The development that has occurred to the south, and pending to the north, triggers the roundabout's need, however, its construction is being delayed by the unavailability of land to the southeast.

The PSP specifies land to the southeast as a Neighbourhood Activity Centre (NAC). And education facilities will exist alongside Sydney Way to the north. As noted in Section 4.2 above, Ballarat-Carngham Road in this location would ideally have a safe and attractive crossing for active transport users.

The issue has been considered at length by Council and the Department of Transport and Planning as part of consideration of nearby development applications. And it is understood that the Department of Transport and Planning are undertaking project planning for the duplication of Ballarat-Carngham Road, although its construction is not funded. This planning work has included preparation of design drawings for a roundabout constructed slightly to the west which would negate the need to acquire land to the southeast, combined with a signalised pedestrian crossing a short distance east of the intersection. As well as an alternative traffic signalised intersection, including pedestrian crossings, which again would negate the need to acquire land to the southeast.

Expectations of long term traffic activity at the intersection dictates that a signalised intersection with a geometry including 2 through traffic lanes in the east and west-bound directions, and auxiliary turn lanes, could be expected to provide satisfactory operating performance.

It is the authors view that a signalised intersection represents the best transport planning outcome.

***Recommendation 12*: In consultation with the Department of Transport and Planning, revise the PSP and DCP specifying Junction 02 as a signalised intersection.**

5.5 North-South Road Cross Intersections

The PSP does not specify intersection control at 2 cross intersections between North-South Road and 2 Key Access Streets in the education precinct north of Ballarat-Carngham Road. Given previous and planned development, only 1 cross intersection will eventuate in this area. Uncontrolled cross intersections are best avoided due to safety shortcomings. A roundabout would be an appropriate intersection control (and speed management device) at this intersection and planning for the proposed development anticipates a roundabout. As a local access intersection, this is not considered a DCP project.

***Recommendation 13*: If updating PSP drawings to reflect the as built network, show a single lane roundabout at this intersection.**

5.6 Junction 05

The PSP identifies the North-South Road forming T-intersections with Greenhalghs Road, with DCP funded roundabouts (JNC_04, JNC_05). The DCP specifies that T-intersections (i.e. uncontrolled give-way intersections) will function satisfactory in the interim period prior to project triggers.

At junction 05, the south approach is being constructed as Innsbruck Road. Land north of the intersection is not within the Growth Area and has established residential properties, inhibiting construction of a roundabout as specified by the PSP. Accordingly, it is understood development planning is underway for a traffic signalised intersection.

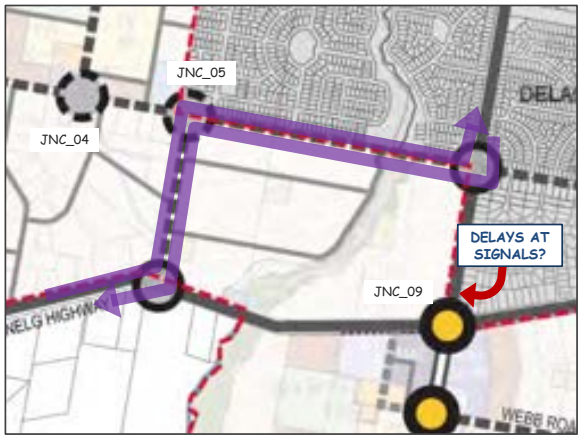
***Recommendation 14*: Revise the PSP and DCP specifying Junction 05 as a signalised intersection.**

5.7 Junction 09

A traffic signal upgrade of the intersection of Glenelg Highway / Wiltshire Lane / Cherry Flat Road (JNC_09) has recently been delivered. Whilst the PSP anticipated most approaches with double right turn lanes, single right turn lanes are currently provided, and the constructed layout may be designed for future upgrade with additional lanes.

Due to the layout of the nearby PSP road network, if motorists experience excessive delays at Junction 05, there is a risk that nearby link roads will be utilised as a short cut between the arterial roads as shown in the figure below.

Figure 5.2 Potential Short Cut between Glenelg Highway and Wiltshire Lane



The need for double right turn lanes at Junction 09, particularly on the north approach, is anticipated in future.

***Recommendation 15*: In collaboration with the Department of Transport and Planning, ensure additional right turn capacity can be implemented at Junction 09.**

5.8 Cherry Flat Road Intersections (JNC_11)

The PSP specifies a 3 approach roundabout at the Cherry Flat Road / Schreenans Road intersection, and development of land west of Cherry Flat Road incorporating Key Access Streets forming nearby T intersections with Cherry Flat Road. Roundabouts have safety benefits managing turning traffic compared to give-way intersections. So it's more desirable that development of land west of Cherry Flat Road has a Key Access Street network that includes a fourth approach to the Cherry Flat Road / Schreenans Road intersection (JNC_11). The PSP design for this intersection shows the roundabout encroaching into private land on the west side.

***Recommendation 16*: Modify the PSP to show a Key Access Street forming a west approach to the Cherry Flat Road / Schreenans Road intersection.**

Figure 5.3 Realignment of Key Access Road as Forth Approach to Junction 11

5.9 Webb Road

The PSP defines Webb Road as a Key Access Street, it currently has a 20m road reserve. The roadway provides a long central spine locally and is likely to be a highly trafficked local street. Nearby development is currently occurring and construction of Webb Road has commenced at its northern end, appearing to be a 20m Collector Street Constrained (CS1) cross section.

***Recommendation 17*: If updating PSP drawings to reflect the as built network, show Webb Road as a Collector Road.**

The PSP does not specify intersection control at the Schreenans Road / Webb Road intersection. Uncontrolled cross intersections are best avoided due to safety shortcomings. A roundabout would be an appropriate intersection control (and speed management device) at this intersection. As a local access intersection, this is not considered a DCP project.

***Recommendation 18*: If updating PSP drawings, show a single lane roundabout at this intersection.**

5.10 Schreenans Road

The PSP shows Schreenans Road extending over Bonshaw Creek, the bridge is DCP funded at an estimated cost of approximately $9M. It is understood that although there has been previous investigation into the need for and economic value of the bridge crossing, it is to remain as part of the PSP and DCP.

Schreenans Road curves between the bridge and Ross Creek Road. The PSP / DCP incorporates land for the roadways straight sections, however, the land acquisition doesn't include any chamfer / splay at the curve. Ideally a large radius curve would be provided for a through priority Link Road which would require additional land as a chamfer / splay.

The affected land to the south is subject to a planning permit application for what is known as the River Gum Rise estate.

Development of the Ploughmans Arms estate has occurred to the north. This development has implemented an intersection at the centre of the curve inconsistent with the PSP's intent, given it gives priority to a north-south aligned Key Access Street (known as Settlers Drive) rather than Schreenans Road, and that it incorporates a fourth roadway approach (known as Carthew Road).

The sketches below have been prepared to compare potential roadway layouts with a desirable curve radius and an undesirable radius if constrained by current PSP / DCP land areas.

Figure 5.4 Potential Schreenans Road / Settlers Drive Intersection Layout with Additional Land Provisions

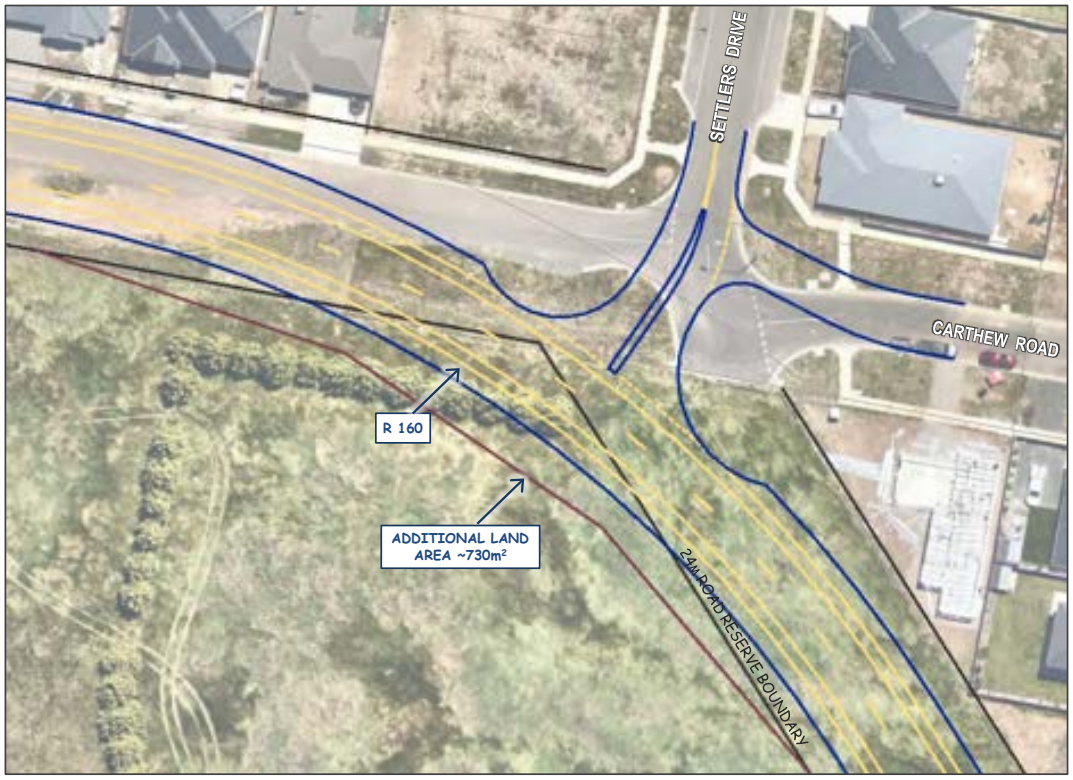
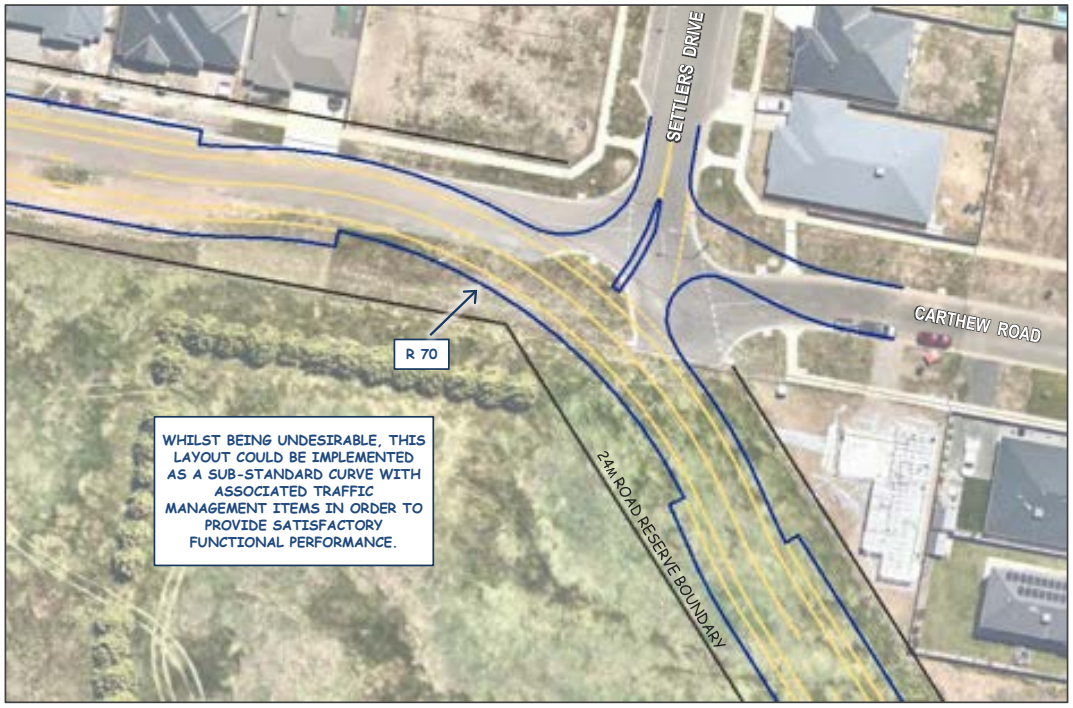


Figure 5.5 Potential Schreenans Road / Settlers Drive Intersection Layout within Current Land Provisions



It is understood that consideration is being given to the provision of a roundabout at the intersection, which would also require additional land than currently provided by the PSP / DCP, especially as the non-perpendicular approaches will pose difficulties achieving a suitable geometric layout.

***Recommendation 19*: Either via the PSP / DCP revision or other mechanism, ensure that sufficient land is available for the alignment of Schreenans Road and its intersection with Settlers Drive to achieve normal design minima geometry.**

5.11 Albert Street / Prince Street / Docwra Street Intersection

The Albert Street / Prince Street / Docwra Street intersection has recently been upgraded to traffic signal control.

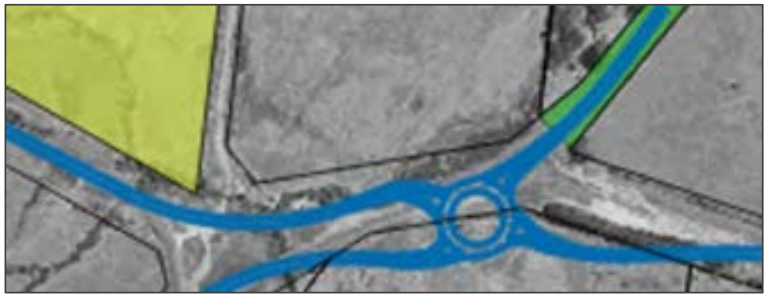
***Recommendation 20*: If updating PSP drawings, show traffic signals at this intersection.**

5.12 Ballarat Link Road, Bonshaw

The PSP states that the Ballarat Link Road intersections in Bonshaw are "subject to further investigation". The DCP does not include land acquisition or intersection works in this section of the Ballarat Link Road. Yet the provision of roundabouts along the Ballarat Link Road in Bonshaw will likely require land beyond the existing road reserves.

The following drawing of the Ballarat Link Road is taken from the City of Ballarat website.

Figure 5.6 Ballarat Link Road Plan in Bonshaw



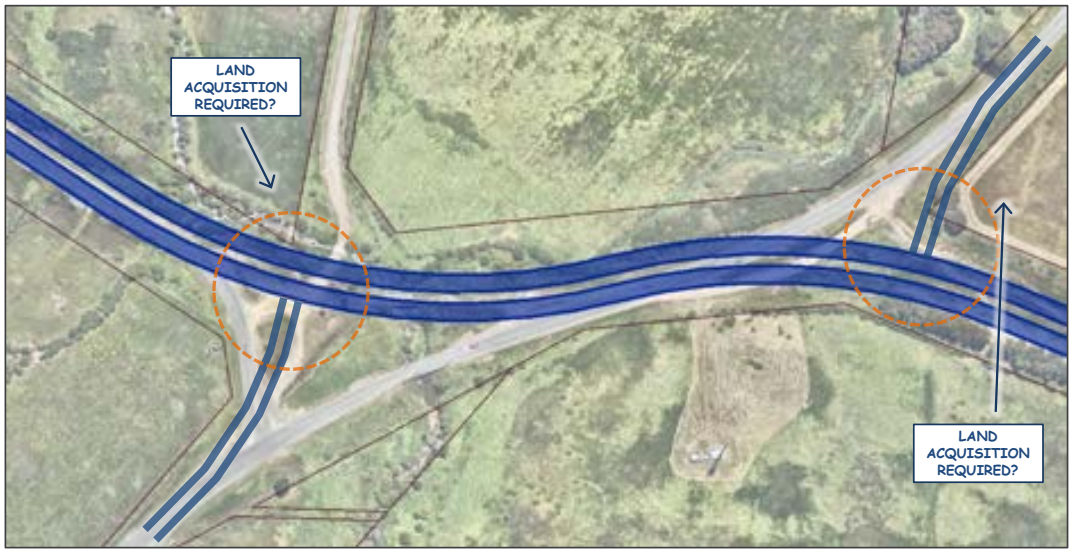
Source: City of Ballarat data exchange

Winter Creek and Bonshaw Creek traverse the area. The DCP incorporates land acquisition for drainage infrastructure (retarding basins).

Figure 5.7 DCP Drainage Land Acquisition in Bonshaw

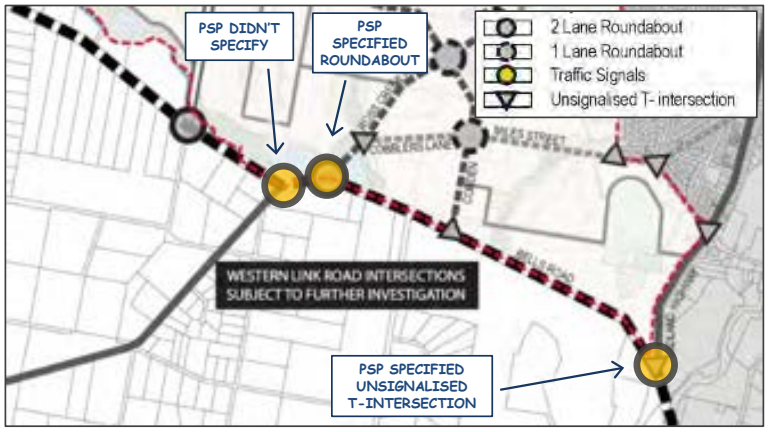
The following drawing shows that for the Ballarat Link Road to have a large radius curve at the Ross Creek Road and Sebastopol-Smythesdale Road intersections, and for those intersections to align near perpendicular, land beyond the existing road reserves will likely be required.

Figure 5.8 Ballarat Link Road Large Radius Alignment Sketch



The figure below shows what the author considers most likely to be the appropriate intersection treatment along the Ballarat Link Road in Bonshaw.

Figure 5.9 PSP Road Network Plan in Bonshaw



<u>Recommendation 21</u>: Revise the PSP to show current expectations of most likely intersection treatments along the Ballarat Link Road.

<u>Recommendation 22</u>: Either via the PSP / DCP revision or other mechanism, ensure that in the vicinity of the Ross Creek Road and Sebastopol-Smythesdale Road intersections, sufficient land remains available for future provision of the Ballarat Link Road.

5.13 Active Transport Crossings

Following on from the discussion in Section 4, the PSP and DCP should have further information specifying path / trail road crossings that need to be incorporated into DCP projects. Uncontrolled shared path crossings are very low cost items but their inclusion into DCP projects (if not already allowed for) will ensure a suitable active transport network is delivered.

***Recommendation 23*: For Junction 01, provide additional design direction specifying the eastern approach to incorporate a shared path crossing facility.**

***Recommendation 24*: For Junction 08, provide additional design direction specifying the provision of an uncontrolled shared path crossing located east of the intersection.**

***Recommendation 25*: For the southern end of Cherry Flat Road (RD_21), provide additional design direction specifying the provision of an uncontrolled shared path crossing located north of the Ballarat Link Road.**

Note: Active transport users at Junction 02 have been addressed as part of the recommendation above for that intersection.

APPENDIX D. PROJECT RISK MULTI-CRITERIA ASSESSMENT (MCA)

		Group	Growth Demand				Development Activity		Project scope & cost estimate			Delivery to Council's Strategic Aims	Project Deliverability
		ID	1	2	3	4	5	6	7	8	9	10	11
	PSP ID	Item	Population Projections	Land Uptake	Rezoning/ Modification to Land Use	Actual vs Planned Growth Patterns	Modelled vs Actual Traffic Movements	Staged Development	Concept vs Actual Design	Land Acquisition	Construction Costs	Active vs Car-dependant transport	Ease of Delivery
Precinct 4	DI_RD_03b	Comments	Net dwelling increase of 1,334 or 88% above the original 2014 projection and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare – there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP The neighbouring property to the east (property 213) is fully subdivided with no allowance for DI_RD_03b within this property.	Surrounding developments have their own connections to other arterial roads (Dyson Drive, Carngham Road) – this road would be built as part of the development of Lot 1 of PS807486.	The road's primary function is to connect the proposed schools with the surrounding developed areas.	Surrounding developments have their own connections to other roads – this road would be built as part of the development of Lot 1 of PS807486	It is estimated that the alignment will move approximately 35 metres westward into Lot 1 of PS807486 or Property 230.	The realignment has meant the northern arm into proposed roundabout at Carngham Road is now off-90 degrees.	Detailed design is required to understand the total project costs even though the proposed road has been marginally shortened.	The N-S road will have footpaths, shared paths and cycle lanes that will connect to the wider network	This delivery of this project is considered low risk of being further delayed given the single developer delivering the road as per PSP requirements
	DI_RD_03b	Risk score	2	1	1	1	1	1	1	1	1	1	11
	DI_JNC_02	Comments	Net dwelling increase of 1,334 or 88% above the original 2014 projection and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare – there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP The proposed NAC on the south east corner presents a challenge that the property at 163 Carngham Road would be acquired to make the intersection operate as a roundabout	This intersection would be built as part of Regional Roads Victoria's Carngham Road improvements (including duplication) coupled with the development of Lot 1 of PS807486 (PSP property ID 230).	The intersection's function is to create a safer intersection with an arterial road (Carngham Road) for the N-S connector where there are proposed schools, sporting facilities and shops adjacent to the N-S road. Current traffic movements service only the southern side where the current intersection treatment is adequate, the norther arm would, in time, require roundabout/traffic signals.	Surrounding developments have their own connections to other roads (see Actual vs Planned above)	The northern roundabout arm will move approximately 35 metres westward into Lot 1 of PS807486, Property 230 and still requires the acquisition of 163 Carngham Road for a roundabout	The realignment moves the northern arm at the proposed roundabout at Carngham Road is now off-90 degrees where splays are still required. There is the potential need to modify the intersection to traffic signals for safer pedestrian/cyclist movements at Carngham Road, this may reduce the need to acquire 163 Carngham Road or at least the only acquiring a 5x5 m splay instead of acquiring more than 50% of the property.	Detailed design is required to understand the total project costs even though the proposed road has been marginally shortened.	The N-S road will have footpaths, shared paths and cycle lanes that will connect to the wider network; there are no details about how non-vehicle traffic will safely cross intersection. VicRoads Traffic Engineering Manual discusses that car-pedestrian crash data at roundabouts is less than at signalised intersections although the perception is that it is less safe. Treatments such as raised pavements or pedestrian operated signals could be installed to reduce vehicle approach and departure speeds, however this needs to be considered as part of the wider transport network especially traffic movements around the NAC	The delivery of this project is medium risk of being delayed due to unresolved design-related issues (interface with RRV controlled road).
	DI_JNC_02	Risk score	2	1	2	3	2	1	1	2	1	2	17
	DI_RD_04	Comments	Net dwelling increase of 1,334 or 88% above the original 2014 projection and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare – there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP	Road is largely completed and conforms to the LR2 cross section as specified in the PSP.	The road's primary function is to connect the proposed schools with the surrounding developed areas.	The road has been built in stages as per the development site it is located in.	The road has generally moved westward, into property 218, property 216 no longer has portions of the road in its development area.	All land has been acquired for the construction of this road	Completed in stages by the developer	The N-S road will have footpaths, shared paths and cycle lanes that will connect to the wider network	This road is largely completed
	DI_RD_04	Risk score	2	1	1	1	1	1	1	1	1	1	11
Precinct 2	DI_RD_11	Comments	Net dwelling decrease of 516 or 38% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare – there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP	The development area is currently under construction, planned development in accordance with the PSP	The yet to be built road continues the N-S collector, adjacent properties are currently under development	The Winterfield (north) development is currently in progress triggering the requirement to build the road	The road alignment has been move further west to connect into DI_RD_04, no change to the cross section design	Roads intersecting with DI_RD_11 will have splays for uncontrolled T and cross roads.	The westward realignment has no significant impact on the original cost estimates.	DI_RD_11 will have footpaths, shared paths and cycle lanes that will connect to the wider network and to the schools and public open space that are part of the Winterfield (north) development	This delivery of this project is considered relatively low risk.
	DI_RD_11	Risk score	1	1	1	1	1	1	1	1	1	1	10
	DI_JNC_04	Comments	Net dwelling decrease of 516 or 38% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at the original density of 15 lots/hectare – there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP.	The development area is currently under construction, planned development in accordance with the PSP	The intersection's function is to create a safer intersection with Greenhalghs Road for the N-S connector where there are proposed schools, sporting facilities and shops adjacent along the N-S road corridor.	The junction will serve as the main entrance for the Winterfield (north) development which in time will connect with DI_RD_04 at the northern end.	The westward movement of DI_RD_11 has no significant impact on the original estimates. The northward movement of roundabout avoids the acquisition of properties on the southern side of Greenhalghs Road.	The land has already been subdivided for the splays and northward movement of the proposed roundabout.	Detailed design is required to understand the total project costs relative the DCP cost estimates, however it is likely that these increases will be relatively minor.	The Greenhalghs Road shared path is located on the northern side, minimising the need for safer crossing points until DI_JNC_05 to the east.	This delivery of this project is considered relatively low risk.
	DI_JNC_04	Risk score	1	1	1	1	1	1	1	1	1	1	10
	DI_JNC_05	Comments	Net dwelling decrease of 516 or 38% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare - there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP. LDRZ property on the south western corner prevents the creation of splays for proposed roundabout	The development area is currently under construction, planned development in accordance with the PSP	The intersection's function is to create a safer intersection with Greenhalghs Road for the N-S collector and DI_RD_12.	The Winterfield's (south) development is currently in progress triggering the requirement to build the intersection	The junction has been modified from a roundabout to traffic signals to avoid acquiring land other than from Winterfield (south)	As detailed in the following discussion, there is the potential need to modify the intersection to traffic signals given the spatial constraints. There are no splays acquired for slip lanes should the junction become traffic signalled.	Replacing the proposed roundabout to traffic signals incurs a significant cost, these are detailed below.	The Greenhalghs Road and DI_RD_12 will have footpaths, shared paths and cycle lanes that will connect to the wider network. Traffic signals will allow pedestrian and cyclists to cross in a regulated manner, given the shared path does transitions from the southern to the northern side of Greenhalghs Road.	The delivery of this project is considered to be moderate risk of being delayed due to the identified solution of traffic signals instead of a roundabout.
	DI_JNC_05	Risk score	1	1	2	1	2	1	2	2	3	1	16
	DI_RD_12	Comments	Net dwelling decrease of 516 or 38% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare - there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP	The development area is currently under construction, planned development in accordance with the PSP, although the road is now immediately adjacent to western property boundary	The road's function is to create a N-S collector joining Glenelg Highway and Greenhalghs Road. The adopted road profile LR2 is considered appropriate.	The Winterfield (south) development is currently in progress triggering the requirement to build the road and intersections (DI_JNC_05 and DI_JNC_08) The revised position of the road allows for future connections for the LDRZ area which is under it is own development as a future PSP by Council.	The road alignment has moved westward but is still inside property 158 (Winterfield South).	The proposed splays have been reduced or eliminated at the junctions (see DI_JNC_05 and DI_JNC_08). New splays will be required for any future western connection from the LDRZ area.	There are changes to the construction costs that can only be ascertained from detailed design and would be reflected more in the junction designs at each end.	There are changes to the construction costs that can only be ascertained from detailed design and would be reflected more in the junction designs at each end. DI_RD_12 will have footpaths, shared paths and cycle lanes that will connect to the wider network, especially the southern end where it will connect to Ballarat's Strategic Cycling Corridor along the Glenelg Highway.	This project is considered relatively low risk of altering from the original PSP concepts.
	DI_RD_12	Risk score	1	1	1	1	1	1	1	1	1	1	10
	DI_JNC_08	Comments	Net dwelling decrease of 516 or 38% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare - there would be no significant deviation from the original assumptions for the area	Surrounding land use has remained as per PSP	The development area is currently under construction, planned development in accordance with the PSP. Minor realignment of DI_RD_12 has resulted in a minor reduction in land acquisition	The proposed roundabout is considered adequate for the current and future traffic demands, RRV have ensure the design also caters for the future possible duplication (outside of the PSP).	The Winterfield (south) development is currently in progress triggering the requirement to build the road (DI_RD_12) and the junction.	The northern arm has moved westward but there is still enough road reserve for the proposed junction.	The proposed splays have been reduced or eliminated at the junction.	Council's review of the originally estimated DCP costs and the recently awarded tender shows significant underestimation. These differences can be attributed to changed standards/construction requirements, water main relocation and changing from Council to VicRoads pavement design, more discussion as to these caused are listed below.	The proposed roundabout will have footpaths, shared paths and cycle lanes crossing points that connect to Ballarat's Strategic Cycling Corridor along the Glenelg Highway.	This delivery of this project is considered moderate risk of being delayed due to unresolved land acquisition and design-related issues.
	DI_JNC_08	Risk score	1	1	1	1	1	1	1	1	3	1	12
Precinct 1	DI_RD_20	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare on the western side. PSP allocated Low Density Residential traffic volumes on the eastern side, however development will be at 15-20 lots/hectare depending on location	Surrounding land use has remained as per PSP, although the properties bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road, and Ross Creek Road were considered to remain as LDRZ, when several blocks in this area are developed as residential.	Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The existing duplicated road adequately serves the traffic demands of the area.	The further duplication of Cherry Flat beyond the current extent is based on the development of the western side of road, however, the area bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road, and Ross Creek Road were not considered as a trigger for further duplication works in the PSP.	The staged development of this road would adequately serve the current and future traffic demands.	The southern end of this section terminates at a proposed roundabout (DI_JNC_11) which requires further land acquisition for the splays/roundabout. Land acquisition is a "mix" of PAO and DCP-related land acquisition.	The construction costs are largely dependent on the construction timing of the adjacent development sites. Previous section was delivered by Council instead of the developers.	This section has footpaths, shared paths and cycle lanes that connect into Ballarat's Strategic Cycling Corridor along the Glenelg Highway.	This delivery of this project is relatively moderate risk of being delayed due to unresolved land acquisition and design-related issues.
	DI_RD_20	Risk score	1	2	2	1	1	2	1	3	1	1	15
	DI_JNC_11	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare on the western side. PSP allocated Low Density Residential traffic volumes on the eastern side, however development will be at 15-20 lots/hectare depending on location	Surrounding land use has remained as per PSP, although the properties bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road and Ross Creek Road were considered to remain as LDRZ, when several blocks in this area are developed as residential.	Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The duplicated Cherry Flat Road would adequately serve the north-south traffic demands to the junction. The Schreenans Road arm cross section (LR2) was developed using the SMEC traffic modelling, however the new forth arm proposed to connect the development site on the western side warrants further investigation to understand the traffic movement impacts this new arm creates.	The further duplication of Cherry Flat Road is planned for south of the intersection. However as discussed above, the area bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road, and Ross Creek Road were not directly considered as a well-defined trigger (unlike the west side) for further duplication works.	The traffic modelling suggests that the level of service at the roundabout delivers is the best solution for the intersection. Other options, namely traffic signals would impact the overall movements and create unnecessary traffic wait times outside of peak flow periods.	The south eastern corner of the intersection has an existing Public Acquisition Overlay unlike the other land acquisitions within the PSP. While a PAO achieves the same outcome as the other land acquisitions in PSP, the process differs and the funding for this acquisition is outside the PSP and possibly not budgeted by Council.	The design standards have changed since the development of the PSP, as such, it is expected the costs for the intersection treatment to increase accordingly.	This junction will have footpaths, shared paths and cycle lanes intersecting that will connect into the wider network. May need to investigate treatments that create a safer crossing for more vulnerable users.	This project has a high number of high risk items i.e. unresolved land acquisition (PAO2/splays) and design-related issues (fourth arm and pavement design).
	DI_JNC_11	Risk score	1	2	2	1	3	3	2	3	2	2	21
	DI_RD_21	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare on the western side. PSP allocated Low Density Residential traffic volumes on the eastern side, however development will be at 15-20 lots/hectare depending on location	Surrounding land use has remained as per PSP, although the properties bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road and Ross Creek Road were considered to remain as LDRZ, when several blocks in this area are developed as residential.	Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The duplicated Cherry Flat Road would adequately serve the north-south traffic demands, especially when the Ballarat Link Road is built after 2036.	The further duplication of Cherry Flat Road is planned for south of the intersection to only 190 m, however development on either side of would necessitate further duplication ~600m longer. The fragmented lot ownership/development on the eastern side warrants further investigation.	Traffic modelling is required to determine whether the remaining duplication is required	The intersection is subject to DCP-related land acquisition and PAO2 for a duplicated Cherry Flat Road. Five properties are subject to the existing PAO2, where two already have a carriageway easement over the nominated alignment. The PAO2 is not funded by the DCP and would be subject to Council/DoT funding to finalised.	Cherry Flat Road is also earmarked as an arterial road upon duplication. As such the design standards differ, could require additional funding to deliver this section of road.	This section of Cherry Flat Road has an allowance for footpaths, shared paths and cycle lanes that run parallel and would continue to connect into Ballarat's Strategic Cycling Corridor along the Glenelg Highway.	The above listed issues regarding the funding of and finalising the PAO2, 120 m of 895 m of the full length to be duplicated, this project is at risk of not meeting the aims of the PSP.
	DI_RD_21	Risk score	1	2	2	1	2	3	2	3	2	1	19

	PSP ID	Group	Growth Demand				Development Activity		Project scope & cost estimate			Delivery to Council's Strategic Aims	Project Deliverability
		ID	1	2	3	4	5	6	7	8	9	10	11
		Item	Population Projections	Land Uptake	Rezoning/ Modification to Land Use	Actual vs Planned Growth Patterns	Modelled vs Actual Traffic Movements	Staged Development	Concept vs Actual Design	Land Acquisition	Construction Costs	Active vs Car-dependant transport	Ease of Delivery
	DI_RD_31a	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare on the western side. PSP allocated Low Density Residential traffic volumes on the eastern side, however development will be at 15-20 lots/hectare depending on location	Properties bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road and Ross Creek Road were considered to remain as LDRZ, when several blocks in this area are developed as residential (15 lots/hectare), creating significant increases to traffic in the area.	Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct. Further analysis is required to understand how this translates to the LDRZ area is required.	The proposed road would adequately serve the traffic demands of the area, although there is uncertainty with reviewing/increasing the densities to the areas adjacent to the proposed road.	Fragmented property ownership increases the risk of ad hoc development adjacent to the road	The existing traffic modelling will need to be reviewed considering the increased housing densities in the adjacent areas from LDRZ to GRZ	The splays at the Cherry Flat Rd end have been discussed in the previous section (DI_JNC_11) which requires further land acquisition for the splays/roundabout. The widening of the road reserve on the northern side ignores the need to create splays at the Webb Road intersection for a possible roundabout (not considered in the PSP).	Subject to the traffic analysis, the construction costs are likely to increase given the increase in traffic loads and potential intersection treatments.	This section has footpaths, shared paths and cycle lanes that connect into the wider network, especially Cherry Flat Road and Delacombe Town Centre.	Given the above listed issues regarding the housing density, this project is at risk being delivered without meeting the PSP performance criteria of meeting the traffic loads at full development.
	DI_RD_31a	Risk score	1	2	3	3	2	3	3	3	2	1	23
	DI_RD_31b	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare on the western side. PSP allocated Low Density Residential traffic volumes on the eastern side, however development will be at 15-20 lots/hectare depending on location	Properties bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road and Ross Creek Road were considered to remain as LDRZ, when several blocks in this area are developed as residential (15 lots/hectare), creating significant increases to traffic in the area.	Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct. Further analysis is required to understand how this translates to the LDRZ area is required.	The approaching roads may adequately serve the traffic demands of the area, although some form of intersection treatment is required given the increasing the densities to the areas adjacent to the proposed road.	Fragmented property ownership increases the risk of ad hoc development adjacent to the road	The existing traffic modelling will need to be reviewed considering the increased housing densities in the adjacent areas from LDRZ to GRZ	The widening of the road reserve on the northern side ignores the need to create splays at the Webb Road intersection for a possible roundabout (not considered in the PSP).	Subject to the traffic analysis, the construction costs are likely to mirror the construction costs of DI_JNC_12.	Footpaths, shared paths, and cycle lanes are part of the cross section.	The above listed issues highlight that traffic modelling will be required.
	DI_RD_31b	Risk score	1	2	3	3	3	3	3	3	2	1	24
	DI_RD_31c	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare on the western side. PSP allocated Low Density Residential traffic volumes on the eastern side, however development will be at 15-20 lots/hectare depending on location	Properties bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road and Ross Creek Road were considered to remain as LDRZ, when several blocks in this area are developed as residential (15 lots/hectare), creating significant increases to traffic in the area.	Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct. Further analysis is required to understand how this translates to the LDRZ area is required.	The proposed bridge is included to address a large gap between creek crossings (i.e. Ascot Garden Drive and Joses Lane) over Bonshaw Creek. Modelling to date suggests that the bridge is not warranted until 2030+.	Cannot be staged given it is proposed to be a two-way bridge.	There are no concept designs for the proposed bridge.	The widening of the road reserve on the northern side is proposed, however there may be more land required (Council reserve available)	The height of the proposed bridge will determine the costs where there is at least 12 m from bottom of the creek channel to the develop-able land.	Previous traffic analysis has commented that a bridge is required in this location to best connect footpaths, shared paths and cycle lanes to the wider network, while vehicle traffic have alternative locations to cross.	The above listed issues highlight many unknowns as to whether the project would continue.
	DI_RD_31c	Risk score	1	2	3	3	2	3	2	1	3	1	21
	DI_RD_31d	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare.	Surrounding land use has remained as per PSP Realignment is driven by developer not the PSP	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The proposed road would adequately serve the traffic demands of the area without the bridge (DI_RD_31c). As discussed in previous sections, the increased lot development in the LDRZ and the construction of the bridge would significantly alter the traffic patterns.	Development is occuring in stages, development on the southern side may reduce the land available for the road and Settlers Drive intersection	The road without the bridge connection would adequately service the adjacent developments, in fact, it would be over-designed as a standalone road. The LR2 profile is considered an appropriate profile for the modelled traffic demands. It will need to be validated when in the increased lot yields in the LDRZ areas for this would increase the traffic demands.	The splays at the Ross Creek Road end are required for the future roundabout (DI_JNC_12). The PSP concept design showed a sweeping corner and the detailed design of PLP202167SC has altered this into a more straightened alignment. The intersection of Carthew Road and Settlers Drive will require additional analysis as the intersection may need additional control (i.e. traffic signals or roundabout).	Subject to the traffic analysis, the construction costs are likely to increase given the potential intersection treatment at Settlers Drive	This section has footpaths, shared paths and cycle lanes that connect into the wider network.	Given the above listed issues regarding the alignment, this project is at risk being delivered without meeting the PSP performance criteria of meeting the traffic loads at full development.
	DI_RD_31d	Risk score	1	1	3	2	2	3	3	3	3	1	22
	DI_RD_38	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed junction is at GRZ (15-20 lots/hectare) or part of the LAC.	No significant changes to date	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	There is a potential flow-on effect of underestimating the traffic generated for Schreenans Lane that needs further analysis to ensure the road design is suitable	Ross Creek Road is already 30 m wide, thus being a suitable width for proposed cross section. Adjacent developments would require service roads to be constructed on their land as part of the gifted assets process	ESR have recommended that the cross section matches the Tait St cross-section LR3 instead of LR2, which is possible to deliver if the service roads are located in the adjacent development areas	No additional land acquisition is required for the LR2 cross section and conceptually for the LR3 cross section as long as the service roads are located in the adjacent development	It is considered that building to LR2 cross section would not see any significant increase to projected construction costs.	This section of road will have footpaths, shared paths and cycle lanes adjacent and intersecting that will connect into the wider network.	Rated as moderate risk until LR2/LR3 cross section is resolved
	DI_RD_38	Risk score	1	1	1	2	2	1	1	2	1	1	13
	DI_RD_39	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed junction is at GRZ (15-20 lots/hectare) or part of the LAC.	No significant changes to date	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	There is a potential flow-on effect of underestimating the traffic generated for Schreenans Lane that needs further analysis to ensure the road design is suitable	Ross Creek Road is already 30 m wide, thus being a suitable width for proposed cross section. Adjacent developments would require service roads to be constructed on their land as part of the gifted assets process	ESR have recommended that the cross section matches the Tait St cross-section LR3 instead of LR2, which is possible to deliver if the service roads are located in the adjacent development areas	No additional land acquisition is required for the LR2 cross section and conceptually for the LR3 cross section as long as the service roads are located in the adjacent development	It is considered that building to LR2 cross section would not see any significant increase to projected construction costs.	This section of road will have footpaths, shared paths and cycle lanes adjacent and intersecting that will connect into the wider network.	Rated as moderate risk until LR2/LR3 cross section is resolved
	DI_RD_39	Risk score	1	1	1	2	2	1	1	2	1	1	13
	DI_RD_23	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed junction is at GRZ (15-20 lots/hectare) or part of the LAC.	No significant changes to date	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The realignment of Cobden Street ultimately connnects to DI_JNC_12 thus creating a four-arm roundabout. It is also uncertain about how the original Cobden Street alignment will connect into the new alignment. It needs to be resolved given the issues that are now faced at Di_RD_31d/Carthew Road/Settlers Drive intersection	Development adjacent to the proposed road would allow the road to be built to the required cross section	LR2 cross section is considered adequate for the proposed road and the modelled traffic volumes Roundabout construction will be required when Cobblers Lane/Miles Street is similarly upgraded	PSP & DCP accounts for the extra width required for the 24 m road reserve	Further detailed design is required for the intersection of the old and new Cobden Road intersection so as to avoid the issue that is now present at Settlers Drive/DI_RD_31d	This section of road will have footpaths, shared paths and cycle lanes adjacent and intersecting that will connect into the wider network.	This project is at risk being delivered without meeting the PSP performance criteria of meeting the traffic loads at full development at the junction of the old and new Cobden Streets.
	DI_RD_23	Risk score	1	1	1	2	3	1	1	1	3	1	15
	DI_RD_24	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed junction is at GRZ (15-20 lots/hectare)	No significant changes to date	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The trigger for the construction of this section is the Ballarat Western Link Road. This road was identified as one of the connecting roads.	Development adjacent to the proposed road would allow the road to be built to the required cross section	LR2 cross section is considered adequate for the proposed road and the modelled traffic volumes Roundabout construction will be required when Cobblers Lane/Miles Street is similarly upgraded	PSP & DCP accounts for the extra width required for the 24 m road reserve	No significant changes to the proposed road have been identified to date, Ballarat Western Link Road intersection treatment is not listed in the DCP to any detail	This section of road will have footpaths, shared paths and cycle lanes adjacent and intersecting that will connect into the wider network.	This project is considered low risk
	DI_RD_24	Risk score	1	1	1	2	1	1	1	1	2	1	12

		Group	Growth Demand				Development Activity		Project scope & cost estimate			Delivery to Council's Strategic Aims	Project Deliverability
		ID	1	2	3	4	5	6	7	8	9	10	11
	PSP ID	Item	Population Projections	Land Uptake	Rezoning/ Modification to Land Use	Actual vs Planned Growth Patterns	Modelled vs Actual Traffic Movements	Staged Development	Concept vs Actual Design	Land Acquisition	Construction Costs	Active vs Car-dependant transport	Ease of Delivery
	DI_JNC_X1	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of 15 lots/hectare on the western side. PSP allocated Low Density Residential traffic volumes on the eastern side, however development will be at 15-20 lots/hectare depending on location	Properties bounded by Ascot Garden Drive, Cherry Flat Road, Webb Road and Ross Creek Road were considered to remain as LDRZ, when several blocks in this area are developed as residential (15 lots/hectare), creating significant increases to traffic in the area.	Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct. Further analysis is required to understand how this translates to the LDRZ area is required.	The approaching roads may adequately serve the traffic demands of the area, although the proposed rondabout treatment will require additional modelling to confirm treatment is appropriate.	Fragmented property ownership increases the risk of ad hoc development adjacent to the road	The existing traffic modelling will need to be reviewed considering the increased housing densities in the adjacent areas from LDRZ to GRZ	Additional splays are required to accommodate suggested roundabout on top of the land acquisition for the Schreenans Road widening	Subject to the traffic analysis, the construction costs are likely to mirror the construction costs of DI_JNC_12.	This will need to be considered in the traffic analysis about how to best connect/manage footpaths, shared paths and cycle lanes.	traffic modelling and negotiation with the affected landowners will be required before this junction proceeds.
	DI_JNC_X1	Risk score	1	2	3	3	3	3	3	2	2	2	24
	DI_RD_X1	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of up to 20 lots/hectare.	Surrounding land use has changed to the PSP - changing from LDRZ to UGZ	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The proposed realignment may not adequately serve the traffic demands of the area for it is a less-direct route between Precinct 1 and the Delacombe Town Centre.	Development is occuring in stages	The LR2 profile is considered an appropriate profile for the modelled traffic demands. It will need to be validated when in the increased lot yields in the LDRZ areas for this would increase the traffic demands.	Schreenans and Joses Lanes will be require further widening to accommodate the LR2 profile. Splays at Joses Lane and Schreenans Road will be required for the roundabout. The design for PLP202167SC, adjacent to Joses Lane will require significant redesign unless the acquisition is made for the southern side of Joses Lane.	In comparison to the original alignment, the construction costs are likely to be significantly less for the bridge crossing, however the length of road is approx. 135m longer.	This section has footpaths, shared paths and cycle lanes that connect into the wider network. The proposed alignment would be used less by non-vehicle traffic as it is less direct route for most users to the Delacombe Town Centre and the wider network.	Given the above listed issues regarding the alignment, it is recommended to continue with the original alignment.
	DI_RD_X1	Risk score	1	2	2	1	3	2	2	3	3	3	22
	DI_RD_X2	Comments	Net dwelling decrease of 33 or 2% below the original 2014 projections and the actual lots determined in 2021.	Development adjacent to the proposed road is at original density of up to 20 lots/hectare.	Surrounding land use has changed to the PSP - changing from LDRZ to UGZ	While part of Precinct 1, this section (east side of Bonshaw Creek) has not seen the scale of development as the area adjacent to Cherry Flat Road/Delacombe Town Centre (west side of Bonshaw Creek). Revised year 2036 projections indicate that an additional 1,312 dwellings in the precinct.	The proposed road would adequately serve the traffic demands although some investigation of the cross section is required.	Development is occuring in stages	The Collector Road (Constrained) profile is considered an appropriate profile for the modelled traffic demands.	Collector Road (Constrained) profile can fit in the existing road reserve(s)	Key Access Street is a narrower profile to collector road standard, in any case, the costs of applying the profile has not been factored in the DCP	This section has footpaths, shared paths and cycle lanes that connect into the wider network.	Given the above listed issues regarding the alignment, this project is at risk or remaining Key Access Street profile.
	DI_RD_X2	Risk score	1	1	2	1	2	2	2	1	3	1	16

APPENDIX E. COST ESTIMATES FOR MORAY STREET-STYLE ROUNDABOUT TREATMENT FOR DI_JNC_11 AND DI_JNC_12

JNC_11: Cherry Flat Rd and Schreenans Rd Roundabout

						99	104.7 Jun-13	107.1 Jun-14	107.4 Jun-15	105.1 Jun-16	105.9 Jun-17	117.1 Jun-18	120.7 Jun-19	121.5 Jun-20	119.8 Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	461.7	$ 2,077.65	$ 2,197.27	$ 2,247.64	$ 2,253.94	$ 2,205.67	$ 2,222.46	$ 2,457.50	$ 2,533.05	$ 2,549.84	$ 2,514.17
	Cut place & Compact and disposal	cu m	$ 35.00	3070.31	$ 107,460.68	$ 113,647.80	$ 116,252.91	$ 116,578.55	$ 114,081.99	$ 114,950.36	$ 127,107.53	$ 131,015.19	$ 131,883.56	$ 130,038.27
	Swale drain formation	lin m	$ 10.00	884	$ 8,840.00	$ 9,348.97	$ 9,563.27	$ 9,590.06	$ 9,384.69	$ 9,456.12	$ 10,456.20	$ 10,777.66	$ 10,849.09	$ 10,697.29
	sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	3821	$ 61,136.00	$ 64,655.95	$ 66,138.04	$ 66,323.30	$ 64,902.97	$ 65,396.99	$ 72,313.39	$ 74,536.52	$ 75,030.55	$ 73,980.74
	40mm Base Course Asphalt	sq m	$ 14.00	3821	$ 53,494.00	$ 56,573.96	$ 57,870.78	$ 58,032.88	$ 56,790.09	$ 57,222.37	$ 63,274.22	$ 65,219.45	$ 65,651.73	$ 64,733.14
	Prime coat	sq m	$ 2.00	3821	$ 7,642.00	$ 8,081.99	$ 8,267.25	$ 8,290.41	$ 8,112.87	$ 8,174.62	$ 9,039.17	$ 9,317.06	$ 9,378.82	$ 9,247.59
	180mm Base Course crushed rock	sq m	$ 12.42	4617	$ 57,343.14	$ 60,644.71	$ 62,034.85	$ 62,208.62	$ 60,876.40	$ 61,339.78	$ 67,827.09	$ 69,912.29	$ 70,375.67	$ 69,390.99
	280mm Subbase Course crushed rock	sq m	$ 18.90	4617	$ 87,261.30	$ 92,285.44	$ 94,400.86	$ 94,665.29	$ 92,638.01	$ 93,343.15	$ 103,215.13	$ 106,388.27	$ 107,093.41	$ 105,594.99
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	4617	$ 55,404.00	$ 58,593.93	$ 59,937.05	$ 60,104.95	$ 58,817.78	$ 59,265.49	$ 65,533.42	$ 67,548.11	$ 67,995.82	$ 67,044.44
Kerb & Channel	Type SM2	lin m	$ 40.00	884	$ 35,360.00	$ 37,395.88	$ 38,253.09	$ 38,360.24	$ 37,538.75	$ 37,824.48	$ 41,824.81	$ 43,110.63	$ 43,396.36	$ 42,789.17
Footpath	Concrete	sq m	$ 45.00	252	$ 11,340.00	$ 11,992.91	$ 12,267.82	$ 12,302.18	$ 12,038.73	$ 12,130.36	$ 13,413.27	$ 13,825.64	$ 13,917.27	$ 13,722.55
Concrete Splitter Islands		sq m	$ 75.00	271	$ 20,325.00	$ 21,495.23	$ 21,987.95	$ 22,049.55	$ 21,577.35	$ 21,741.59	$ 24,040.98	$ 24,780.08	$ 24,944.32	$ 24,595.30
Drainage	Subsoil Drains	lin m	$ 18.00	884	$ 15,912.00	$ 16,828.15	$ 17,213.89	$ 17,262.11	$ 16,892.44	$ 17,021.02	$ 18,821.16	$ 19,399.78	$ 19,528.36	$ 19,255.13
	Flush out Risers/outlets	No	$ 590.00	10	$ 5,900.00	$ 6,239.70	$ 6,382.73	$ 6,400.61	$ 6,263.54	$ 6,311.21	$ 6,978.69	$ 7,193.23	$ 7,240.91	$ 7,139.60
	Drainage Pits	No	$ 2,100.00	4	$ 8,400.00	$ 8,883.64	$ 9,087.27	$ 9,112.73	$ 8,917.58	$ 8,985.45	$ 9,935.76	$ 10,241.21	$ 10,309.09	$ 10,164.85
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	300	$ 48,000.00	$ 50,763.64	$ 51,927.27	$ 52,072.73	$ 50,957.58	$ 51,345.45	$ 56,775.76	$ 58,521.21	$ 58,909.09	$ 58,084.85
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	0.2	$ 2,000.00	$ 2,115.15	$ 2,163.64	$ 2,169.70	$ 2,123.23	$ 2,139.39	$ 2,365.66	$ 2,438.38	$ 2,454.55	$ 2,420.20
	Signage	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Tactile pavers	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	0.1	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
Landscaping		item	$ 25,000.00	0.1	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	8	$ 28,000.00	$ 29,612.12	$ 30,290.91	$ 30,375.76	$ 29,725.25	$ 29,951.52	$ 33,119.19	$ 34,137.37	$ 34,363.64	$ 33,882.83
	High Pressure Sodium Lantern	item	$ 750.00	8	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching	lin m	$ 180.00	150	$ 27,000.00	$ 28,554.55	$ 29,209.09	$ 29,290.91	$ 28,663.64	$ 28,881.82	$ 31,936.36	$ 32,918.18	$ 33,136.36	$ 32,672.73
	Electrical pit	No	$ 1,600.00	8	$ 12,800.00	$ 13,536.97	$ 13,847.27	$ 13,886.06	$ 13,588.69	$ 13,692.12	$ 15,140.20	$ 15,605.66	$ 15,709.09	$ 15,489.29
Services Relocating/alteration	Telstra	item	$ 50,000.00	0.5	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
	Electrical	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Water	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Other	item	$ -		$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	0	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 751,695.77	$ 794,975.22	$ 813,198.15	$ 815,476.01	$ 798,012.37	$ 804,086.68	$ 889,127.01	$ 916,461.40	$ 922,535.71	$ 909,627.80
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 75,169.58	$ 79,497.52	$ 81,319.81	$ 81,547.60	$ 79,801.24	$ 80,408.67	$ 88,912.70	$ 91,646.14	$ 92,253.57	$ 90,962.78
Contingency		item	15.00%		$ 112,754.36	$ 119,246.28	$ 121,979.72	$ 122,321.40	$ 119,701.86	$ 120,613.00	$ 133,369.05	$ 137,469.21	$ 138,380.36	$ 136,444.17
				TOTAL	**$ 939,619.71**	**$ 993,719.02**	**$ 1,016,497.68**	**$ 1,019,345.01**	**$ 997,515.47**	**$ 1,005,108.35**	**$ 1,111,408.76**	**$ 1,145,576.75**	**$ 1,153,169.64**	**$ 1,137,034.76**

Applying Moray St-style safety treatments

						99	104.7	107.1	0	105.1	105.9	0	0	0	0
							Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20	Jan-00
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		0	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing		0	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	461.7	$ 2,077.65	$ 2,197.27	$ 2,247.64	$ 2,253.94	$ 2,205.67	$ 2,222.46	$ 2,457.50	$ 2,533.05	$ 2,549.84	$ 2,514.17
	Cut place & Compact and disposal	cu m	$ 35.00	3070.31	$ 107,460.68	$ 113,647.80	$ 116,252.91	$ 116,578.55	$ 114,081.99	$ 114,950.36	$ 127,107.53	$ 131,015.19	$ 131,883.56	$ 130,038.27
	Swale drain formation	lin m	$ 10.00	884	$ 8,840.00	$ 9,348.97	$ 9,563.27	$ 9,590.06	$ 9,384.69	$ 9,456.12	$ 10,456.20	$ 10,777.66	$ 10,849.09	$ 10,697.29
	sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	3821	$ 61,136.00	$ 64,655.95	$ 66,138.04	$ 66,323.30	$ 64,902.97	$ 65,396.99	$ 72,313.39	$ 74,536.52	$ 75,030.55	$ 73,980.74
	40mm Base Course Asphalt	sq m	$ 14.00	3821	$ 53,494.00	$ 56,573.96	$ 57,870.78	$ 58,032.88	$ 56,790.09	$ 57,222.37	$ 63,274.22	$ 65,219.45	$ 65,651.73	$ 64,733.14
	Prime coat	sq m	$ 2.00	3821	$ 7,642.00	$ 8,081.99	$ 8,267.25	$ 8,290.41	$ 8,112.87	$ 8,174.62	$ 9,039.17	$ 9,317.06	$ 9,378.82	$ 9,247.59
	180mm Base Course crushed rock	sq m	$ 12.42	4617	$ 57,343.14	$ 60,644.71	$ 62,034.85	$ 62,208.62	$ 60,876.40	$ 61,339.78	$ 67,827.09	$ 69,912.29	$ 70,375.67	$ 69,390.99
	280mm Subbase Course crushed rock	sq m	$ 18.90	4617	$ 87,261.30	$ 92,285.44	$ 94,400.86	$ 94,665.29	$ 92,638.01	$ 93,343.15	$ 103,215.13	$ 106,388.27	$ 107,093.41	$ 105,594.99
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	4617	$ 55,404.00	$ 58,593.93	$ 59,937.05	$ 60,104.95	$ 58,817.78	$ 59,265.49	$ 65,533.42	$ 67,548.11	$ 67,995.82	$ 67,044.44
Raised Pavements		item	$ 5,000.00	6	$ 30,000.00	$ 31,727.27	$ 32,454.55	$ 32,545.45	$ 31,848.48	$ 32,090.91	$ 35,484.85	$ 36,575.76	$ 36,818.18	$ 36,303.03
Kerb & Channel	Type SM2	lin m	$ 40.00	884	$ 35,360.00	$ 37,395.88	$ 38,253.09	$ 38,360.24	$ 37,538.75	$ 37,824.48	$ 41,824.81	$ 43,110.63	$ 43,396.36	$ 42,789.17
Footpath	Concrete	sq m	$ 45.00	252	$ 11,340.00	$ 11,992.91	$ 12,267.82	$ 12,302.18	$ 12,038.73	$ 12,130.36	$ 13,413.27	$ 13,825.64	$ 13,917.27	$ 13,722.55
Concrete Splitter Islands		sq m	$ 75.00	271	$ 20,325.00	$ 21,495.23	$ 21,987.95	$ 22,049.55	$ 21,577.35	$ 21,741.59	$ 24,040.98	$ 24,780.08	$ 24,944.32	$ 24,595.30
Drainage	Subsoil Drains	lin m	$ 18.00	884	$ 15,912.00	$ 16,828.15	$ 17,213.89	$ 17,262.11	$ 16,892.44	$ 17,021.02	$ 18,821.16	$ 19,399.78	$ 19,528.36	$ 19,255.13
	Flush out Risers/outlets	No	$ 590.00	10	$ 5,900.00	$ 6,239.70	$ 6,382.73	$ 6,400.61	$ 6,263.54	$ 6,311.21	$ 6,978.69	$ 7,193.23	$ 7,240.91	$ 7,139.60
	Drainage Pits	No	$ 2,100.00	4	$ 8,400.00	$ 8,883.64	$ 9,087.27	$ 9,112.73	$ 8,917.58	$ 8,985.45	$ 9,935.76	$ 10,241.21	$ 10,309.09	$ 10,164.85
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	300	$ 48,000.00	$ 50,763.64	$ 51,927.27	$ 52,072.73	$ 50,957.58	$ 51,345.45	$ 56,775.76	$ 58,521.21	$ 58,909.09	$ 58,084.85
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 5.00	600	$ 3,000.00	$ 3,172.73	$ 3,245.45	$ 3,254.55	$ 3,184.85	$ 3,209.09	$ 3,548.48	$ 3,657.58	$ 3,681.82	$ 3,630.30
	Signage	No	$ 250.00	24	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
	Tactile pavers	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Green matting	m	$ 300.00	240	$ 72,000.00	$ 76,145.45	$ 77,890.91	$ 78,109.09	$ 76,436.36	$ 77,018.18	$ 85,163.64	$ 87,781.82	$ 88,363.64	$ 87,127.27
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	0.1	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
Landscaping		item	$ 25,000.00	0.1	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	8	$ 28,000.00	$ 29,612.12	$ 30,290.91	$ 30,375.76	$ 29,725.25	$ 29,951.52	$ 33,119.19	$ 34,137.37	$ 34,363.64	$ 33,882.83
	High Pressure Sodium Lantern	item	$ 1,250.00	8	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching	lin m	$ 180.00	150	$ 27,000.00	$ 28,554.55	$ 29,209.09	$ 29,290.91	$ 28,663.64	$ 28,881.82	$ 31,936.36	$ 32,918.18	$ 33,136.36	$ 32,672.73
	Electrical pit	No	$ 1,600.00	8	$ 12,800.00	$ 13,536.97	$ 13,847.27	$ 13,886.06	$ 13,588.69	$ 13,692.12	$ 15,140.20	$ 15,605.66	$ 15,709.09	$ 15,489.29
Services Relocating/alteration	Telstra	item	$ 50,000.00	0.5	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
	Electrical	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Water	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Other	item	$ -		$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	0	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 864,695.77	$ 914,481.28	$ 935,443.60	$ 938,063.89	$ 917,975.00	$ 924,962.44	$ 1,022,786.61	$ 1,054,230.09	$ 1,061,217.53	$ 1,046,369.22
Professional Fees	Survey, Geotech, Pavement & Design	item	0.00%		$ 86,469.58	$ 91,448.13	$ 93,544.36	$ 93,806.39	$ 91,797.50	$ 92,496.24	$ 102,278.66	$ 105,423.01	$ 106,121.75	$ 104,636.92
Contingency		item	0.00%		$ 129,704.36	$ 137,172.19	$ 140,316.54	$ 140,709.58	$ 137,696.25	$ 138,744.37	$ 153,417.99	$ 158,134.51	$ 159,182.63	$ 156,955.38
				TOTAL	**$ 1,080,869.71**	**$ 1,143,101.60**	**$ 1,169,304.50**	**$ 1,172,579.86**	**$ 1,147,468.75**	**$ 1,156,203.05**	**$ 1,278,483.26**	**$ 1,317,787.61**	**$ 1,326,521.91**	**$ 1,307,961.52**

JNC_12: Ross Creek Rd and Schreenans Rd Roundabout

					99	104.7	107.1	107.4	105.1	105.9	117.1	120.7	121.5	119.8
						Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20	Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	313.7	$ 1,411.65	$ 1,492.93	$ 1,527.15	$ 1,531.43	$ 1,498.63	$ 1,510.04	$ 1,669.74	$ 1,721.07	$ 1,732.48	$ 1,708.24
	Cut place & Compact and disposal	cu m	$ 35.00	2086.105	$ 73,013.68	$ 77,217.49	$ 78,987.52	$ 79,208.77	$ 77,512.50	$ 78,102.51	$ 86,362.64	$ 89,017.68	$ 89,607.69	$ 88,353.92
	Swale drain formation	lin m	$ 10.00	495	$ 4,950.00	$ 5,235.00	$ 5,355.00	$ 5,370.00	$ 5,255.00	$ 5,295.00	$ 5,855.00	$ 6,035.00	$ 6,075.00	$ 5,990.00
	sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	2691	$ 43,056.00	$ 45,534.98	$ 46,578.76	$ 46,709.24	$ 45,708.95	$ 46,056.87	$ 50,927.85	$ 52,493.53	$ 52,841.45	$ 52,102.11
	40mm Base Course Asphalt	sq m	$ 14.00	2691	$ 37,674.00	$ 39,843.11	$ 40,756.42	$ 40,870.58	$ 39,995.33	$ 40,299.76	$ 44,561.87	$ 45,931.84	$ 46,236.27	$ 45,589.35
	Prime coat	sq m	$ 2.00	2691	$ 5,382.00	$ 5,691.87	$ 5,822.35	$ 5,838.65	$ 5,713.62	$ 5,757.11	$ 6,365.98	$ 6,561.69	$ 6,605.18	$ 6,512.76
	180mm Base Course crushed rock	sq m	$ 12.42	3137	$ 38,961.54	$ 41,204.78	$ 42,149.30	$ 42,267.37	$ 41,362.20	$ 41,677.04	$ 46,084.81	$ 47,501.59	$ 47,816.44	$ 47,147.40
	280mm Subbase Course crushed rock	sq m	$ 18.90	3137	$ 59,289.30	$ 62,702.93	$ 64,140.24	$ 64,319.91	$ 62,942.48	$ 63,421.58	$ 70,129.06	$ 72,285.04	$ 72,764.14	$ 71,746.04
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	3137	$ 37,644.00	$ 39,811.38	$ 40,723.96	$ 40,838.04	$ 39,963.48	$ 40,267.67	$ 44,526.39	$ 45,895.26	$ 46,199.45	$ 45,553.04
Kerb & Channel	Type SM2	lin m	$ 40.00	495	$ 19,800.00	$ 20,940.00	$ 21,420.00	$ 21,480.00	$ 21,020.00	$ 21,180.00	$ 23,420.00	$ 24,140.00	$ 24,300.00	$ 23,960.00
Footpath	Concrete	sq m	$ 45.00	554	$ 24,930.00	$ 26,365.36	$ 26,969.73	$ 27,045.27	$ 26,466.09	$ 26,667.55	$ 29,487.91	$ 30,394.45	$ 30,595.91	$ 30,167.82
Concrete Splitter Islands		sq m	$ 75.00	36	$ 2,700.00	$ 2,855.45	$ 2,920.91	$ 2,929.09	$ 2,866.36	$ 2,888.18	$ 3,193.64	$ 3,291.82	$ 3,313.64	$ 3,267.27
Drainage	Subsoil Drains	lin m	$ 18.00	495	$ 8,910.00	$ 9,423.00	$ 9,639.00	$ 9,666.00	$ 9,459.00	$ 9,531.00	$ 10,539.00	$ 10,863.00	$ 10,935.00	$ 10,782.00
	Flush out Risers/outlets	No	$ 590.00	10	$ 5,900.00	$ 6,239.70	$ 6,382.73	$ 6,400.61	$ 6,263.54	$ 6,311.21	$ 6,978.69	$ 7,193.23	$ 7,240.91	$ 7,139.60
	Drainage Pits	No	$ 2,100.00	4	$ 8,400.00	$ 8,883.64	$ 9,087.27	$ 9,112.73	$ 8,917.58	$ 8,985.45	$ 9,935.76	$ 10,241.21	$ 10,309.09	$ 10,164.85
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	150	$ 24,000.00	$ 25,381.82	$ 25,963.64	$ 26,036.36	$ 25,478.79	$ 25,672.73	$ 28,387.88	$ 29,260.61	$ 29,454.55	$ 29,042.42
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	0.2	$ 2,000.00	$ 2,115.15	$ 2,163.64	$ 2,169.70	$ 2,123.23	$ 2,139.39	$ 2,365.66	$ 2,438.38	$ 2,454.55	$ 2,420.20
	Signage	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Tactile pavers	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	0.1	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
Landscaping		item	$ 25,000.00	0.1	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	8	$ 28,000.00	$ 29,612.12	$ 30,290.91	$ 30,375.76	$ 29,725.25	$ 29,951.52	$ 33,119.19	$ 34,137.37	$ 34,363.64	$ 33,882.83
	High Pressure Sodium Lantern	item	$ 750.00	8	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	150	$ 27,000.00	$ 28,554.55	$ 29,209.09	$ 29,290.91	$ 28,663.64	$ 28,881.82	$ 31,936.36	$ 32,918.18	$ 33,136.36	$ 32,672.73
	Electrical pit	No	$ 1,600.00	8	$ 12,800.00	$ 13,536.97	$ 13,847.27	$ 13,886.06	$ 13,588.69	$ 13,692.12	$ 15,140.20	$ 15,605.66	$ 15,709.09	$ 15,489.29
Services Relocating/alteration	Telstra	item	$ 50,000.00	0.5	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
	Electrical	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Water	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Other	item	$ -		$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	0	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 561,822.17	$ 594,169.50	$ 607,789.43	$ 609,491.92	$ 596,439.49	$ 600,979.47	$ 664,539.15	$ 684,969.04	$ 689,509.02	$ 679,861.57
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 56,182.22	$ 59,416.95	$ 60,778.94	$ 60,949.19	$ 59,643.95	$ 60,097.95	$ 66,453.91	$ 68,496.90	$ 68,950.90	$ 67,986.16
Contingency		item	15.00%		$ 84,273.32	$ 89,125.43	$ 91,168.41	$ 91,423.79	$ 89,465.92	$ 90,146.92	$ 99,680.87	$ 102,745.36	$ 103,426.35	$ 101,979.24
				TOTAL	**$ 702,277.71**	**$ 742,711.88**	**$ 759,736.79**	**$ 761,864.91**	**$ 745,549.36**	**$ 751,224.33**	**$ 830,673.93**	**########**	**$ 861,886.28**	**$ 849,826.96**

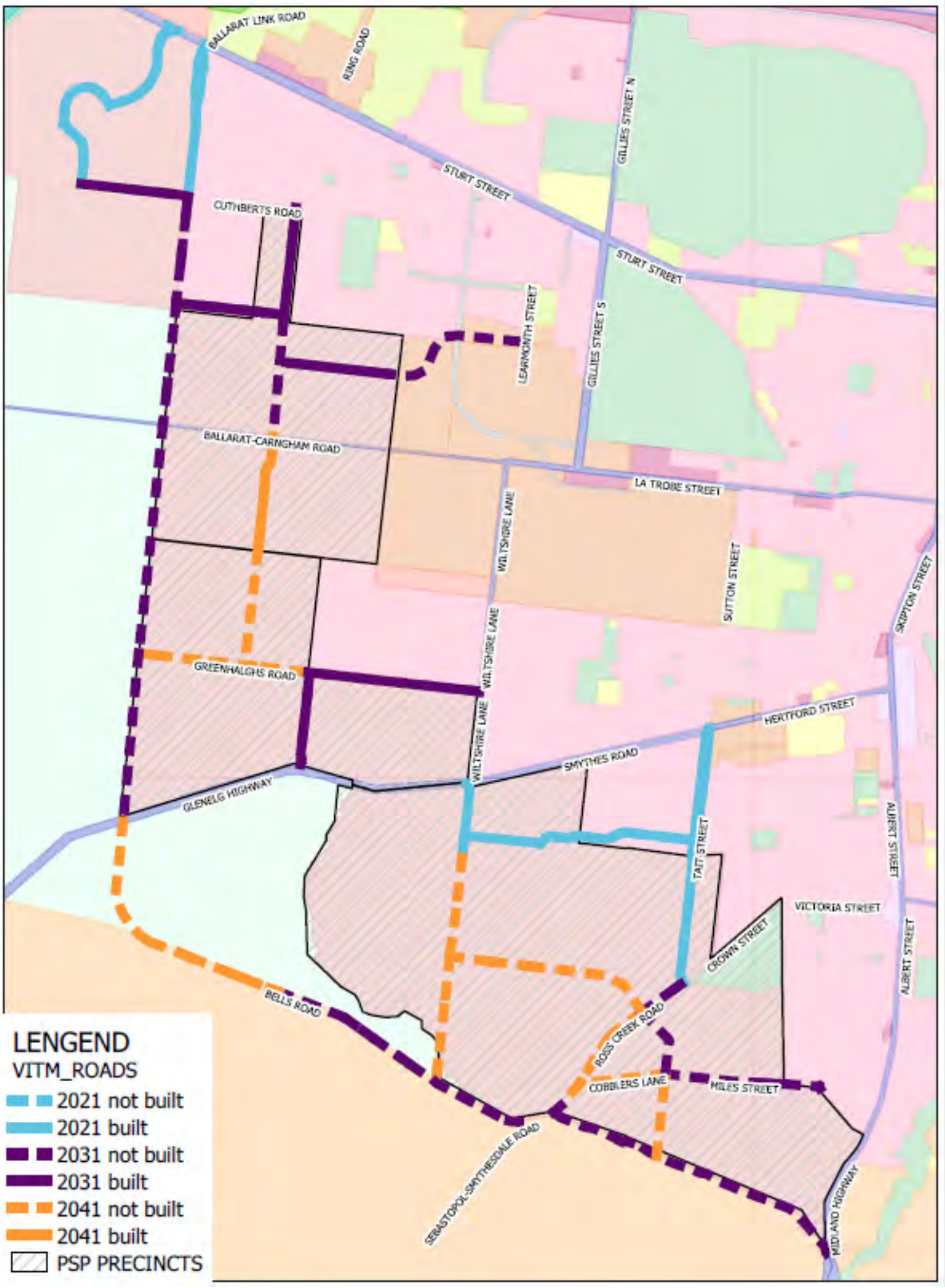
IV

Applying Moray St-style safety treatments

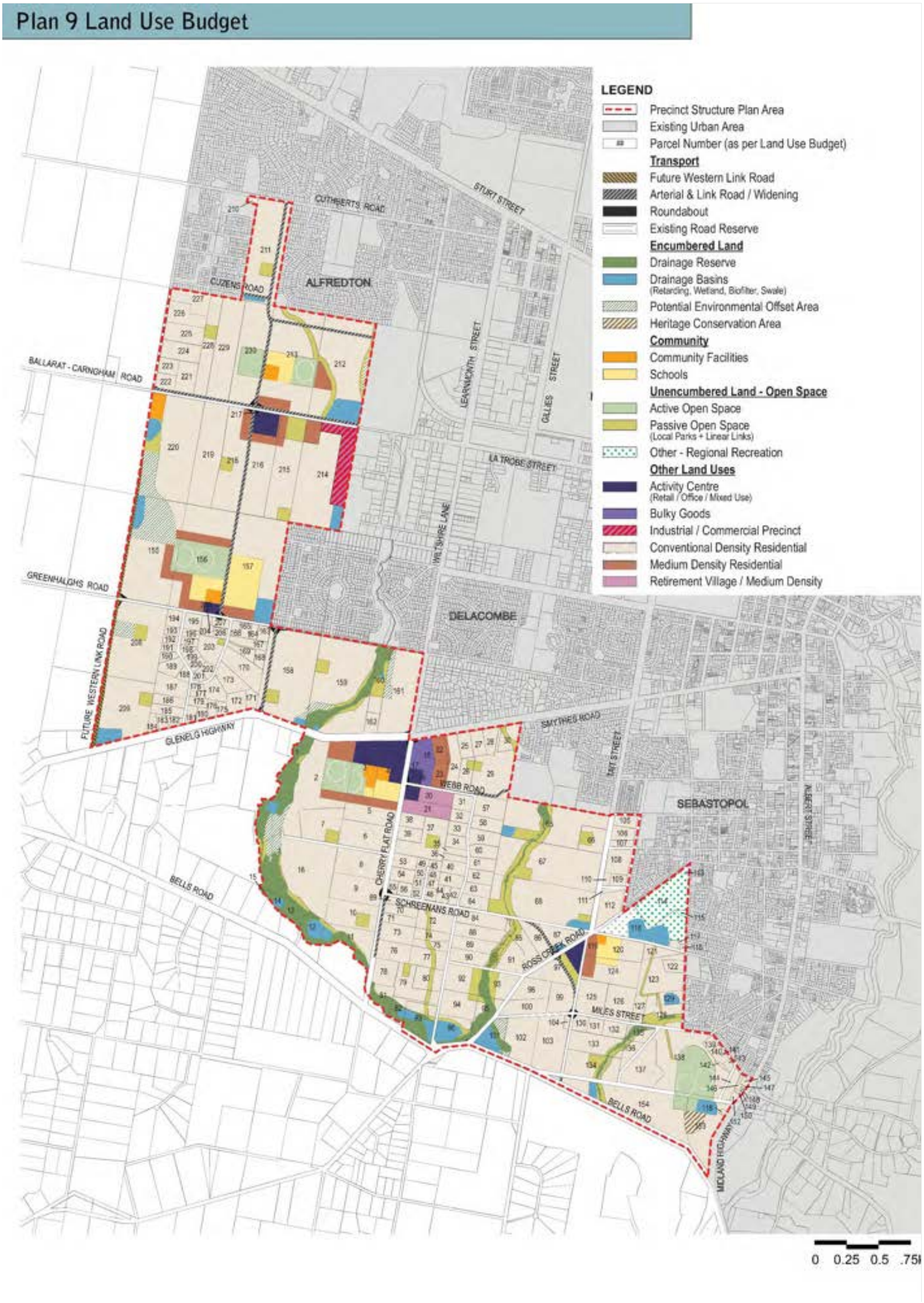
Description	Detail	Unit	Rate	Qty	Amount	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	313.7	$ 1,411.65	$ 1,492.93	$ 1,527.15	$ 1,531.43	$ 1,498.63	$ 1,510.04	$ 1,669.74	$ 1,721.07	$ 1,732.48	$ 1,708.24
	Cut place & Compact and disposal	cu m	$ 35.00	2086.105	$ 73,013.68	$ 77,217.49	$ 78,987.52	$ 79,208.77	$ 77,512.50	$ 78,102.51	$ 86,362.64	$ 89,017.68	$ 89,607.69	$ 88,353.92
	Swale drain formation	lin m	$ 10.00	495	$ 4,950.00	$ 5,235.00	$ 5,355.00	$ 5,370.00	$ 5,255.00	$ 5,295.00	$ 5,855.00	$ 6,035.00	$ 6,075.00	$ 5,990.00
	sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	2691	$ 43,056.00	$ 45,534.98	$ 46,578.76	$ 46,709.24	$ 45,708.95	$ 46,056.87	$ 50,927.85	$ 52,493.53	$ 52,841.45	$ 52,102.11
	40mm Base Course Asphalt	sq m	$ 14.00	2691	$ 37,674.00	$ 39,843.11	$ 40,756.42	$ 40,870.58	$ 39,995.33	$ 40,299.76	$ 44,561.87	$ 45,931.84	$ 46,236.27	$ 45,589.35
	Prime coat	sq m	$ 2.00	2691	$ 5,382.00	$ 5,691.87	$ 5,822.35	$ 5,838.65	$ 5,713.62	$ 5,757.11	$ 6,365.98	$ 6,561.69	$ 6,605.18	$ 6,512.76
	180mm Base Course crushed rock	sq m	$ 12.42	3137	$ 38,961.54	$ 41,204.78	$ 42,149.30	$ 42,267.37	$ 41,362.20	$ 41,677.04	$ 46,084.81	$ 47,501.59	$ 47,816.44	$ 47,147.40
	280mm Subbase Course crushed rock	sq m	$ 18.90	3137	$ 59,289.30	$ 62,702.93	$ 64,140.24	$ 64,319.91	$ 62,942.48	$ 63,421.58	$ 70,129.06	$ 72,285.04	$ 72,764.14	$ 71,746.04
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	3137	$ 37,644.00	$ 39,811.38	$ 40,723.96	$ 40,838.04	$ 39,963.48	$ 40,267.67	$ 44,526.39	$ 45,895.26	$ 46,199.45	$ 45,553.04
Raised Pavements		item	$ 5,000.00	4	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
Kerb & Channel	Type SM2	lin m	$ 40.00	495	$ 19,800.00	$ 20,940.00	$ 21,420.00	$ 21,480.00	$ 21,020.00	$ 21,180.00	$ 23,420.00	$ 24,140.00	$ 24,300.00	$ 23,960.00
Footpath	Concrete	sq m	$ 45.00	554	$ 24,930.00	$ 26,365.36	$ 26,969.73	$ 27,045.27	$ 26,466.09	$ 26,667.55	$ 29,487.91	$ 30,394.45	$ 30,595.91	$ 30,167.82
Concrete Splitter Islands		sq m	$ 75.00	36	$ 2,700.00	$ 2,855.45	$ 2,920.91	$ 2,929.09	$ 2,866.36	$ 2,888.18	$ 3,193.64	$ 3,291.82	$ 3,313.64	$ 3,267.27
Drainage	Subsoil Drains	lin m	$ 18.00	495	$ 8,910.00	$ 9,423.00	$ 9,639.00	$ 9,666.00	$ 9,459.00	$ 9,531.00	$ 10,539.00	$ 10,863.00	$ 10,935.00	$ 10,782.00
	Flush out Risers/outlets	No	$ 590.00	10	$ 5,900.00	$ 6,239.70	$ 6,382.73	$ 6,400.61	$ 6,263.54	$ 6,311.21	$ 6,978.69	$ 7,193.23	$ 7,240.91	$ 7,139.60
	Drainage Pits	No	$ 2,100.00	4	$ 8,400.00	$ 8,883.64	$ 9,087.27	$ 9,112.73	$ 8,917.58	$ 8,985.45	$ 9,935.76	$ 10,241.21	$ 10,309.09	$ 10,164.85
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	150	$ 24,000.00	$ 25,381.82	$ 25,963.64	$ 26,036.36	$ 25,478.79	$ 25,672.73	$ 28,387.88	$ 29,260.61	$ 29,454.55	$ 29,042.42
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 5.00	500	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
	Signage	No	$ 250.00	24	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
	Tactile pavers	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Green matting	m	$ 300.00	240	$ 72,000.00	$ 76,145.45	$ 77,890.91	$ 78,109.09	$ 76,436.36	$ 77,018.18	$ 85,163.64	$ 87,781.82	$ 88,363.64	$ 87,127.27
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	0.1	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
Landscaping		item	$ 25,000.00	0.1	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	8	$ 28,000.00	$ 29,612.12	$ 30,290.91	$ 30,375.76	$ 29,725.25	$ 29,951.52	$ 33,119.19	$ 34,137.37	$ 34,363.64	$ 33,882.83
	High Pressure Sodium Lantern	item	$ 750.00	8	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	150	$ 27,000.00	$ 28,554.55	$ 29,209.09	$ 29,290.91	$ 28,663.64	$ 28,881.82	$ 31,936.36	$ 32,918.18	$ 33,136.36	$ 32,672.73
	Electrical pit	No	$ 1,600.00	8	$ 12,800.00	$ 13,536.97	$ 13,847.27	$ 13,886.06	$ 13,588.69	$ 13,692.12	$ 15,140.20	$ 15,605.66	$ 15,709.09	$ 15,489.29
Services Relocating/alteration	Telstra	item	$ 50,000.00	0.5	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
	Electrical	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Water	item	$ 20,000.00	0.5	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Other	item	$ -		$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	0	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 660,322.17	$ 698,340.71	$ 714,348.52	$ 716,349.50	$ 701,008.68	$ 706,344.62	$ 781,047.73	$ 805,059.45	$ 810,395.38	$ 799,056.52
Professional Fees	Survey, Geotech, Pavement & Design	item	0.00%		$ 66,032.22	$ 69,834.07	$ 71,434.85	$ 71,634.95	$ 70,100.87	$ 70,634.46	$ 78,104.77	$ 80,505.94	$ 81,039.54	$ 79,905.65
Contingency		item	0.00%		$ 99,048.32	$ 104,751.11	$ 107,152.28	$ 107,452.43	$ 105,151.30	$ 105,951.69	$ 117,157.16	$ 120,758.92	$ 121,559.31	$ 119,858.48
				TOTAL	**$ 825,402.71**	**$ 872,925.89**	**$ 892,935.65**	**$ 895,436.88**	**$ 876,260.85**	**$ 882,930.77**	**$ 976,309.67**	**############**	**$1,012,994.23**	**$ 998,820.65**

APPENDIX F. VICTORIAN INTEGRATED TRANSPORT MODEL

Adapted from Victorian Integrated Transport Model – City of Ballarat Phase 4, AECOM 2005



APPENDIX G. Development Contribution Plans Parcel Numbering Plan



APPENDIX H. LAND ACQUISTION BY PSP PROPERTY NUMBER

Ballarat West Precinct 1, 2 & 4: Property-specific land budget where property is affected by studied roads

					TRANSPORT (ORIGINAL ESTIMATE)			TRANSPORT (REVISED ESTIMATE)			TOTAL				ESTIMATED LAND ACQUISITION COSTS			
Property Number	Persistent Feature Identifier	Estimated Land Value ($/ha)	Land Valuation Source	Land Acquisition Project	Arterial Road / Widening	Roundabout	Road Reserve	Arterial Road / Widening	Roundabout	Road Reserve	Total (Original)	Total (Revised)	Net Difference	% Difference	Original	Revised	Net Difference	% Difference
9	2035434	493,044	2	DI_LA_17	0.00	0.12	0.00	0.00	0.18	0.00	0.12	0.18	-0.06	-47%	59,165	87,057	-27,892	-47%
42	2034421	1,000,000	1	DI_LA_17	0.02	0.00	0.00	0.03	0.03	0.00	0.02	0.06	-0.04	-202%	20,000	60,429	-40,429	-202%
43	2028681	1,100,000	1	DI_LA_17	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.02	-0.01	-88%	11,000	20,691	-9,691	-88%
44	2028681	1,050,000	1	DI_LA_17	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.02	-0.01	-95%	10,500	20,526	-10,026	-95%
48	2049706	1,000,000	1	DI_LA_17	0.03	0.00	0.00	0.04	0.00	0.00	0.03	0.04	-0.01	-19%	30,000	35,690	-5,690	-19%
52	2049699	1,100,000	1	DI_LA_17	0.02	0.00	0.00	0.03	0.00	0.00	0.02	0.03	-0.01	-58%	22,000	34,665	-12,665	-58%
55	2051432	1,025,000	1	DI_LA_17	0.03	0.08	0.00	0.03	0.08	0.00	0.11	0.11	0.00	4%	112,750	108,214	4,536	4%
56	2051433	975,000	1	DI_LA_17	0.04	0.00	0.00	0.05	0.00	0.00	0.04	0.05	-0.01	-14%	39,000	44,293	-5,293	-14%
64	2034422	825,000	1	DI_LA_17	0.06	0.00	0.00	0.09	0.02	0.00	0.06	0.12	-0.06	-94%	49,500	96,151	-46,651	-94%
68	2046063	423,733	1	DI_LA_17	0.08	0.00	0.00	0.11	0.00	0.00	0.08	0.11	-0.03	-37%	33,899	46,438	-12,539	-37%
69	2035443	591,462	2	DI_LA_17, PAO2	0.12	0.07	0.00	0.12	0.11	0.00	0.19	0.22	-0.03	-18%	112,378	132,890	-20,512	-18%
84	2028686	562,970	1		0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	-0.03	-	0	14,847	-14,847	-
86	2041900	600,000	1	DI_LA_18	0.80	0.03	0.00	0.62	0.07	0.14	0.83	0.83	-0.00	-1%	498,000	500,759	-2,759	-1%
87	2046063	562,625	2	DI_LA_18	0.00	0.03	0.00	0.00	0.01	0.00	0.03	0.01	0.02	54%	16,879	7,724	9,155	54%
97	2027853	500,000	1	DI_LA_19, DEVELOPER	0.62	0.05	0.00	0.24	0.05	0.00	0.67	0.28	0.39	58%	335,000	142,372	192,628	58%
99	2005747	550,000	1	DI_LA_20	0.22	0.04	0.00	0.22	0.00	0.00	0.26	0.22	0.04	14%	143,000	122,867	20,133	14%
103	2000321	475,000	1	DI_LA_20	0.13	0.00	0.00	0.13	0.00	0.00	0.13	0.13	0.00	1%	61,750	60,908	842	1%
104	2031578	1,000,000	1	DI_LA_20	0.05	0.03	0.00	0.05	0.00	0.00	0.08	0.05	0.03	43%	80,000	45,424	34,576	43%
125	2023250	520,691	2	DI_LA_20	0.00	0.04	0.00	0.00	0.00	0.00	0.04	0.00	0.04	100%	20,828	0	20,828	100%
130	2000321	768,537	2	DI_LA_20	0.00	0.04	0.00	0.00	0.00	0.00	0.04	0.00	0.04	100%	30,741	0	30,741	100%
154	2000321	357,509	1	DI_LA_21	0.08	0.00	0.00	0.08	0.00	0.00	0.08	0.08	0.00	2%	28,601	28,094	506	2%
155	2012306	274,286	1	DI_LA_25, DI_LA_14, DI_LA_23	0.15	0.07	0.00	0.14	0.00	0.00	0.22	0.14	0.08	35%	60,343	39,188	21,155	35%
156	2012998	425,000	1	DI_LA_22, DI_LA_23	1.15	0.04	0.00	2.01	0.13	0.00	1.19	2.13	-0.94	-79%	505,750	907,363	-401,613	-79%
157	2012998	391,294	1	DI_LA_23, DI_LA_22	1.12	0.03	0.00	0.15	0.06	0.00	1.15	0.21	0.94	82%	449,989	82,527	367,462	82%
158	2012289	436,423	1	DI_LA_23, DI_LA_22	1.74	0.21	0.00	1.61	0.15	0.00	1.95	1.76	0.19	10%	851,025	770,112	80,913	10%
159	2012289	374,544	1	DI_LA_23	0.19	0.00	0.00	0.19	0.00	0.00	0.19	0.19	-0.00	-2%	71,163	72,413	-1,250	-2%
160	2012289	374,294	1	DI_LA_23	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04	100%	14,972	0	14,972	100%
161	2012289	424,474	1	DI_LA_23, RRV	0.04	0.05	0.00	0.00	0.00	0.00	0.09	0.00	0.09	100%	38,203	0	38,203	100%
163	2039201	925,000	1	DI_LA_23	0.03	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.04	100%	37,000	0	37,000	100%
164	2039199	1,050,000	1	DI_LA_23	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	100%	10,500	0	10,500	100%
171	2040200	821,429	2	DI_LA_22	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01			11,041	11,041	0	
207	2045819	917,500	2	DI_LA_22	0.00	0.07	0.00	0.00	0.07	0.00	0.07	0.07	0.00	5%	64,225	60,981	3,244	5%
208	2012306	346,238	1	DI_LA_25, DI_LA_14	0.00	0.04	0.00	0.00	0.00	0.00	0.04	0.00	0.04	100%	13,850	0	13,850	100%
213	2036752	475,000	1	DI_LA_24, RRV	1.37	0.06	0.00	0.53	0.06	0.00	1.43	0.59	0.84	59%	679,250	281,537	397,713	59%
216	2001990	475,000	1	DI_LA_24	0.91	0.05	0.00	0.93	0.08	0.00	0.96	1.01	-0.05	-5%	456,000	478,710	-22,710	-5%
217	2001991	3,000,000	1	DI_LA_24, DEVELOPER	0.07	0.02	0.00	0.02	0.08	0.00	0.09	0.09	-0.00	-4%	270,000	279,663	-9,663	-4%
218	2001992	475,000	1	DI_LA_24	0.96	0.07	0.00	1.89	0.13	0.00	1.03	2.02	-0.99	-96%	489,250	960,482	-471,232	-96%
220	2001994	369,707	1	DI_LA_14, DEVELOPER, DI_LA_25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-	0	0	0	-
222	2036748	850,000	1	DI_LA_25, RRV	0.32	0.02	0.00	0.00	0.00	0.00	0.34	0.00	0.34	100%	289,000	0	289,000	100%
230	2036751	500,000	1	DI_LA_24, RRV	1.86	0.07	0.00	1.81	0.20	0.00	1.93	2.01	-0.08	-4%	965,000	1,007,039	-42,039	-4%
				Sub-Total	12.28	1.35	0.00	11.14	1.55	0.14	13.63	12.84	0.80	6%	6,991,550	6,561,096	430,454	6%

Land valuation sources	1	Land Valuation report Feb 2023
	2	Estimated from regression line

Note: Non-DCP numbered projects refer to land acquisition projects outside of the DCP, however, irrespective of the land acquisition "trigger", acqusitition of all land is the simplest for the affected owner

III

APPENDIX I. DRAFT INTERSECTION TREATMENT OPTIONS FOR DI_JNC_02

Ballarat West Precinct Structure Plan

Discussion Paper: Intersection Treatment Options for Carngham Road/Presentation Boulevard and Sydney Way (DI_JNC_02)

Introduction

The Ballarat West Precinct Structure Plan has been developed to guide development on the western side of Ballarat. The PSP was developed in consultation with the community, development sector and service authorities to best deliver infrastructure and community services for the estimated 14,500 residential properties that will form the PSP area.

The PSP identified items such as roads, drainage, and their associated land requirements to ensure that growth areas are served using contemporary infrastructure. An outcome of the PSP is the development of the Developer Contribution Plan (DCP) which allocates costs and reserves land for each property within the PSP.

This discussion paper outlines the current state of development surrounding the intersection labelled DI_JNC_02 and proposes possible alternatives after considering contemporary road design practices and road safety.

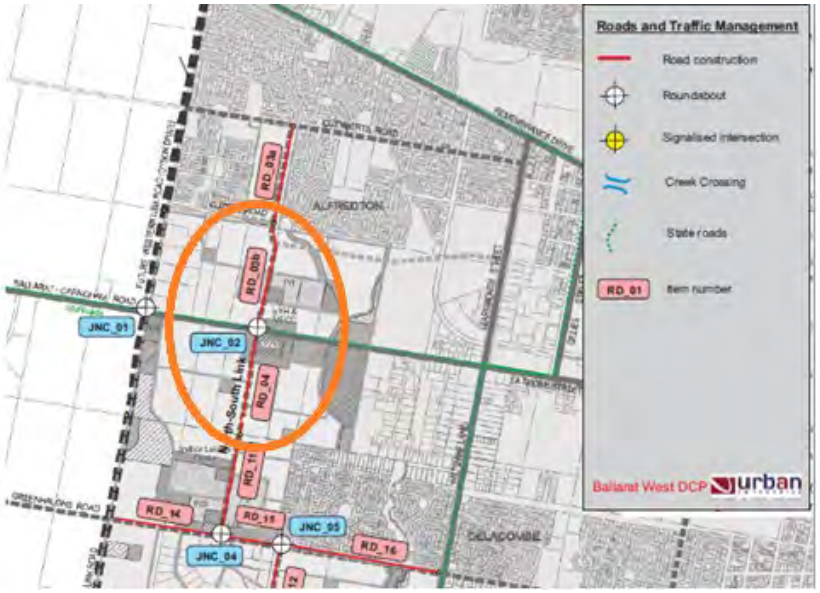


Figure 1 - Locality plan of DI_JNC_02

This intersection is located on Carngham Road at the recently built Presentation Boulevard, which in the PSP is known as RD_04. Future development to the north known as Carringum Estate is to build RD_03, which in their subdivision plan named Sydney Way.

It has been suggested that the initial roundabout concept included in the DCP to manage traffic movement warrants a review to better respond in creating a safer road environment for all users.

In practice, the incremental changes to the location of RD-03 and RD-04 further westward have triggered a review of the DCP given new roads require land acquisition. This report will ultimately inform a larger, precinct analysis of the DCP implementation and development changes.

This report recommends that DI_JNC_02 is modified to traffic signals in response to implementation challenges, and opportunity to provide greater safety outcomes for road users such as pedestrians and cyclists.

PSP objectives

North-South Road

The PSP lists design criteria for the proposed north-south road as having the following:

- Road cross section: Link road with on-road bike lanes (LR2)
- Road Reserve width: 24 m
- Traffic: 16,000 vpd
- Pedestrians: footpath & shared path
- Cyclists: on road bike lane and shared path
- Public Transport: Bus routes nominated
- Responsibility: Council

Figure 2 Nominated cross section for the north-south road RD-03 and RD-04

Carngham Road

The PSP considers the ultimate profile of Carngham Rd as:

- Road cross section: Arterial 2
- Road Reserve width: currently 20 m, design 40 m, although some sections are wider for service roads of up to 60 m.
- Traffic: 15,250 vpd
- Pedestrians: footpath & shared path
- Cyclists: on road bike lane and shared path
- Public Transport: Bus routes nominated
- Responsibility: Regional Roads Victoria

Figure 3 Carngham Rd cross sections

The above design criteria influences the selection of intersection treatment that would best suit all roads users.

DCP Intersection Design

The developed concept design for estimating the PSP costs for the road network is shown in Figure 4. This design using a generic road design template which is considered suitable for the development of the DCP, however as development proceeds, the actual conditions, contemporary engineering design and management principles are applied to ensure the original assumptions and desired outcomes are still relevant.

As can be seen in Figure 4, the concept design for Presentation Bvd (RD-04) proposes the road to pass through 163 Carngham Road. Owing to the current landowner not enabling the acquisition of their lot voluntarily, the subdivision on southern side has moved RD-04 to the western edge of 163 Carngham Road and the other house/property has been demolished. The results of these changes can be seen in Figure 5.

Figure 4 PSP concept design

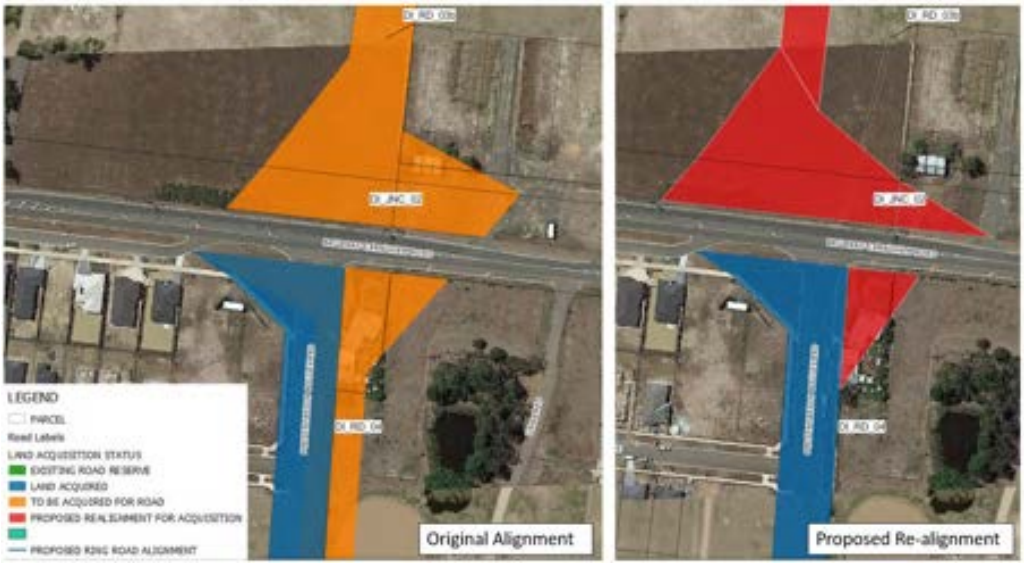


Figure 5 land acquisition envelopes at 163 Carngham Road

Current & Future State of Urban Development

The level of and type of development that exists adjacent to the intersection is summarised in the following table:

North east	Still in development as the Ballymanus Estate, land has been subdivided for the eventual widening of Carngham Road to a duplicated road. A large community health hub/childcare centre is earmarked for the properties closest to the intersection.

South east	Earmarked as Neighbourhood Activity Centre (NAC), construction start is currently unknown, it is uncertain how 163 Carngham Road is to be considered in this, for the purposed of this discussion, it is assumed that it remains.
South west	Largely developed with no further road upgrades required to service this area adjacent to the intersection.
North west	This area is now known as the Carringum Estate, this estate will carry the full width of RD-03 and is discussed in detail below.

The construction of the proposed roundabout as proposed in the DCP is impeded by the current site constraints, however the recent planning application for the north west corner, known as the Carringum Estate highlights the need to reassess the choice of intersection treatment for the north-south road. As will be discussed in the following sections, the "movement" of proposed roads presents opportunities and challenges for the DCP.

Ballymanus Estate

The development on the north east corner known as Ballymanus Estate is largely complete and has created another entrance onto Carngham Rd at Galway Drive, opposite Cumberland Bvd on the southern side of Carngham Rd. This has potentially split the north-south traffic movement of DI_RD_03 & 04 onto two roads.

A large community health hub/childcare centre is earmarked for the properties closest to the intersection. The RRV concepts show that a service road off Carngham Rd will be built for better access to these services.

Carringum Estate

The City of Ballarat has provided concept design plans for the Carringum Estate, which is located on the north eastern side of Carngham Road (Figure 6). This estate will accommodate the full width of DI_RD_03 (Sydney Way) and the 20 m widening of Carngham Rd and another 10 m for the Carngham Rd service road (Figure 6).

Figure 6 Portion of Carringum Estate concept design PLP/2013/347

South Side of Carngham Road

The development on the south western corner of the proposed intersection is largely complete. This includes a splay for the proposed roundabout. The south eastern corner will have the Neighbourhood Activity Centre, the concept design for the NAC is shown in Figure 7.

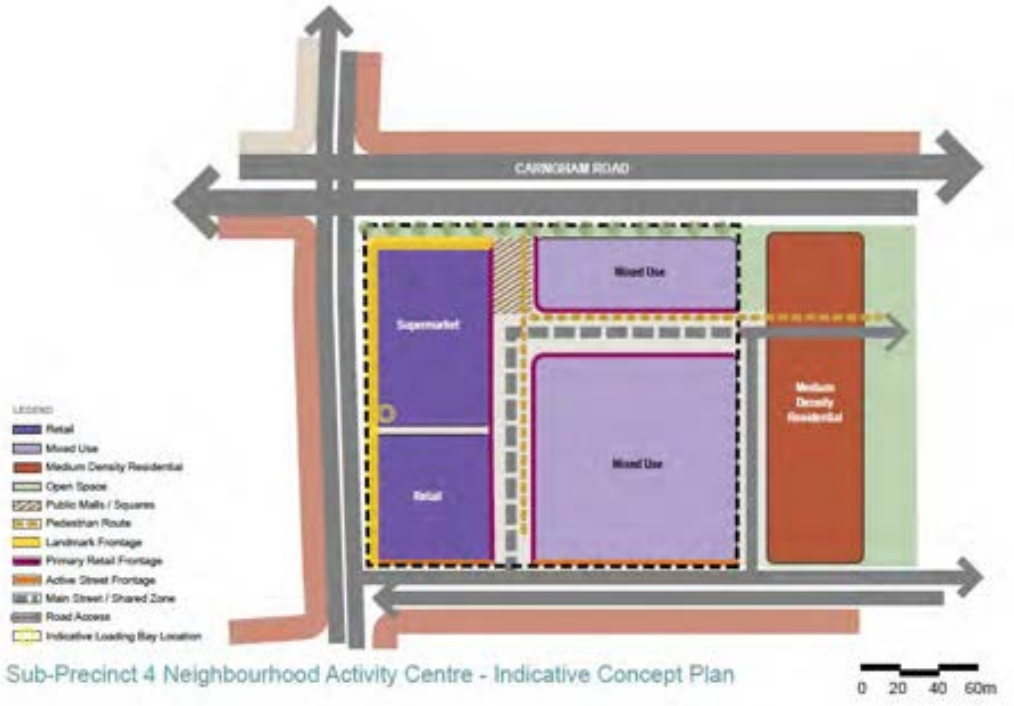


Figure 7 Concept design for the NAC on the south eastern corner

In summary, three of the four corners have made an allowance for the roundabout by the way of splays. An excerpt of the concept design is shown in Figure 6 for the Carringum Estate development (and RRV's design in Figure 10) shows that a roundabout continues to be the intersection treatment of the N-S road. A major difference to the PSP concept (Figure 4) are the north-south legs are no longer at right angles to Carngham Road. This displacement is also due the owner of the south eastern corner property not permitting acquiring any portion of their land (Figure 5).

The current road design of Carngham Rd has a left hand slip lane for traffic turning south off Carngham Road into Presentation Bvd. The current radius of the corner allows for long vehicles to turn into Presentation Bvd but has created the issue of no allowance for a pedestrian path on the southern side Carngham Rd. When considering the long term plan for footpaths/shared paths along both sides of Carngham Road, this is potentially a major safety issue when considering the south east corner will be the NAC. As will be discussed in RRV concepts, a portion of 163 Carngham Rd is to be acquired for the splay/intersection treatment (Figure 8).

Figure 8 Except of ultimate conditions by RRV for DI_JNC_02

It should be noted that pedestrian-operated signals are to be located approximately 100 m eastward from Presentation Bvd under the concept design in Figure 6. The future development of the Neighbourhood Activity Centre (NAC), east of Presentation Bvd will increase the use of these proposed signals, however it is unknown as to when this area will develop. The narrow verge (approx. 2.5m) between Presentation Bvd and the pedestrian signals will be a major source of complaints given pedestrians would feel unsafe walking this section of road (as a footpath) given Carngham Rd arterial classification/posted speed of 60 km/h.

Figure 6 and Figure 8 both show that the kerb line for the roundabout will bring the roadway closer to 163 Carngham Rd, further reducing the verge area/clearance thus further reducing safety in this area.

Other Intersections

As mentioned in the Ballymanus Estate section, the Cumberland Bvd/Galway Ave intersection with Carngham Rd needs to be analysed further. There as several treatment proposals for the Cumberland Bvd/Galway Ave intersection:

1. Left in/left out, with an island in Carngham Rd to enforce the left-in/left-out movement (Figure 6) as one interim option
2. Cross road intersections at DI_JNC_02 and Cumberland Bvd/Galway Ave with a future possible installation of traffic signals (Figure 9) that could be at either intersection
3. Traffic signals of the Cumberland Bvd/Galway Ave intersection for the duplicated Carngham Road and roundabout at JNC_02 (Figure 10).

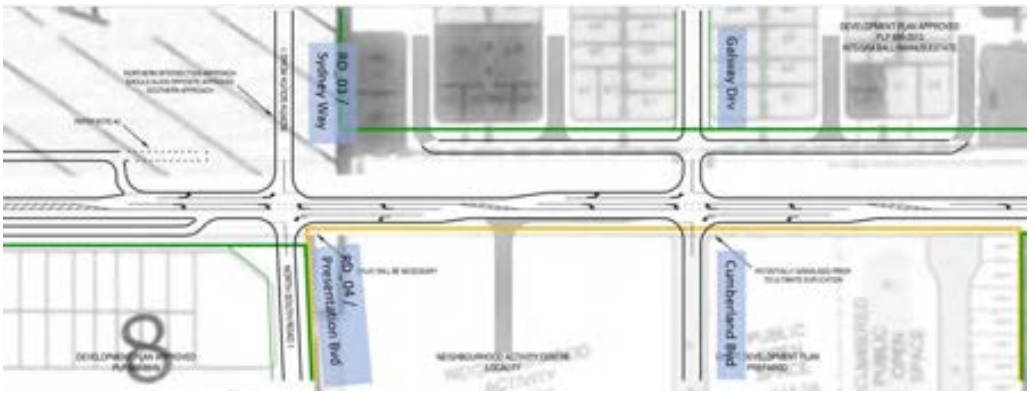


Figure 9 Interim intersection treatments (Carngham Rd remains a two-way road)

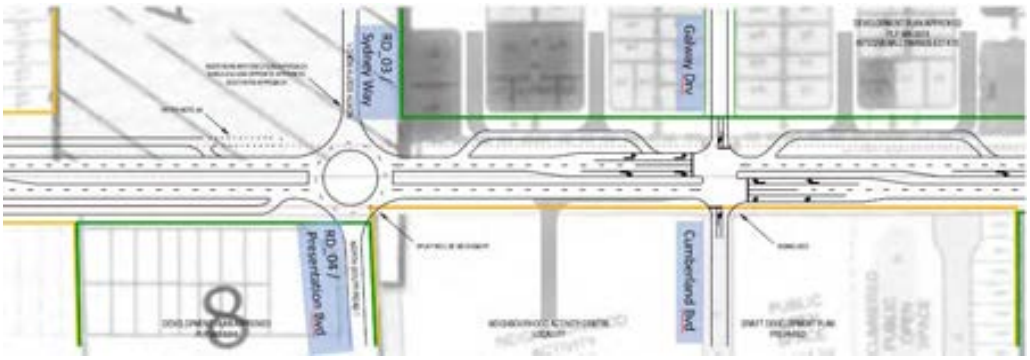


Figure 10 Ultimate design by RRV

The following section discusses the advantages and disadvantages of two broad-based options of retaining the roundabout or changing to traffic signals at DI_JNC_02.

Options Review for Intersection Design

Roundabout

A summary of the advantages and disadvantages for a roundabout intersection treatment in the following table (Table 1), with reference to Austroads design guidelines.

Table 1 advantages and disadvantages of a roundabout intersection treatment

Group	Advantages	Disadvantages
Operations /Movement	• Allows for freer flowing traffic • Reduces the wait times for low traffic volumes portions of the day • Better caters for incremental growth of traffic • Aligns with the current DCP	• Reducing the radius reduces the safety benefits generally attributed to roundabouts as deflecting vehicles will not reduce their speed. • No designated/safe crossing points for pedestrians • Minimal or no protection for vulnerable users ie motorcycles, pedestrian and cycling traffic • The Carngham Rd/Wiltshire Ln intersection is now signalized, the roundabout would not operate in a optimized way •
Design	• Caters for the off-perpendicular alignments of the north and south roads • Can be a staged design for the future duplication of Carngham Rd, although this would be a future DoT funded project, subject to traffic volumes	• The Carringum design moves the existing kerb closer to the 163 Carngham Road and reduces the area where a footpath is required, requiring further land acquisition • The circulating roadway for this intersection increases the land acquisition requirement whereas signals can be implemented within the existing road reserve • Design would need to consider the ultimate road design, potentially increasing the construction costs when duplicating Carngham Road • Creates a need to realign the intersection dues to challenges in securing land acquisitions
DCP Impact	TBC	•

The philosophy of the DCP is to fund and build the right infrastructure for when the demand requires it. The proposed roundabout considers the duplication of Carngham Rd, it can be seen in the proposed design of the Carringum Estate (Figure 6), the roundabout's diameter essentially matches the DCP design.

This will require the acquisition of a portion of 153 Carngham Rd to achieve this, of which to date, the owners have not entered into any discussion for this. As will be discussed in the following section, traffic signals would not require land acquisition and potentially better manage vehicle traffic at the intersection and the wider Ballarat West road network.

Traffic Signals

A preliminary design concept is in Appendix 1 using the current design standards and guidelines. The concept design avoids of any land acquisition of 153 Carngham Rd on the south east corner,

allows the future Sydney Ave (DI_RD_03) connection and the future Carngham Rd duplication without altering the existing road alignment.

A summary of the advantages and disadvantages for a signalised intersection treatment in the following table (Table 1).

Table 2 advantages and disadvantages of a signalised intersection treatment

Group	Advantages	Disadvantages
Operations/ movement	• Creates the future turning lane from Carngham Road into Sydney Way • Creates pedestrian crossings for all four sides of the intersection • Better protects the pedestrians waiting at the south eastern corner, the current design does not allow for pedestrians to safely navigate this section of the intersection. • Better manages the movement of all car/motorcyclist, pedestrian, and cyclist traffic at intersection	• Slows down car traffic by increasing the wait times especially for the side streets • Higher maintenance and operation costs
Design	• Does not alter any of the existing Carngham Road pavement • Current pavement location will be retained for the future Carngham Rd duplication • Eliminates any further land acquisition on the southern side of Carngham Road (appendix 2) • Better aligns Presentation Bvd with the proposed Sydney Way in the future development area on the north west corner of the intersection • Retains existing turning lanes from Carngham Road into Presentation Bvd • Requires marginal widening of Presentation Bvd to fit in the bicycle lane • Comparatively minor alterations to existing intersection design to incorporate bike lanes and alignment with north-south movement	• Signalised traffic control for low traffic volumes would be seen as overkill until ultimate development is reached •
DCP	TBC	•

Noting that this intersection will see a significant number of non-car users ie pedestrians and cyclists moving north and south through the intersection and mostly towards the NAC; signalizing this intersection could deliver multiple safety benefits to the most vulnerable road users.

The concept design in Appendix 1 allows slip lanes for the northern side of the intersection, although similar to roundabouts, slip lanes pose a hazard to pedestrians unless they are controlled either by signals, zebra crossings or raised pavements.

Modifying the intersection to traffic signals will still impact land acquisition on the northern side of Carngham Rd as discussed in the following section.

Land Acquisition Impacts

The Ballarat West Precinct Structure Plan estimated the areas for land acquisition for the Developer Contribution Plan. The development to date has significantly altered the alignments of both RD-03 (now Sydney Way) and RD-04 (now Presentation Bvd). The net impact will need to be assessed as part of a larger, precinct scale DCP review, but in summary the realignment has reduce the required area by the following (and is subject to further analysis).

Project Detailed Description	Area (m^2)
2014 PSP	7,977.32
Current Estimated	4,754.70
Percentage reduction (as of 04/04/2022)	40%

As discussed in the previous section, land acquisition of the south east corner will be avoided with the proposed concept design in the appendix.

Land acquisition is still required to the north of the existing Carngham Rd road reserve, of which, parcels have already been created for the 40 m wide reserve at the intersection as a DoT requirement, not funded by the DCP.

Portions of Carngham Rd will be wider at 60 m to cater for the service roads; which are assets gifted by the developer(s) to the Council given the requirement of no fence lines facing the road, Figure 6 and Figure 10 illustrates this.

The widened road reserve will cater for either intersection treatment option of the roundabout or traffic signals.

Concept Design

In summary the concept design:

1. Replaces the roundabout with traffic signals with full control of all traffic, pedestrian and cyclist movements
2. Retains existing Carngham Road turning lanes
3. Replaces painted island with right-turning lane in future Sydney Way
4. Requires minimal widening of the existing Carngham Rd pavement for bicycle lanes heading east
5. Increases the radius of the kerb on the south eastern corner to better protect pedestrians
6. Modifies Presentation Bvd to better align with Sydney Way and retain the north-heading bicycle lane
7. Protects 163 Carngham Rd from land acquisition
8. Utilizes existing road reserve on the the southern side

9. Minimises the land acquisition requirement on the northern side to that of the development itself
10. Is scalable to allow for the future duplication of Carngham Road with little modification to the current road alignment.

Appendix 1 shows the preliminary design concept, which shows that until the construction of RD-03 on the northern side. The widening of the existing Carngham Rd pavement is to include bicycle lanes when the signals are built.

Appendix 2 shows the changes of the land acquisition requirements from the original PSP to moving Sydney Way (RD-03) westward.

Estimated Costs

The estimated costs for the individual intersection treatments are as follows:

Treatment	Scenario: Two-Way Carngham Road Construction Costs	Scenario: Duplicated Carngham Road Construction Costs
Roundabout	$1,583,649.54	$1,869,817.00
Traffic Signals	$1,925,396.04	$2,334,744.01
Difference	-$341,746.50	-$464,927.01
Percentage (%)	22	25

Note: two-way relates to Figure 6 and duplicated according to the concept design in the appendix

The above estimates used the indexed DCP rates and quantities, and the pavement design is VicRoads 740mm deep pavement rather than Council 540mm deep pavement considering the intersection is an arterial road. The pavement area for each intersection treatment is the same, although in practice

The land acquisition costs are considered for the N-S road not the intersection.

The estimates show that traffic signals are a significantly higher cost than the roundabout, ie 22-25%, depending on the approach. The scenario of upgrading from either of the two-way scenarios to the duplicated scenario has not been evaluated at this time.

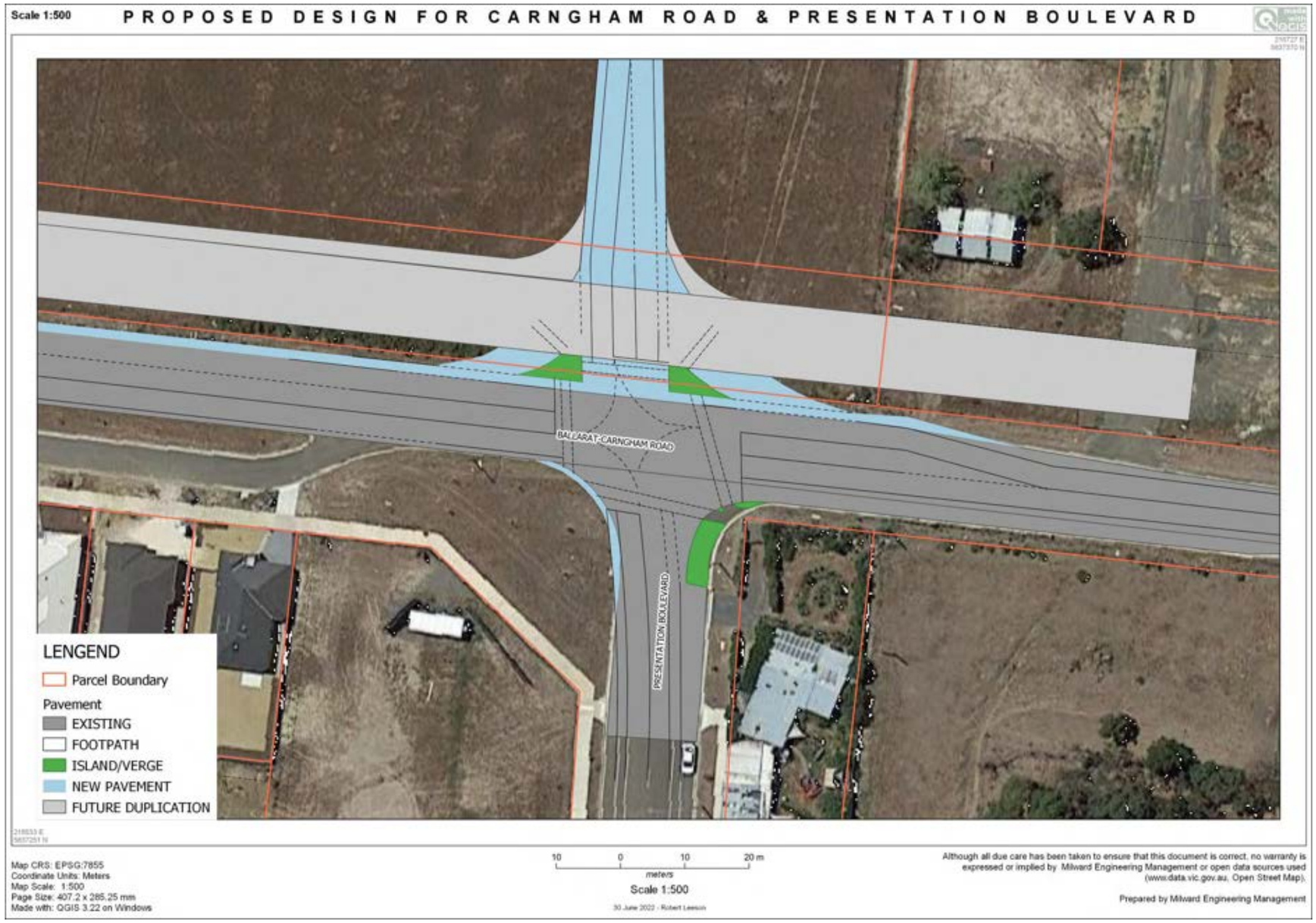
Conclusion/Next Steps

It is recommended that DI_JNC_02 is changed from a roundabout to traffic signals for the following reasons:

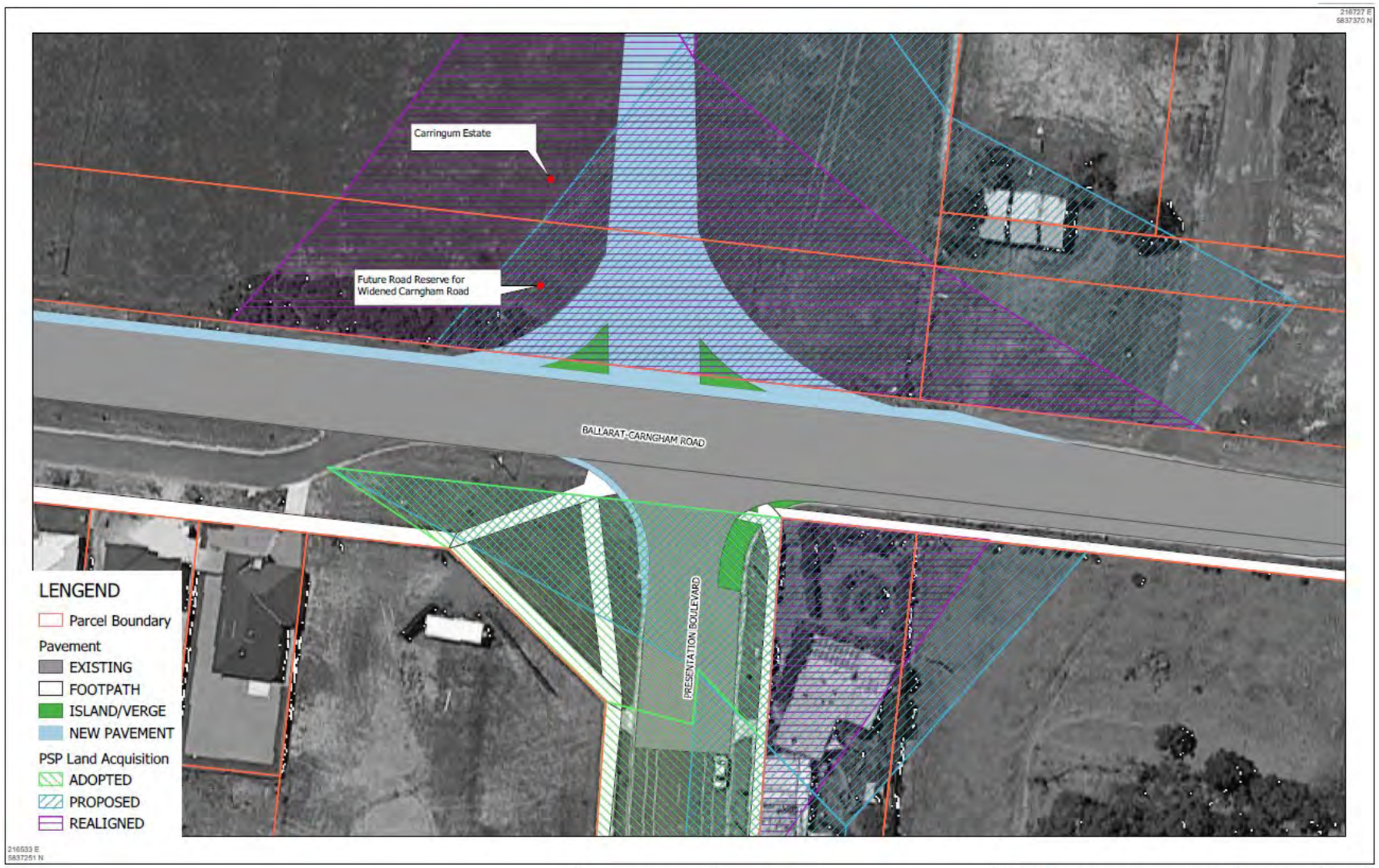
1. Reducing the need to modify the existing Carngham Rd alignment
2. Scalability with any future duplication of Carngham Rd
3. Delivering multiple safety improvements for non-vehicle traffic, especially providing controlled crossing where pedestrian desire to walk
4. Reducing the land acquisition area
5. Reducing the impact to the amenity of 163 Carngham Road.

Note that more detailed analysis and design is required to understand the true cost implications to the DCP.

Appendix 1 – Concept Design for Signalised Intersection at DI-JNC_02



Appendix 2 – Changes to Land Acquisition for Intersection



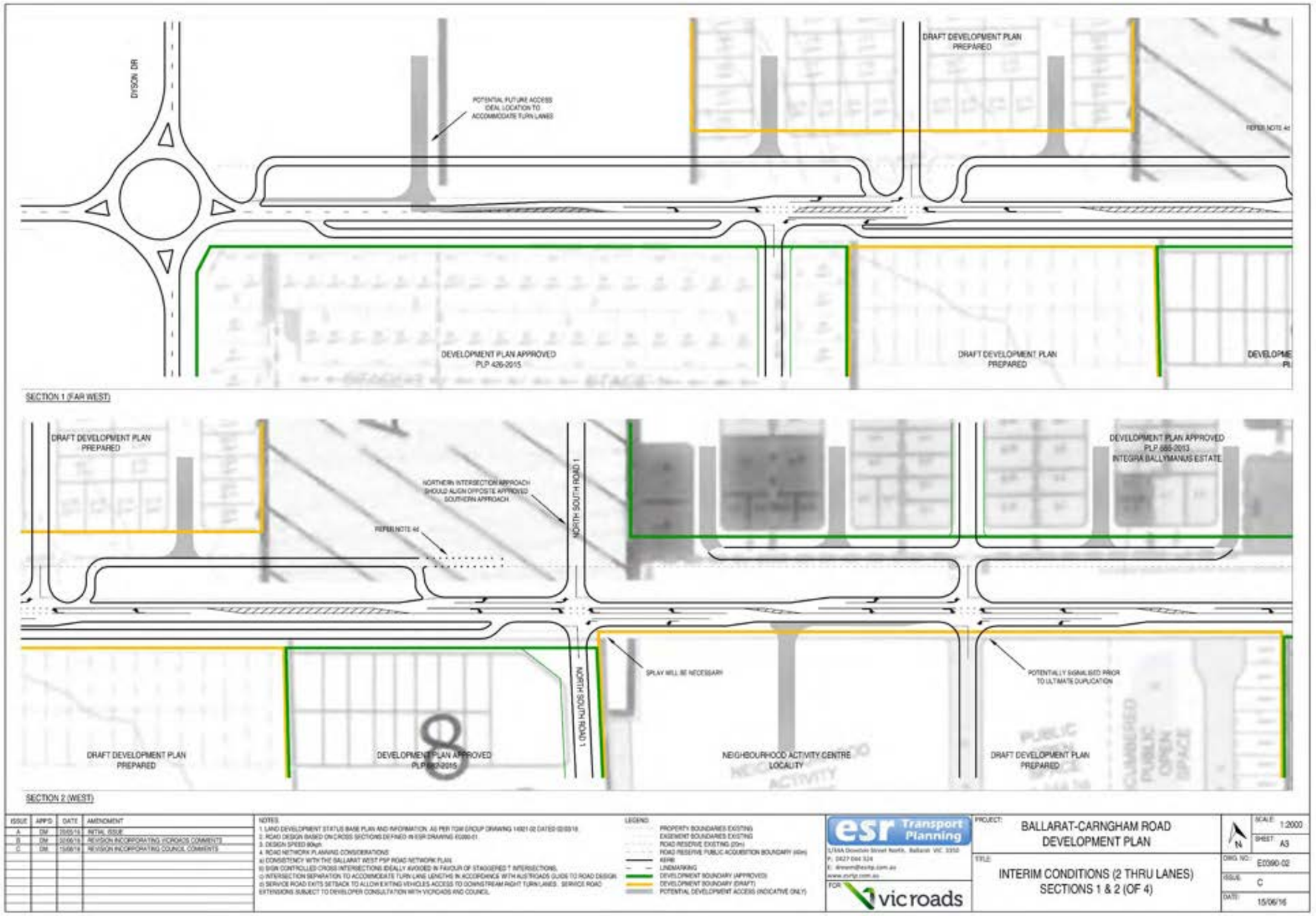
Map CRS: EPSG:7855
Coordinate Units: Meters
Map Scale: 1:500
Page Size: 407.2 x 285.25 mm
Made with: QGIS 3.22 on Windows

10 0 10 20 m
meters
Scale 1:500
16 June 2022 - Robert Leeson

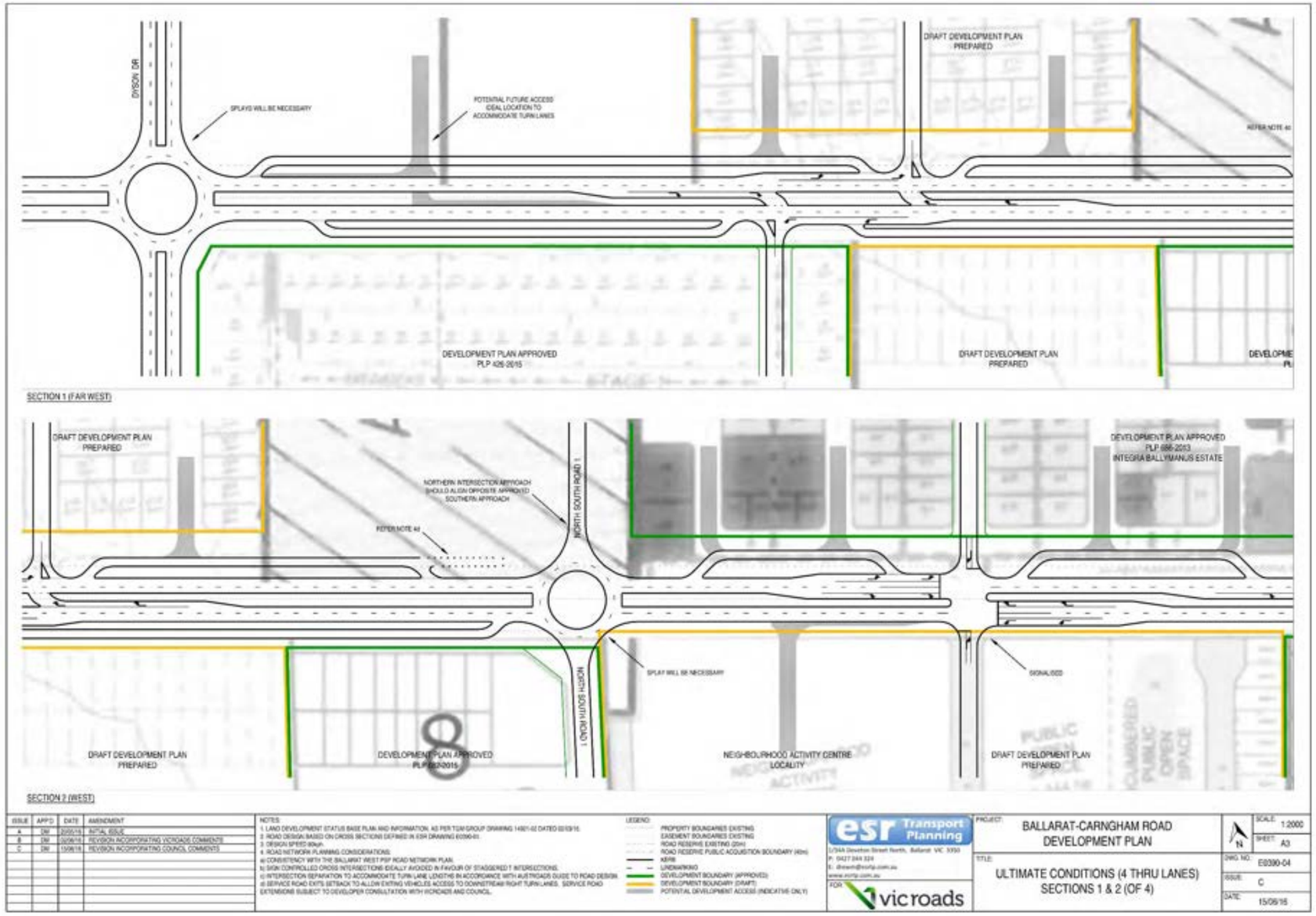
Although all due care has been taken to ensure that this document is correct, no warranty is expressed or implied by Milward Engineering Management or open data sources used (www.data.vic.gov.au, Open Street Map).

Prepared by Milward Engineering Management

Appendix 3 Interim conditions (RRV)



Appendix 4 Ultimate conditions (RRV)



IV

APPENDIX J. COST ESTIMATIONS FOR POSSIBLE INTERSECTION TREATMENTS FOR DI_JNC_02

JNC_02: Carngham Rd and New N-S Rd (North) Roundabout

Two-way traffic on Carngham Road

					Indexation	99	104.7 Jun-13	107.1 Jun-14	107.4 Jun-15	105.1 Jun-16	105.9 Jun-17	117.1 Jun-18	120.7 Jun-19	121.5 Jun-20	119.8 Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	376.8001798	$ 1,695.60	$ 1,793.23	$ 1,834.33	$ 1,839.47	$ 1,800.08	$ 1,813.78	$ 2,005.60	$ 2,067.26	$ 2,080.96	$ 2,051.85
	Cut place & Compact and disposal	cu m	$ 35.00	2505.721196	$ 87,700.24	$ 92,749.65	$ 94,875.72	$ 95,141.47	$ 93,103.99	$ 93,812.68	$ 103,734.33	$ 106,923.43	$ 107,632.12	$ 106,126.15
	Swale drain formation	lin m	$ 10.00	1032	$ 10,320.00	$ 10,914.18	$ 11,164.36	$ 11,195.64	$ 10,955.88	$ 11,039.27	$ 12,206.79	$ 12,582.06	$ 12,665.45	$ 12,488.24
	Sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pavement	Overlay Existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320	sq m	$ 13.40	3127.441493	$ 41,907.72	$ 44,320.58	$ 45,336.53	$ 45,463.52	$ 44,489.91	$ 44,828.56	$ 49,569.63	$ 51,093.55	$ 51,432.20	$ 50,712.57
	105mm, size 20, type SI asphalt with C320	sq m	$ 35.00	3127.441493	$ 109,460.45	$ 115,762.72	$ 118,416.31	$ 118,748.01	$ 116,204.99	$ 117,089.51	$ 129,472.92	$ 133,453.30	$ 134,337.83	$ 132,458.20
	75mm, size 20, type SF asphalt with C320	sq m	$ 26.60	3127.441493	$ 83,189.94	$ 87,979.67	$ 89,996.39	$ 90,248.48	$ 88,315.79	$ 88,988.03	$ 98,399.42	$ 101,424.51	$ 102,096.75	$ 100,668.23
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	3768.001798	$ 27,506.41	$ 29,090.12	$ 29,756.94	$ 29,840.29	$ 29,201.25	$ 29,423.53	$ 32,535.36	$ 33,535.60	$ 33,757.87	$ 33,285.54
	Lower base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	3768.001798	$ 38,056.82	$ 40,247.97	$ 41,170.56	$ 41,285.88	$ 40,401.73	$ 40,709.26	$ 45,014.68	$ 46,398.57	$ 46,706.10	$ 46,052.59
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	3768.001798	$ 63,302.43	$ 66,947.12	$ 68,481.72	$ 68,673.55	$ 67,202.88	$ 67,714.42	$ 74,875.90	$ 77,177.81	$ 77,689.35	$ 76,602.33
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	40mm Base Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	180mm Base Course crushed rock	sq m	$ 12.42	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	280mm Subbase Course crushed rock	sq m	$ 18.90	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	5354	$ 64,248.00	$ 67,947.13	$ 69,504.65	$ 69,699.35	$ 68,206.72	$ 68,725.89	$ 75,994.35	$ 78,330.64	$ 78,849.82	$ 77,746.57
Kerb & Channel	Type SM2	lin m	$ 40.00	1032	$ 41,280.00	$ 43,656.73	$ 44,657.45	$ 44,782.55	$ 43,823.52	$ 44,157.09	$ 48,827.15	$ 50,328.24	$ 50,661.82	$ 49,952.97
Footpath	Concrete	sq m	$ 45.00	493	$ 22,185.00	$ 23,462.32	$ 24,000.14	$ 24,067.36	$ 23,551.95	$ 23,731.23	$ 26,241.05	$ 27,047.77	$ 27,227.05	$ 26,846.09
Concrete Splitter Islands		sq m	$ 75.00	335	$ 25,125.00	$ 26,571.59	$ 27,180.68	$ 27,256.82	$ 26,673.11	$ 26,876.14	$ 29,718.56	$ 30,632.20	$ 30,835.23	$ 30,403.79
Drainage	Subsoil Drains	lin m	$ 18.00	1032	$ 18,576.00	$ 19,645.53	$ 20,095.85	$ 20,152.15	$ 19,720.58	$ 19,870.69	$ 21,972.22	$ 22,647.71	$ 22,797.82	$ 22,478.84
	Flush out Risers/outlets	No	$ 590.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pits	No	$ 2,100.00	12	$ 25,200.00	$ 26,650.91	$ 27,261.82	$ 27,338.18	$ 26,752.73	$ 26,956.36	$ 29,807.27	$ 30,723.64	$ 30,927.27	$ 30,494.55
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	395	$ 63,200.00	$ 66,838.79	$ 68,370.91	$ 68,562.42	$ 67,094.14	$ 67,604.85	$ 74,754.75	$ 77,052.93	$ 77,563.64	$ 76,478.38
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	40	$ 8,000.00	$ 8,460.61	$ 8,654.55	$ 8,678.79	$ 8,492.93	$ 8,557.58	$ 9,462.63	$ 9,753.54	$ 9,818.18	$ 9,680.81
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Signage	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Tactile pavers	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	1	$ 60,000.00	$ 63,454.55	$ 64,909.09	$ 65,090.91	$ 63,696.97	$ 64,181.82	$ 70,969.70	$ 73,151.52	$ 73,636.36	$ 72,606.06
Landscaping		item	$ 25,000.00	1	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	10	$ 35,000.00	$ 37,015.15	$ 37,863.64	$ 37,969.70	$ 37,156.57	$ 37,439.39	$ 41,398.99	$ 42,671.72	$ 42,954.55	$ 42,353.54
	High Pressure Sodium Lantern	item	$ 750.00	10	$ 7,500.00	$ 7,931.82	$ 8,113.64	$ 8,136.36	$ 7,962.12	$ 8,022.73	$ 8,871.21	$ 9,143.94	$ 9,204.55	$ 9,075.76
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	200	$ 36,000.00	$ 38,072.73	$ 38,945.45	$ 39,054.55	$ 38,218.18	$ 38,509.09	$ 42,581.82	$ 43,890.91	$ 44,181.82	$ 43,563.64
	Electrical pit	No	$ 1,600.00	10	$ 16,000.00	$ 16,921.21	$ 17,309.09	$ 17,357.58	$ 16,985.86	$ 17,115.15	$ 18,925.25	$ 19,507.07	$ 19,636.36	$ 19,361.62
Services Relocating/alteration	Testra	item	$ 50,000.00	1	$ 50,000.00	$ 52,878.79	$ 54,090.91	$ 54,242.42	$ 53,080.81	$ 53,484.85	$ 59,141.41	$ 60,959.60	$ 61,363.64	$ 60,505.05
	Electrical	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Water	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Other	item	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee	incl Prom & controller	item	$ 75,000.00	0.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 1,046,953.62	$ 1,107,232.76	$ 1,132,613.46	$ 1,135,786.04	$ 1,111,462.88	$ 1,119,923.11	$ 1,238,366.35	$ 1,276,437.39	$ 1,284,897.62	$ 1,266,919.63
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 104,695.36	$ 110,723.28	$ 113,261.35	$ 113,578.60	$ 111,146.29	$ 111,992.31	$ 123,836.63	$ 127,643.74	$ 128,489.76	$ 126,691.96
Contingency		item	15.00%		$ 157,043.04	$ 166,084.91	$ 169,892.02	$ 170,367.91	$ 166,719.43	$ 167,988.47	$ 185,754.95	$ 191,465.61	$ 192,734.64	$ 190,037.94
				TOTAL	**$ 1,308,692.02**	**$ 1,384,040.95**	**$ 1,415,766.82**	**$ 1,419,732.56**	**$1,389,328.60**	**$1,399,903.89**	**$ 1,547,957.93**	**$ 1,595,546.74**	**$1,606,122.02**	**$ 1,583,649.54**

JNC_02: Carngham Rd/New N-S Road Signalised Intersection
Two-way traffic on Carngham Road

					Indexation	99	104.7	107.1	107.4	105.1	105.9	117.1	120.7	121.5	119.8
							Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20	Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	379.12	$ 1,706.04	$ 1,804.27	$ 1,845.63	$ 1,850.79	$ 1,811.16	$ 1,824.95	$ 2,017.95	$ 2,079.99	$ 2,093.78	$ 2,064.48
	Cut place & Compact and disposal	cu m	$ 35.00	2521.148	$ 88,240.18	$ 93,320.68	$ 95,459.83	$ 95,727.23	$ 93,677.20	$ 94,390.25	$ 104,372.98	$ 107,581.71	$ 108,294.77	$ 106,779.53
	Swale drain formation	lin m	$ 10.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	sawcut existing Pavement	lin m	$ 7.50	150	$ 1,125.00	$ 1,189.77	$ 1,217.05	$ 1,220.45	$ 1,194.32	$ 1,203.41	$ 1,330.68	$ 1,371.59	$ 1,380.68	$ 1,361.36
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	2696.4	$ 36,131.76	$ 38,212.07	$ 39,087.99	$ 39,197.49	$ 38,358.06	$ 38,650.03	$ 42,737.67	$ 44,051.55	$ 44,343.52	$ 43,723.08
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	2696.4	$ 94,374.00	$ 99,807.65	$ 102,095.51	$ 102,381.49	$ 100,188.96	$ 100,951.58	$ 111,628.24	$ 115,060.02	$ 115,822.64	$ 114,202.07
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	2696.4	$ 71,724.24	$ 75,853.82	$ 77,592.59	$ 77,809.93	$ 76,143.61	$ 76,723.20	$ 84,837.46	$ 87,445.61	$ 88,025.20	$ 86,793.58
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	3106.2	$ 22,675.26	$ 23,980.81	$ 24,530.51	$ 24,599.22	$ 24,072.42	$ 24,255.66	$ 26,820.94	$ 27,645.49	$ 27,828.73	$ 27,439.36
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	3106.2	$ 31,372.62	$ 33,178.92	$ 33,939.47	$ 34,034.54	$ 33,305.68	$ 33,559.20	$ 37,108.42	$ 38,249.24	$ 38,502.76	$ 37,964.04
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	3106.2	$ 52,184.16	$ 55,188.70	$ 56,453.77	$ 56,611.91	$ 55,399.55	$ 55,821.24	$ 61,724.90	$ 63,622.51	$ 64,044.20	$ 63,148.10
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	595	$ 9,520.00	$ 10,068.12	$ 10,298.91	$ 10,327.76	$ 10,106.59	$ 10,183.52	$ 11,260.53	$ 11,606.71	$ 11,683.64	$ 11,520.16
	40mm Base Course Asphalt	sq m	$ 14.00	595	$ 8,330.00	$ 8,809.61	$ 9,011.55	$ 9,036.79	$ 8,843.26	$ 8,910.58	$ 9,852.96	$ 10,155.87	$ 10,223.18	$ 10,080.14
	Prime coat	sq m	$ 2.00	595	$ 1,190.00	$ 1,258.52	$ 1,287.36	$ 1,290.97	$ 1,263.32	$ 1,272.94	$ 1,407.57	$ 1,450.84	$ 1,460.45	$ 1,440.02
	180mm Base Course crushed rock	sq m	$ 12.42	685	$ 8,507.70	$ 8,997.54	$ 9,203.78	$ 9,229.57	$ 9,031.91	$ 9,100.66	$ 10,063.15	$ 10,372.52	$ 10,441.27	$ 10,295.18
	280mm Subbase Course crushed rock	sq m	$ 18.90	685	$ 12,946.50	$ 13,691.90	$ 14,005.76	$ 14,044.99	$ 13,744.21	$ 13,848.83	$ 15,313.49	$ 15,784.27	$ 15,888.89	$ 15,666.57
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	3791.2	$ 45,494.40	$ 48,113.77	$ 49,216.67	$ 49,354.53	$ 48,297.59	$ 48,665.22	$ 53,812.06	$ 55,466.40	$ 55,834.04	$ 55,052.82
Kerb & Channel	Type SM2	lin m	$ 40.00	859	$ 34,360.00	$ 36,338.30	$ 37,171.27	$ 37,275.39	$ 36,477.13	$ 36,754.79	$ 40,641.98	$ 41,891.43	$ 42,169.09	$ 41,579.07
Footpath	Concrete	sq m	$ 45.00	195	$ 8,775.00	$ 9,280.23	$ 9,492.95	$ 9,519.55	$ 9,315.68	$ 9,386.59	$ 10,379.32	$ 10,698.41	$ 10,769.32	$ 10,618.64
Concrete Splitter Islands		sq m	$ 75.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Drainage	Subsoil Drains	lin m	$ 18.00	1032	$ 18,576.00	$ 19,645.53	$ 20,095.85	$ 20,152.15	$ 19,720.58	$ 19,870.69	$ 21,972.22	$ 22,647.71	$ 22,797.82	$ 22,478.84
	Flush out Risers/outlets	No	$ 590.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pits	No	$ 2,100.00	12	$ 25,200.00	$ 26,650.91	$ 27,261.82	$ 27,338.18	$ 26,752.73	$ 26,956.36	$ 29,807.27	$ 30,723.64	$ 30,927.27	$ 30,494.55
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	395	$ 63,200.00	$ 66,838.79	$ 68,370.91	$ 68,562.42	$ 67,094.14	$ 67,604.85	$ 74,754.75	$ 77,052.93	$ 77,563.64	$ 76,478.38
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	40	$ 8,000.00	$ 8,460.61	$ 8,654.55	$ 8,678.79	$ 8,492.93	$ 8,557.58	$ 9,462.63	$ 9,753.54	$ 9,818.18	$ 9,680.81
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Signage	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Tactile pavers	No	$ 250.00	20	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	1	$ 60,000.00	$ 63,454.55	$ 64,909.09	$ 65,090.91	$ 63,696.97	$ 64,181.82	$ 70,969.70	$ 73,151.52	$ 73,636.36	$ 72,606.06
Landscaping		item	$ 25,000.00	1	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	1	$ 198,000.00	$ 209,400.00	$ 214,200.00	$ 214,800.00	$ 210,200.00	$ 211,800.00	$ 234,200.00	$ 241,400.00	$ 243,000.00	$ 239,600.00
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	15	$ 52,500.00	$ 55,522.73	$ 56,795.45	$ 56,954.55	$ 55,734.85	$ 56,159.09	$ 62,098.48	$ 64,007.58	$ 64,431.82	$ 63,530.30
	High Pressure Sodium Lantern	item	$ 750.00	15	$ 11,250.00	$ 11,897.73	$ 12,170.45	$ 12,204.55	$ 11,943.18	$ 12,034.09	$ 13,306.82	$ 13,715.91	$ 13,806.82	$ 13,613.64
	Distribution Box	item	$ 5,000.00	2	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	200	$ 36,000.00	$ 38,072.73	$ 38,945.45	$ 39,054.55	$ 38,218.18	$ 38,509.09	$ 42,581.82	$ 43,890.91	$ 44,181.82	$ 43,563.64
	Electrical pit	No	$ 1,600.00	10	$ 16,000.00	$ 16,921.21	$ 17,309.09	$ 17,357.58	$ 16,985.86	$ 17,115.15	$ 18,925.25	$ 19,507.07	$ 19,636.36	$ 19,361.62
Services Relocating/alteration	Telstra	item	$ 50,000.00	1	$ 50,000.00	$ 52,878.79	$ 54,090.91	$ 54,242.42	$ 53,080.81	$ 53,484.85	$ 59,141.41	$ 60,959.60	$ 61,363.64	$ 60,505.05
	Electrical	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Water	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Other	item	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee	incl Prom & controller	item	$ 75,000.00	1.00	$ 75,000.00	$ 79,318.18	$ 81,136.36	$ 81,363.64	$ 79,621.21	$ 80,227.27	$ 88,712.12	$ 91,439.39	$ 92,045.45	$ 90,757.58
				Subtotal	$ 1,263,882.86	$ 1,336,651.87	$ 1,367,291.46	$ 1,371,121.41	$ 1,341,758.47	$ 1,351,971.67	$ 1,494,956.39	$ 1,540,915.77	$ 1,551,128.96	$ 1,529,425.93
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 126,388.29	$ 133,665.19	$ 136,729.15	$ 137,112.14	$ 134,175.85	$ 135,197.17	$ 149,495.64	$ 154,091.58	$ 155,112.90	$ 152,942.59
Contingency		item	15.00%		$ 189,582.43	$ 200,497.78	$ 205,093.72	$ 205,668.21	$ 201,263.77	$ 202,795.75	$ 224,243.46	$ 231,137.37	$ 232,669.34	$ 229,413.89
				TOTAL	**$ 1,579,853.58**	**$ 1,670,814.84**	**$ 1,709,114.32**	**$ 1,713,901.76**	**$ 1,677,198.09**	**$ 1,689,964.58**	**$ 1,868,695.49**	**$ 1,926,144.71**	**$ 1,938,911.21**	**$ 1,911,782.41**

VI

JNC_02: Carngham Rd and New N-S Rd (North) Roundabout

Duplicated Carngham Road

					Indexation	99	104.7	107.1	107.4	105.1	105.9	117.1	120.7	121.5	119.8
							Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20	Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	687.2	$ 3,092.40	$ 3,270.45	$ 3,345.41	$ 3,354.79	$ 3,282.94	$ 3,307.93	$ 3,657.78	$ 3,770.23	$ 3,795.22	$ 3,742.12
	Cut place & Compact and disposal	cu m	$ 35.00	4569.88	$ 159,945.80	$ 169,154.80	$ 173,032.27	$ 173,516.96	$ 169,801.05	$ 171,093.54	$ 189,188.42	$ 195,004.63	$ 196,297.12	$ 193,550.57
	Swale drain formation	lin m	$ 10.00	1032	$ 10,320.00	$ 10,914.18	$ 11,164.36	$ 11,195.64	$ 10,955.88	$ 11,039.27	$ 12,206.79	$ 12,582.06	$ 12,665.45	$ 12,488.24
	sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSVS6+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	6872	$ 92,084.80	$ 97,386.65	$ 99,619.01	$ 99,898.06	$ 97,758.71	$ 98,502.83	$ 108,920.51	$ 112,269.04	$ 113,013.16	$ 111,431.91
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	6872	$ 240,520.00	$ 254,368.12	$ 260,198.91	$ 260,927.76	$ 255,339.92	$ 257,283.52	$ 284,493.86	$ 293,240.04	$ 295,183.64	$ 291,053.49
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	6872	$ 182,795.20	$ 193,319.77	$ 197,751.17	$ 198,305.10	$ 194,058.34	$ 195,535.47	$ 216,215.33	$ 222,862.43	$ 224,339.56	$ 221,200.66
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	6872	$ 50,165.60	$ 53,053.92	$ 54,270.06	$ 54,422.08	$ 53,256.61	$ 53,661.99	$ 59,337.29	$ 61,161.49	$ 61,566.87	$ 60,705.44
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	6872	$ 69,407.20	$ 73,403.37	$ 75,085.97	$ 75,296.30	$ 73,683.81	$ 74,244.67	$ 82,096.80	$ 84,620.70	$ 85,181.56	$ 83,989.72
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	6872	$ 115,449.60	$ 122,096.70	$ 124,895.48	$ 125,245.32	$ 122,563.16	$ 123,496.09	$ 136,557.05	$ 140,755.22	$ 141,688.15	$ 139,705.68
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	40mm Base Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	180mm Base Course crushed rock	sq m	$ 12.42	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	280mm Subbase Course crushed rock	sq m	$ 18.90	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	5354	$ 64,248.00	$ 67,947.13	$ 69,504.65	$ 69,699.35	$ 68,206.72	$ 68,725.89	$ 75,994.35	$ 78,330.64	$ 78,849.82	$ 77,746.57
Kerb & Channel	Type SM2	lin m	$ 40.00	1032	$ 41,280.00	$ 43,656.73	$ 44,657.45	$ 44,782.55	$ 43,823.52	$ 44,157.09	$ 48,827.15	$ 50,328.24	$ 50,661.82	$ 49,952.97
Footpath	Concrete	sq m	$ 45.00	493	$ 22,185.00	$ 23,462.32	$ 24,000.14	$ 24,067.36	$ 23,551.95	$ 23,731.23	$ 26,241.05	$ 27,047.77	$ 27,227.05	$ 26,846.09
Concrete Splitter Islands		sq m	$ 75.00	335	$ 25,125.00	$ 26,571.59	$ 27,180.68	$ 27,256.82	$ 26,673.11	$ 26,876.14	$ 29,718.56	$ 30,632.20	$ 30,835.23	$ 30,403.79
Drainage	Subsoil Drains	lin m	$ 18.00	1032	$ 18,576.00	$ 19,645.53	$ 20,095.85	$ 20,152.15	$ 19,720.58	$ 19,870.69	$ 21,972.22	$ 22,647.71	$ 22,797.82	$ 22,478.84
	Flush out Risers/outlets	No	$ 590.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pits	No	$ 2,100.00	12	$ 25,200.00	$ 26,650.91	$ 27,261.82	$ 27,338.18	$ 26,752.73	$ 26,956.36	$ 29,807.27	$ 30,723.64	$ 30,927.27	$ 30,494.55
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	395	$ 63,200.00	$ 66,838.79	$ 68,370.91	$ 68,562.42	$ 67,094.14	$ 67,604.85	$ 74,754.75	$ 77,052.93	$ 77,563.64	$ 76,478.38
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	40	$ 8,000.00	$ 8,460.61	$ 8,654.55	$ 8,678.79	$ 8,492.93	$ 8,557.58	$ 9,462.63	$ 9,753.54	$ 9,818.18	$ 9,680.81
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Signage	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Tactile pavers	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	1	$ 60,000.00	$ 63,454.55	$ 64,909.09	$ 65,090.91	$ 63,696.97	$ 64,181.82	$ 70,969.70	$ 73,151.52	$ 73,636.36	$ 72,606.06
Landscaping		item	$ 25,000.00	1	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	10	$ 35,000.00	$ 37,015.15	$ 37,863.64	$ 37,969.70	$ 37,156.57	$ 37,439.39	$ 41,398.99	$ 42,671.72	$ 42,954.55	$ 42,353.54
	High Pressure Sodium Lantern	item	$ 750.00	10	$ 7,500.00	$ 7,931.82	$ 8,113.64	$ 8,136.36	$ 7,962.12	$ 8,022.73	$ 8,871.21	$ 9,143.94	$ 9,204.55	$ 9,075.76
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	200	$ 36,000.00	$ 38,072.73	$ 38,945.45	$ 39,054.55	$ 38,218.18	$ 38,509.09	$ 42,581.82	$ 43,890.91	$ 44,181.82	$ 43,563.64
	Electrical pit	No	$ 1,600.00	10	$ 16,000.00	$ 16,921.21	$ 17,309.09	$ 17,357.58	$ 16,985.86	$ 17,115.15	$ 18,925.25	$ 19,507.07	$ 19,636.36	$ 19,361.62
Services Relocating/alteration	Testra	item	$ 50,000.00	1	$ 50,000.00	$ 52,878.79	$ 54,090.91	$ 54,242.42	$ 53,080.81	$ 53,484.85	$ 59,141.41	$ 60,959.60	$ 61,363.64	$ 60,505.05
	Electrical	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Water	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Other	item	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee	incl Prom & controller	item	$ 75,000.00	0.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 1,507,594.60	$ 1,594,395.50	$ 1,630,943.25	$ 1,635,511.72	$ 1,600,486.79	$ 1,612,669.38	$ 1,783,225.53	$ 1,838,047.15	$ 1,850,229.74	$ 1,824,341.75
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 150,759.46	$ 159,439.55	$ 163,094.32	$ 163,551.17	$ 160,048.68	$ 161,266.94	$ 178,322.55	$ 183,804.72	$ 185,022.97	$ 182,434.17
Contingency		item	15.00%		$ 226,139.19	$ 239,159.33	$ 244,641.49	$ 245,326.76	$ 240,073.02	$ 241,900.41	$ 267,483.83	$ 275,707.07	$ 277,534.46	$ 273,651.26
				TOTAL	**$ 1,884,493.25**	**$ 1,992,994.38**	**$ 2,038,679.06**	**$ 2,044,389.65**	**$2,000,608.49**	**$2,015,836.72**	**$ 2,229,031.91**	**$ 2,297,558.94**	**$2,312,787.17**	**$ 2,280,427.19**

VII

n Rd/New N-S Road Signalised Intersection

Duplicated Carngham Road

					Indexation		99	104.7 Jun-13	107.1 Jun-14	107.4 Jun-15	105.1 Jun-16	105.9 Jun-17	117.1 Jun-18	120.7 Jun-19	121.5 Jun-20	119.8 Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**		**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76		$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01	
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76		$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01	
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	687.5	$ 3,093.75	$ 3,271.88		$ 3,346.88	$ 3,356.25	$ 3,284.38	$ 3,309.38	$ 3,659.38	$ 3,771.88	$ 3,796.88	$ 3,743.75	
	Cut place & Compact and disposal	cu m	$ 35.00	4571.875	$ 160,015.63	$ 169,228.65		$ 173,107.81	$ 173,592.71	$ 169,875.17	$ 171,168.23	$ 189,271.01	$ 195,089.76	$ 196,382.81	$ 193,635.07	
	Swale drain formation	lin m	$ 10.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	sawcut existing Pavement	lin m	$ 7.50	150	$ 1,125.00	$ 1,189.77		$ 1,217.05	$ 1,220.45	$ 1,194.32	$ 1,203.41	$ 1,330.68	$ 1,371.59	$ 1,380.68	$ 1,361.36	
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	6190	$ 82,946.00	$ 87,721.68		$ 89,732.49	$ 89,983.84	$ 88,056.81	$ 88,727.08	$ 98,110.87	$ 101,127.09	$ 101,797.36	$ 100,373.04	
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	6190	$ 216,650.00	$ 229,123.79		$ 234,375.91	$ 235,032.42	$ 229,999.14	$ 231,749.85	$ 256,259.75	$ 264,137.93	$ 265,888.64	$ 262,168.38	
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	6190	$ 164,654.00	$ 174,134.08		$ 178,125.69	$ 178,624.64	$ 174,799.35	$ 176,129.88	$ 194,757.41	$ 200,744.83	$ 202,075.36	$ 199,247.97	
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	6190	$ 45,187.00	$ 47,788.68		$ 48,884.12	$ 49,021.05	$ 47,971.25	$ 48,336.40	$ 53,448.46	$ 55,091.63	$ 55,456.77	$ 54,680.83	
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	6190	$ 62,519.00	$ 66,118.58		$ 67,634.19	$ 67,823.64	$ 66,371.18	$ 66,876.38	$ 73,949.24	$ 76,222.66	$ 76,727.86	$ 75,654.31	
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	6190	$ 103,992.00	$ 109,979.42		$ 112,500.44	$ 112,815.56	$ 110,399.59	$ 111,239.93	$ 123,004.68	$ 126,786.21	$ 127,626.55	$ 125,840.82	
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	595	$ 9,520.00	$ 10,068.12		$ 10,298.91	$ 10,327.76	$ 10,106.59	$ 10,183.52	$ 11,260.53	$ 11,606.71	$ 11,683.64	$ 11,520.16	
	40mm Base Course Asphalt	sq m	$ 14.00	595	$ 8,330.00	$ 8,809.61		$ 9,011.55	$ 9,036.79	$ 8,843.26	$ 8,910.58	$ 9,852.96	$ 10,155.87	$ 10,223.18	$ 10,080.14	
	Prime coat	sq m	$ 2.00	595	$ 1,190.00	$ 1,258.52		$ 1,287.36	$ 1,290.97	$ 1,263.32	$ 1,272.94	$ 1,407.57	$ 1,450.84	$ 1,460.45	$ 1,440.02	
	180mm Base Course crushed rock	sq m	$ 12.42	685	$ 8,507.70	$ 8,997.54		$ 9,203.78	$ 9,229.57	$ 9,031.91	$ 9,100.66	$ 10,063.15	$ 10,372.52	$ 10,441.27	$ 10,295.18	
	280mm Subbase Course crushed rock	sq m	$ 18.90	685	$ 12,946.50	$ 13,691.90		$ 14,005.76	$ 14,044.99	$ 13,744.21	$ 13,848.83	$ 15,313.49	$ 15,784.27	$ 15,888.89	$ 15,666.57	
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Prime coat	sq m	$ 2.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Subgrade improvement (300mm depth)	sq m	$ 12.00	6875	$ 82,500.00	$ 87,250.00		$ 89,250.00	$ 89,500.00	$ 87,583.33	$ 88,250.00	$ 97,583.33	$ 100,583.33	$ 101,250.00	$ 99,833.33	
Kerb & Channel	Type SM2	lin m	$ 40.00	859	$ 34,360.00	$ 36,338.30		$ 37,171.27	$ 37,275.39	$ 36,477.13	$ 36,754.79	$ 40,641.98	$ 41,891.43	$ 42,169.09	$ 41,579.07	
Footpath	Concrete	sq m	$ 45.00	195	$ 8,775.00	$ 9,280.23		$ 9,492.95	$ 9,519.55	$ 9,315.68	$ 9,386.59	$ 10,379.32	$ 10,698.41	$ 10,769.32	$ 10,618.64	
Concrete Splitter Islands		sq m	$ 75.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Drainage	Subsoil Drains	lin m	$ 18.00	1032	$ 18,576.00	$ 19,645.53		$ 20,095.85	$ 20,152.15	$ 19,720.58	$ 19,870.69	$ 21,972.22	$ 22,647.71	$ 22,797.82	$ 22,478.84	
	Flush out Risers/outlets	No	$ 590.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Drainage Pits	No	$ 2,100.00	12	$ 25,200.00	$ 26,650.91		$ 27,261.82	$ 27,338.18	$ 26,752.73	$ 26,956.36	$ 29,807.27	$ 30,723.64	$ 30,927.27	$ 30,494.55	
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	395	$ 63,200.00	$ 66,838.79		$ 68,370.91	$ 68,562.42	$ 67,094.14	$ 67,604.85	$ 74,754.75	$ 77,052.93	$ 77,563.64	$ 76,478.38	
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	40	$ 8,000.00	$ 8,460.61		$ 8,654.55	$ 8,678.79	$ 8,492.93	$ 8,557.58	$ 9,462.63	$ 9,753.54	$ 9,818.18	$ 9,680.81	
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Miscellaneous	Line Marking	item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76		$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01	
	Signage	No	$ 250.00		$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Tactile pavers	No	$ 250.00	20	$ 5,000.00	$ 5,287.88		$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51	
	Street Name Signs	No	$ 200.00		$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	w-Beam barrier	lin m	$ 110.00		$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36		$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15	
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76		$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01	
Traffic Management		item	$ 60,000.00	1	$ 60,000.00	$ 63,454.55		$ 64,909.09	$ 65,090.91	$ 63,696.97	$ 64,181.82	$ 70,969.70	$ 73,151.52	$ 73,636.36	$ 72,606.06	
Landscaping		item	$ 25,000.00	1	$ 25,000.00	$ 26,439.39		$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53	
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Intersection Signals - divided cross	item	$ 207,000.00	1	$ 207,000.00	$ 218,918.18		$ 223,936.36	$ 224,563.64	$ 219,754.55	$ 221,427.27	$ 244,845.45	$ 252,372.73	$ 254,045.45	$ 250,490.91	
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Intersection Lighting	Pole	item	$ 3,500.00	15	$ 52,500.00	$ 55,522.73		$ 56,795.45	$ 56,954.55	$ 55,734.85	$ 56,159.09	$ 62,098.48	$ 64,007.58	$ 64,431.82	$ 63,530.30	
	High Pressure Sodium Lantern	item	$ 750.00	15	$ 11,250.00	$ 11,897.73		$ 12,170.45	$ 12,204.55	$ 11,943.18	$ 12,034.09	$ 13,306.82	$ 13,715.91	$ 13,806.82	$ 13,613.64	
	Distribution Box	item	$ 5,000.00	2	$ 10,000.00	$ 10,575.76		$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01	
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	200	$ 36,000.00	$ 38,072.73		$ 38,945.45	$ 39,054.55	$ 38,218.18	$ 38,509.09	$ 42,581.82	$ 43,890.91	$ 44,181.82	$ 43,563.64	
	Electrical pit	No	$ 1,600.00	10	$ 16,000.00	$ 16,921.21		$ 17,309.09	$ 17,357.58	$ 16,985.86	$ 17,115.15	$ 18,925.25	$ 19,507.07	$ 19,636.36	$ 19,361.62	
Services Relocating/alteration	Telstra	item	$ 50,000.00	1	$ 50,000.00	$ 52,878.79		$ 54,090.91	$ 54,242.42	$ 53,080.81	$ 53,484.85	$ 59,141.41	$ 60,959.60	$ 61,363.64	$ 60,505.05	
	Electrical	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52		$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02	
	Water	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52		$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02	
	Other	item	$ -		$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Vicroads 10 year Maintenance Fee	incl Prom & controller	item	$ 75,000.00	1.00	$ 75,000.00	$ 79,318.18		$ 81,136.36	$ 81,363.64	$ 79,621.21	$ 80,227.27	$ 88,712.12	$ 91,439.39	$ 92,045.45	$ 90,757.58	
				Subtotal	$ 1,750,537.58	$ 1,851,326.10		$ 1,893,763.38	$ 1,899,068.04	$ 1,858,398.98	$ 1,872,544.74	$ 2,070,585.35	$ 2,134,241.27	$ 2,148,387.02	$ 2,118,327.29	
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 175,053.76	$ 185,132.61		$ 189,376.34	$ 189,906.80	$ 185,839.90	$ 187,254.47	$ 207,058.54	$ 213,424.13	$ 214,838.70	$ 211,832.73	
Contingency		item	15.00%		$ 262,580.64	$ 277,698.92		$ 284,064.51	$ 284,860.21	$ 278,759.85	$ 280,881.71	$ 310,587.80	$ 320,136.19	$ 322,258.05	$ 317,749.09	
				TOTAL	$ 2,188,171.97	$ 2,314,157.63		$ 2,367,204.22	$ 2,373,835.04	$ 2,322,998.73	$ 2,340,680.92	$ 2,588,231.69	$ 2,667,801.58	$ 2,685,483.78	$ 2,647,909.11	

APPENDIX K. DI_JNC_05 COSTINGS FOR POTENTIAL INTERSECTION TREATMENTS (ROUNDABOUT VS TRAFFIC SIGNALS

JNC_05: Greenhalghs Rd and New N-S Rd (South) Roundabout

						99	104.7 Jun-13	107.1 Jun-14	107.4 Jun-15	105.1 Jun-16	105.9 Jun-17	117.1 Jun-18	120.7 Jun-19	121.5 Jun-20	119.8 Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	262.2	$ 1,179.90	$ 1,247.83	$ 1,276.44	$ 1,280.01	$ 1,252.60	$ 1,262.14	$ 1,395.62	$ 1,438.52	$ 1,448.06	$ 1,427.90
	Cut place & Compact and disposal	cu m	$ 35.00	1743.63	$ 61,027.05	$ 64,540.73	$ 66,020.17	$ 66,205.10	$ 64,787.30	$ 65,280.45	$ 72,184.52	$ 74,403.69	$ 74,896.83	$ 73,848.89
	Swale drain formation	lin m	$ 10.00	423	$ 4,230.00	$ 4,473.55	$ 4,576.09	$ 4,588.91	$ 4,490.64	$ 4,524.82	$ 5,003.36	$ 5,157.18	$ 5,191.36	$ 5,118.73
	sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	2241	$ 35,856.00	$ 37,920.44	$ 38,789.67	$ 38,898.33	$ 38,065.31	$ 38,355.05	$ 42,411.49	$ 43,715.35	$ 44,005.09	$ 43,389.38
	40mm Base Course Asphalt	sq m	$ 14.00	2241	$ 31,374.00	$ 33,180.38	$ 33,940.96	$ 34,036.04	$ 33,307.15	$ 33,560.67	$ 37,110.05	$ 38,250.93	$ 38,504.45	$ 37,965.71
	Prime coat	sq m	$ 2.00	2241	$ 4,482.00	$ 4,740.05	$ 4,848.71	$ 4,862.29	$ 4,758.16	$ 4,794.38	$ 5,301.44	$ 5,464.42	$ 5,500.64	$ 5,423.67
	180mm Base Course crushed rock	sq m	$ 12.42	2622	$ 32,565.24	$ 34,440.21	$ 35,229.67	$ 35,328.35	$ 34,571.79	$ 34,834.94	$ 38,519.09	$ 39,703.28	$ 39,966.43	$ 39,407.23
	280mm Subbase Course crushed rock	sq m	$ 18.90	2622	$ 49,555.80	$ 52,409.01	$ 53,610.37	$ 53,760.53	$ 52,609.24	$ 53,009.69	$ 58,616.00	$ 60,418.03	$ 60,818.48	$ 59,967.52
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	2622	$ 31,464.00	$ 33,275.56	$ 34,038.33	$ 34,133.67	$ 33,402.69	$ 33,656.95	$ 37,216.51	$ 38,360.65	$ 38,614.91	$ 38,074.62
Kerb & Channel	Type SM2	lin m	$ 40.00	423	$ 16,920.00	$ 17,894.18	$ 18,304.36	$ 18,355.64	$ 17,962.55	$ 18,099.27	$ 20,013.45	$ 20,628.73	$ 20,765.45	$ 20,474.91
Footpath	Concrete	sq m	$ 45.00	398	$ 17,910.00	$ 18,941.18	$ 19,375.36	$ 19,429.64	$ 19,013.55	$ 19,158.27	$ 21,184.45	$ 21,835.73	$ 21,980.45	$ 21,672.91
Concrete Splitter Islands		sq m	$ 75.00	27	$ 2,025.00	$ 2,141.59	$ 2,190.68	$ 2,196.82	$ 2,149.77	$ 2,166.14	$ 2,395.23	$ 2,468.86	$ 2,485.23	$ 2,450.45
Drainage	Subsoil Drains	lin m	$ 18.00	423	$ 7,614.00	$ 8,052.38	$ 8,236.96	$ 8,260.04	$ 8,083.15	$ 8,144.67	$ 9,006.05	$ 9,282.93	$ 9,344.45	$ 9,213.71
	Flush out Risers/outlets	No	$ 590.00	28	$ 16,520.00	$ 17,471.15	$ 17,871.64	$ 17,921.70	$ 17,537.90	$ 17,671.39	$ 19,540.32	$ 20,141.05	$ 20,274.55	$ 19,990.87
	Drainage Pits	No	$ 2,100.00	25	$ 52,500.00	$ 55,522.73	$ 56,795.45	$ 56,954.55	$ 55,734.85	$ 56,159.09	$ 62,098.48	$ 64,007.58	$ 64,431.82	$ 63,530.30
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	250	$ 40,000.00	$ 42,303.03	$ 43,272.73	$ 43,393.94	$ 42,464.65	$ 42,787.88	$ 47,313.13	$ 48,767.68	$ 49,090.91	$ 48,404.04
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	95	$ 19,000.00	$ 20,093.94	$ 20,554.55	$ 20,612.12	$ 20,170.71	$ 20,324.24	$ 22,473.74	$ 23,164.65	$ 23,318.18	$ 22,991.92
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Signage	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Tactile pavers	No	$ 250.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	w-Beam barrier	lin m	$ 110.00		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	1	$ 60,000.00	$ 63,454.55	$ 64,909.09	$ 65,090.91	$ 63,696.97	$ 64,181.82	$ 70,969.70	$ 73,151.52	$ 73,636.36	$ 72,606.06
Landscaping		item	$ 25,000.00	1	$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	8	$ 28,000.00	$ 29,612.12	$ 30,290.91	$ 30,375.76	$ 29,725.25	$ 29,951.52	$ 33,119.19	$ 34,137.37	$ 34,363.64	$ 33,882.83
	High Pressure Sodium Lantern	item	$ 750.00	8	$ 6,000.00	$ 6,345.45	$ 6,490.91	$ 6,509.09	$ 6,369.70	$ 6,418.18	$ 7,096.97	$ 7,315.15	$ 7,363.64	$ 7,260.61
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	250	$ 45,000.00	$ 47,590.91	$ 48,681.82	$ 48,818.18	$ 47,772.73	$ 48,136.36	$ 53,227.27	$ 54,863.64	$ 55,227.27	$ 54,454.55
	Electrical pit	No	$ 1,600.00	8	$ 12,800.00	$ 13,536.97	$ 13,847.27	$ 13,886.06	$ 13,588.69	$ 13,692.12	$ 15,140.20	$ 15,605.66	$ 15,709.09	$ 15,489.29
Services Relocating/alteration	Telstra	item	$ 50,000.00	1	$ 50,000.00	$ 52,878.79	$ 54,090.91	$ 54,242.42	$ 53,080.81	$ 53,484.85	$ 59,141.41	$ 60,959.60	$ 61,363.64	$ 60,505.05
	Electrical	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Water	item	$ 20,000.00	1	$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Other	item	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	1.00	$ 75,000.00	$ 79,318.18	$ 81,136.36	$ 81,363.64	$ 79,621.21	$ 80,227.27	$ 88,712.12	$ 91,439.39	$ 92,045.45	$ 90,757.58
				Subtotal	$ 812,522.99	$ 859,304.62	$ 879,002.14	$ 881,464.33	$ 862,587.54	$ 869,153.38	$ 961,075.17	$ 990,621.46	$ 997,187.31	$ 983,234.89
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 81,252.30	$ 85,930.46	$ 87,900.21	$ 88,146.43	$ 86,258.75	$ 86,915.34	$ 96,107.52	$ 99,062.15	$ 99,718.73	$ 98,323.49
Contingency		item	15.00%		$ 121,878.45	$ 128,895.69	$ 131,850.32	$ 132,219.65	$ 129,388.13	$ 130,373.01	$ 144,161.28	$ 148,593.22	$ 149,578.10	$ 147,485.23
				TOTAL	**$ 1,015,653.74**	**$ 1,074,130.77**	**$ 1,098,752.68**	**$ 1,101,830.42**	**$ 1,078,234.42**	**$ 1,086,441.73**	**$ 1,201,343.97**	**$ 1,238,276.83**	**$ 1,246,484.13**	**$ 1,229,043.61**

IX

JNC_05 New: Greenhalghs Rd and New N-S Rd (South) Signalisation

					Indexation	99	104.7	107.1	107.4	105.1	105.9	117.1	120.7	121.5	119.8
						Revised Scope	Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20	Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**		**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment			$ 10,000.00	1		$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1		$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	1000		$ 4,500.00	$ 4,759.09	$ 4,868.18	$ 4,881.82	$ 4,777.27	$ 4,813.64	$ 5,322.73	$ 5,486.36	$ 5,522.73	$ 5,445.45
	Cut place & Compact and disposal	cu m	$ 35.00	1420		$ 49,700.00	$ 52,561.52	$ 53,766.36	$ 53,916.97	$ 52,762.32	$ 53,163.94	$ 58,786.57	$ 60,593.84	$ 60,995.45	$ 60,142.02
	Swale drain formation	lin m	$ 10.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	sawcut existing Pavement	lin m	$ 7.50	140		$ 1,050.00	$ 1,110.45	$ 1,135.91	$ 1,139.09	$ 1,114.70	$ 1,123.18	$ 1,241.97	$ 1,280.15	$ 1,288.64	$ 1,270.61
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	1095		$ 30,660.00	$ 32,425.27	$ 33,168.55	$ 33,261.45	$ 32,549.15	$ 32,796.91	$ 36,265.52	$ 37,380.42	$ 37,628.18	$ 37,101.70
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	2625		$ 42,000.00	$ 44,418.18	$ 45,436.36	$ 45,563.64	$ 44,587.88	$ 44,927.27	$ 49,678.79	$ 51,206.06	$ 51,545.45	$ 50,824.24
	40mm Base Course Asphalt	sq m	$ 14.00	2625		$ 36,750.00	$ 38,865.91	$ 39,756.82	$ 39,868.18	$ 39,014.39	$ 39,311.36	$ 43,468.94	$ 44,805.30	$ 45,102.27	$ 44,471.21
	Prime coat	sq m	$ 2.00	2625		$ 5,250.00	$ 5,552.27	$ 5,679.55	$ 5,695.45	$ 5,573.48	$ 5,615.91	$ 6,209.85	$ 6,400.76	$ 6,443.18	$ 6,353.03
	180mm Base Course crushed rock	sq m	$ 12.42	2625		$ 32,602.50	$ 34,479.61	$ 35,269.98	$ 35,368.77	$ 34,611.34	$ 34,874.80	$ 38,563.16	$ 39,748.70	$ 40,012.16	$ 39,452.32
	280mm Subbase Course crushed rock	sq m	$ 18.90	2625		$ 49,612.50	$ 52,468.98	$ 53,671.70	$ 53,822.05	$ 52,669.43	$ 53,070.34	$ 58,683.07	$ 60,487.16	$ 60,888.07	$ 60,036.14
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Prime coat	sq m	$ 2.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	875		$ 10,500.00	$ 11,104.55	$ 11,359.09	$ 11,390.91	$ 11,146.97	$ 11,231.82	$ 12,419.70	$ 12,801.52	$ 12,886.36	$ 12,706.06
Kerb & Channel	Type SM2	lin m	$ 40.00	560		$ 22,400.00	$ 23,689.70	$ 24,232.73	$ 24,300.61	$ 23,780.20	$ 23,961.21	$ 26,495.35	$ 27,309.90	$ 27,490.91	$ 27,106.26
Footpath	Concrete	sq m	$ 45.00	860		$ 38,700.00	$ 40,928.18	$ 41,866.36	$ 41,983.64	$ 41,084.55	$ 41,397.27	$ 45,775.45	$ 47,182.73	$ 47,495.45	$ 46,830.91
Concrete Splitter Islands		sq m	$ 75.00	130		$ 9,750.00	$ 10,311.36	$ 10,547.73	$ 10,577.27	$ 10,350.76	$ 10,429.55	$ 11,532.58	$ 11,887.12	$ 11,965.91	$ 11,798.48
Drainage	Subsoil Drains	lin m	$ 18.00	560		$ 10,080.00	$ 10,660.36	$ 10,904.73	$ 10,935.27	$ 10,701.09	$ 10,782.55	$ 11,922.91	$ 12,289.45	$ 12,370.91	$ 12,197.82
	Flush out Risers/outlets	No	$ 590.00	12		$ 7,080.00	$ 7,487.64	$ 7,659.27	$ 7,680.73	$ 7,516.24	$ 7,573.45	$ 8,374.42	$ 8,631.88	$ 8,689.09	$ 8,567.52
	Drainage Pits	No	$ 2,100.00	13		$ 27,300.00	$ 28,871.82	$ 29,533.64	$ 29,616.36	$ 28,982.12	$ 29,202.73	$ 32,291.21	$ 33,283.94	$ 33,504.55	$ 33,035.76
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	275		$ 44,000.00	$ 46,533.33	$ 47,600.00	$ 47,733.33	$ 46,711.11	$ 47,066.67	$ 52,044.44	$ 53,644.44	$ 54,000.00	$ 53,244.44
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	1		$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
	Signage	No	$ 250.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Tactile pavers	No	$ 250.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Street Name Signs	No	$ 200.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	w-Beam barrier	lin m	$ 110.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Nett Gain		No	$ 1,500.00	1		$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
Environmental Management		item	$ 10,000.00	1		$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Traffic Management		item	$ 60,000.00	1		$ 60,000.00	$ 63,454.55	$ 64,909.09	$ 65,090.91	$ 63,696.97	$ 64,181.82	$ 70,969.70	$ 73,151.52	$ 73,636.36	$ 72,606.06
Landscaping		item	$ 25,000.00	1		$ 25,000.00	$ 26,439.39	$ 27,045.45	$ 27,121.21	$ 26,540.40	$ 26,742.42	$ 29,570.71	$ 30,479.80	$ 30,681.82	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	1		$ 198,000.00	$ 209,400.00	$ 214,200.00	$ 214,800.00	$ 210,200.00	$ 211,800.00	$ 234,200.00	$ 241,400.00	$ 243,000.00	$ 239,600.00
	Intersection Signals - T	item	$ 172,500.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	12		$ 42,000.00	$ 44,418.18	$ 45,436.36	$ 45,563.64	$ 44,587.88	$ 44,927.27	$ 49,678.79	$ 51,206.06	$ 51,545.45	$ 50,824.24
	High Pressure Sodium Lantern	item	$ 750.00	12		$ 9,000.00	$ 9,518.18	$ 9,736.36	$ 9,763.64	$ 9,554.55	$ 9,627.27	$ 10,645.45	$ 10,972.73	$ 11,045.45	$ 10,890.91
	Distribution Box	item	$ 5,000.00	1		$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	300		$ 54,000.00	$ 57,109.09	$ 58,418.18	$ 58,581.82	$ 57,327.27	$ 57,763.64	$ 63,872.73	$ 65,836.36	$ 66,272.73	$ 65,345.45
	Electrical pit	No	$ 1,600.00	12		$ 19,200.00	$ 20,305.45	$ 20,770.91	$ 20,829.09	$ 20,383.03	$ 20,538.18	$ 22,710.30	$ 23,408.48	$ 23,563.64	$ 23,233.94
Services Relocating/alteration	Telstra	item	$ 50,000.00	1		$ 50,000.00	$ 52,878.79	$ 54,090.91	$ 54,242.42	$ 53,080.81	$ 53,484.85	$ 59,141.41	$ 60,959.60	$ 61,363.64	$ 60,505.05
	Electrical	item	$ 20,000.00	1		$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Water	item	$ 20,000.00	1		$ 20,000.00	$ 21,151.52	$ 21,636.36	$ 21,696.97	$ 21,232.32	$ 21,393.94	$ 23,656.57	$ 24,383.84	$ 24,545.45	$ 24,202.02
	Other	item	$ -	0		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	1		$ 75,000.00	$ 79,318.18	$ 81,136.36	$ 81,363.64	$ 79,621.21	$ 80,227.27	$ 88,712.12	$ 91,439.39	$ 92,045.45	$ 90,757.58
					Subtotal	$ 1,040,635.00	$ 1,100,550.35	$ 1,125,777.86	$ 1,128,931.30	$ 1,104,754.93	$ 1,113,164.11	$ 1,230,892.51	$ 1,268,733.78	$ 1,277,142.95	$ 1,259,273.46
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%			$ 104,063.50	$ 110,055.03	$ 112,577.79	$ 112,893.13	$ 110,475.49	$ 111,316.41	$ 123,089.25	$ 126,873.38	$ 127,714.30	$ 125,927.35
Contingency		item	15.00%			$ 156,095.25	$ 165,082.55	$ 168,866.68	$ 169,339.70	$ 165,713.24	$ 166,974.62	$ 184,633.88	$ 190,310.07	$ 191,571.44	$ 188,891.02
					TOTAL	**$ 1,300,793.75**	**$ 1,375,687.94**	**$ 1,407,222.33**	**$ 1,411,164.13**	**$ 1,380,943.67**	**$ 1,391,455.13**	**$ 1,538,615.64**	**$ 1,585,917.23**	**$ 1,596,428.69**	**$ 1,574,091.83**

x

APPENDIX L. DI_JNC_05 MEMORANDUM BY MEM DEC 2021

22.12.2021

Memo

To
Chris Duckett

From
Justin Hinch

CC
Lily Garrod

Re
DI_JNC_05 Review

Background

An initial review of the Ballarat West DCP (Urban Enterprise, March 2017) Project DI_JNC_05 at the Greenhalghs Road / New North-South Road (South) intersection has been undertaken with the understanding the adopted roundabout scope is to be changed to a signalised intersection following difficulties in achieving the necessary land acquisition which would facilitate delivering the project promptly.

The task required it is to review concept designs for the signalised intersection, establish a concept that can be achieved within the existing road reserve provisions and/or with land acquisition that is more likely to be achieved, and develop the cost estimates for consideration as part of the DCP update.

The City has internally prepared two (2) concept designs, both of which require land acquisition to the west encroaching on private land at 453 Greenhalghs Road which has no development planned and would ideally be avoided.

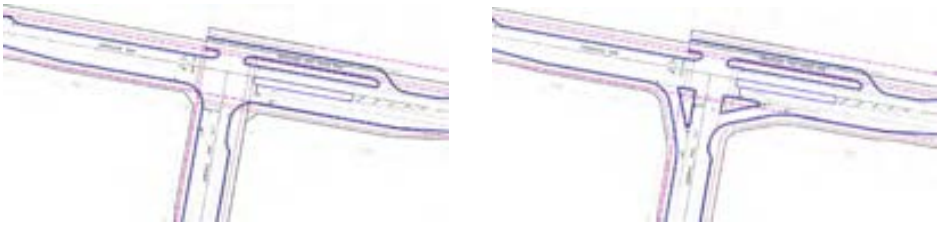


Figure 1 - Signalised intersection concepts

An option to acquire land to the east has been suggested to achieve additional land provision for the intersection, as this land is currently being developed (known as Winterfield South) and may be more practical given the proposed development had shown this area as a court bowl for local lot access. Winterfield's original development proposal included the splays on their land. DCP land projects DI_LA_22 and DI_LA_23 require Winterfield developments to the north and to the south to provide land funded under the DCP for the new North-South Road and Greenhalghs Road widening respectively.

Milward Engineering Management Pty Ltd

T: 0429 080 282
E: justin@milward.com.au
40 Kepler Street
Warrnambool VIC 3280
www.milward.com.au

Figure 2 – Winterfield South development latest plan showing a court bowl and road land provisions

The total project cost in the DCP (2017) for a roundabout was estimated at $1.015M with 42% or $0.427M calculated as the existing / external demand. Indexation of the roundabout cost into 2021 values equates to $1.229M with a 0.516M external contribution required, with a key aim of the design review to keep the cost of any scope changes as close as possible to the original amounts (including indexation).

A review of the cost estimate by the developer (Winterfield / Reeds) calculated the roundabout treatment in November 2020 at $1.938M, an increase of $0.709M (58%).

Traffic Analysis

The DCP is supported by a traffic report (SMEC Australia Pty Ltd, December 2011) that outlines required traffic modelling, refinement of the road hierarchy, preparation of functional layout plans and civil estimates for road and intersection construction components of the work.

The DI_JNC_05 intersection is within Precinct 2: Greenhalghs Road Precinct and proposed as a single lane roundabout at the ‘T’ junction of two ‘link’ roads. Both link roads are expected to accommodate public transport bus routes and provision of bike lanes on-road for Greenhalghs Road and the new North-South Road. A shared path is also proposed in Greenhalghs Road.

Table 1 - Road Classification Summary and Proposed Road Reserve Reservations

	Greenhalghs Road	North-South Road (South)
Road Category	Link	Link
Indicative Traffic	13,000vpd	9,500vpd
Lanes	2	2
Posted Speed Limit	60km/h	60km/h
Bus Route	Yes	Yes
Bike Lane	Yes, on-road	Yes, Copenhagen
Shared Path	Yes	No
Existing Road Reserve Width	20m	N/A
Proposed Road Reserve Width	24m (+4m)	24m

Figure 3 - Ultimate Arrangement - Link Road with On-Road Bicycle Lanes

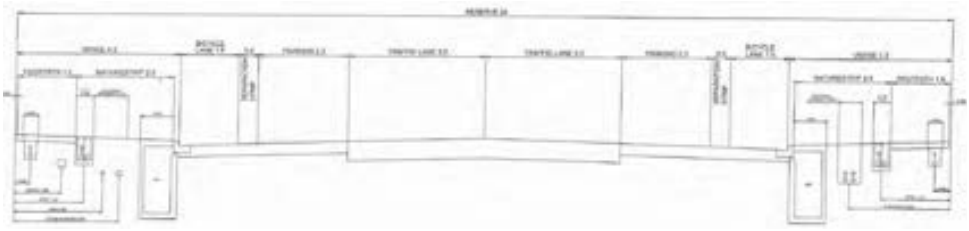
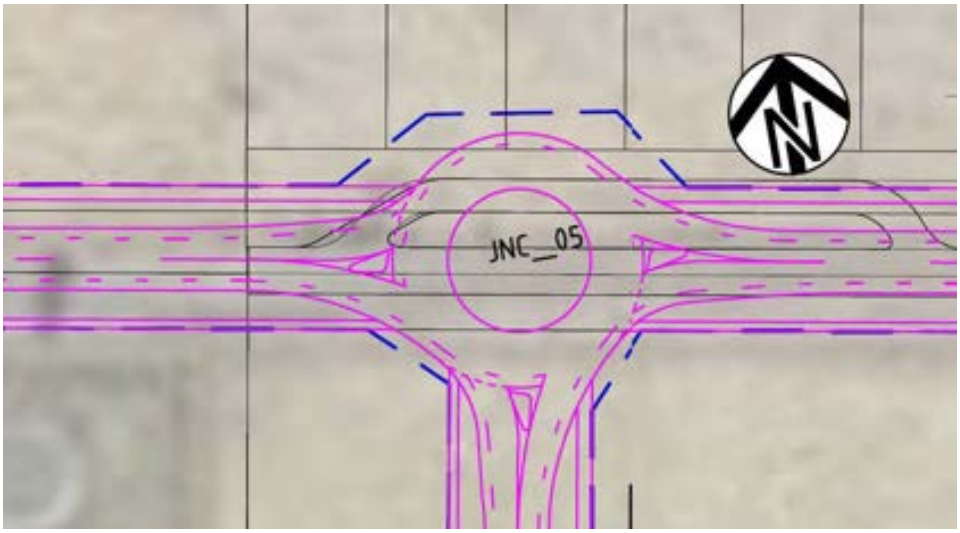


Figure 4 - Ultimate Arrangement - Link Road with Copenhagen Bicycle Lanes

While the traffic report did not specifically include the DI_JNC_05 intersection, analysis, and commentary on similar and/or connected intersections suggest that a single lane roundabout is more than sufficient to meet intersection the performance criteria and as such was adopted.



It is noted that no land acquisition for the intersection was included in the DCP, other than the standard road reserve widening associated with the link roads. It is noted that the concept plan alignment for the North-South Road was offset further east away from the land parcel boundary potentially with the land acquisition challenges in mind, whereas the adopted alignment is hard against the land parcel boundary. Land acquisition to the north boundary of Greenhalghs Road was a significant factor in changing to a signalised intersection, as existing developed lots occupied the proposed land acquisition area which now cannot be achieved.

Land acquisition for Greenhalghs Road (DI_LA_23) also changes from the north-side on the west approach to the new North-South Road to the south-side on the east approach resulting in a constricted land provision for left-hand turns out of the new North-South Road into Greenhalghs Road and an alignment change for the link road at the intersection which are key issues to review.

Design Considerations

- All traffic lanes, including turning lanes and center medians have been adopted the standard lane widths of 3.5m which allows for large vehicles to pass or overtake, without either vehicle having to move sideways towards the outer edge of the lane (Austroads, February 2021) also considered appropriate for urban arterial roads.
- While Copenhagen bicycle lanes have been identified for the North-South Road, this has not been adopted in the design phase, with bicycle lanes now situated between the parking lane and traffic lane as per the Ultimate Arrangement - Link Road with On-Road Bicycle Lanes.
- Diversion tapers for turning lanes assume an operating speed of 60km/h a stop condition taper of 50-55m. This could potentially be reduced to 20-25m through detailed design considering further the urban right-turn movement criteria (Austroads, February 2021).
- Storage length is the greater of either 1) the length of one design turning vehicle; or 2) calculated number of car spaces (minus 1) multiplied by 8.0m or as per SIDRA analysis. Adopted 50m on the west and south approaches (which can accommodate 2 semi-trailer trucks or 6 standard cars). This could potentially be reduced 20-25m through the detailed design once SIDRA analysis is undertaken.
- Due to the length of tapers and vehicle storage required, it is likely that the south approach will need to be designed in conjunction with the subdivisional roads which propose an intersection approximately 70m to the south.
- The median separating existing traffic lanes and service road on Greenhalghs Road is proposed to be narrowed by approximately 0.5-1.0m and vegetation trimmed / removed to achieve desired traffic lane widths and limit diversion of through traffic movements. Even if center medians are reduced to 2.5-3.0m (an absolute minimum) a road safety audit during the detailed design phase is to assess if narrowing can be avoided.
- The existing service road is not able to be truncated to remove access from the intersection, as this would impede access to waste collection services and potentially be problematic for emergency services. Entry to the service road via the western end will remain as an ‘entry only’ with access from all legs / approaches of the intersection. Exit from the service road will remain at the eastern end. Consideration on whether exit

is a ‘left out only’ or vehicles can right-turn into Greenhalghs Road will need road safety criteria applied to design options to determine the appropriate treatment.

- On-street parking provisions will need to be removed along the tapers / approaches to the intersection, reallocating this provision to the additional turning lane. This will have limited impact, with only the residential property on the south-west corner to have no abutting on-street parking but note this is a large lot (1.09ha) and would not need this provision – although may limit future development.
- While land acquisition of the south-west residential property is not being proposed to implement the intersection design, the large / dense vegetation bordering the property may need to be trimmed to achieve best practice sight distance outcomes. As the land will remain privately owned, consultation on this issue should be reviewed once detailed design has been completed and road safety audit undertaken.
- The intersection design generally maintains the existing cross section and functions to the east. This cross section does not formally provide for on-road bicycle lanes for the full length in both directions. The service road will be utilised along with on-road bicycle lanes to achieve suitable provisions. The design includes a recommendation to install an off-road intersection safety treatment at Royal York Road in between the service road connections and would ideally be undertaken in conjunction with intersection and road works.
- The proposed shared path along Greenhalghs Road transitions from a northern boundary alignment, west of the intersection to a southern boundary alignment, east of the intersection and hence provision for the shared path at the crossing locations is required. This is provided on the west side of the intersection, and no provision for pedestrians to cross is proposed on the east side of the intersection to limit the number of conflict points (as the service road would also need a crossing).
- Major drainage is to be installed through the intersection as part of DI_DR_06 works from a basin north-west of the intersection with a 1,200mm diameter outfall heading south along the new North-South Link Road, assumed to be closer to the western boundary (either in the verge or parking lane). Drainage is assumed to connect road pavement areas to this outfall via kerb and channel.

Refer to attached Functional / Concept Plan which proposes the intersection layout and key considerations.

Land Provision

As a result of the design considerations, the south approach deviates off its centered alignment within the 24m road reserve to the east by approximately 3m which would require an additional 217m2 of land acquisition to accommodate the alignment change and intersection splay.

The land required is already proposed as a road reserve for local lot access via a driveway and is not expected to result in any detrimental impact on the access or amenity with the land acquisition not included in the cost estimates.

Coordination of the intersection design with the subdivision design is necessary to coordinate this outcome.

Cost Estimate

It was noted in a preliminary review of the existing roundabout cost estimate used to inform the DCP an allowance for 'Vicroads 10 year Maintenance Fee incl prom & controller' was included. It is understood that this cost would only be applicable to signalised intersections.

In preparing a new cost estimate for a signalised intersection the following was applied:

- Rates and indexation consistent with other DCP signalised intersections
- Descriptions / details of cost items, no new or amended items are included

Scope	Amount
Original DCP Project Cost Estimate 'Roundabout' (Indexed June 2021)	$1,229,043.61
Revised DCP Project Cost Estimate 'Signalised Intersection' (Adopts Original DCP Rates, Indexed June 2021)	$1,574,091.83
Cost Estimate Variance	$345,048.22

Based on the Functional / Concept Plan and adopting the cost estimate rationale from the original DCP it is assessed the signalised intersection treatment would cost $345,048.22 (28%) more than the roundabout treatment.

Noting the DCP cost estimate is indexed from 2012, there are likely various cost increases related to item rates (which the indexation partially mitigates). As a sensitivity assessment of the signalised intersection cost estimate, new item rates have been adopted typically from knowledge of VicRoads cost estimates and tender rates as listed below which provides the 'upper' cost estimate potential.

Item	Original Rate *(Indexed June 2021)*	Revised Rate	% Increase
Site Establishment	$10,000.00	$50,000.00	400%
40mm Profiling & Asphalt Overlay	$33.88/$m^2$	$44.00/$m^2$	30%
40mm Asphalt Wearing Course	$19.36/$m^2$	$35.00/$m^2$	81%
40mm Asphalt Base Course	$16.94/$m^2$	$35.00/$m^2$	107%
180mm Crushed Rock Base Course	$15.03/$m^2$	$19.00/$m^2$	26%
280mm Crushed Rock Subbase Course	$22.87/$m^2$	$28.00/$m^2$	22%
300mm Subgrade Improvement	$14.52/$m^2$	$48.00/$m^2$	231%
Kerb & Channel	$48.40/l.m	$110.00/l.m	127%
Concrete Footpath	$54.45/$m^2$	$125.00/$m^2$	130%
Splitter Islands / Channelised Median	$90.76/$m^2$	$160.00/$m^2$	76%
375mm dia. Drainage Pipe	$193.62/l.m	$260.00/l.m	34%
Traffic Signals – Cross Road	$239,600.00	$250,000.00	4%

Scope	Amount
Revised DCP Project Cost Estimate 'Signalised Intersection' (Adopts Original DCP Rates, Indexed June 2021)	$1,574,091.83
Revised DCP Project Cost Estimate 'Signalised Intersection' (Revised DCP Rates for selected items, Indexed Original DCP Rates for all other items - June 2021)	$1,943,440.44
Cost Estimate Variance	$369,348.61

If a new cost estimate was prepared using 2021 item rates, it is assessed that signalised intersection would cost $369,348.61 (23%) more than the 2021 indexed item rates, noting this sensitivity analysis focused on a selected items only and not the entire cost estimate. It is expected that this 'upper' cost estimate would closer reflect tendered rates.

In assessing the impacts of changing the DCP Project DI_JNC_05 from a roundabout to a signalised intersection, this would cost $714,396.83 (58%) more to deliver. In lieu of a formal DCP review, it is assumed that any additional cost would be considered part of the 'external' liability to fund.

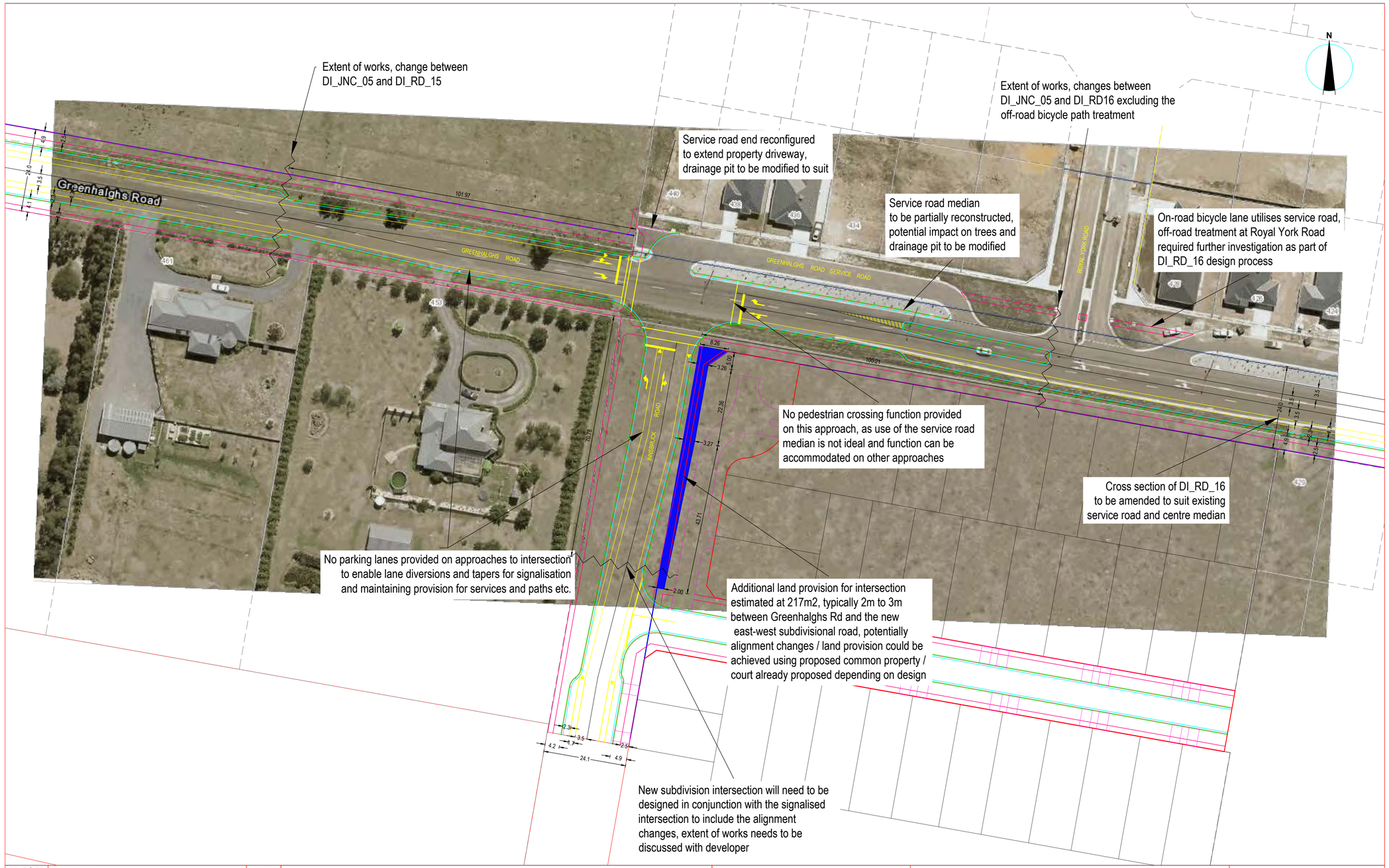
Funding	Original DCP Roundabout *(Indexed June 2021)*	Revised DCP Signalisation *(Indexed June 2021)*	Revised DCP Signalisation *(Revised Item Rates)*
DCP (58%)	$712,845.30	$912,973.26	$1,127,195.46
External (42%)	$516,198.32	$661,118.57	$816,244.99
Total Funding	$1,229,043.62	$1,574,091.83	$1,943,440.45
Funding Liability (External plus DCP shortfall)	$516,198.32	$861,246.53	$1,230,595.15

Conclusion

1. Confirm the Winterfield development is open to redesign of the subdivision roads (i.e. court bowl and intersection) to accommodate the south approach to the signalised intersection, and any terms or conditions.
2. Land acquisition of the Winterfield land is expected to be over a proposed road reserve for local lot access and should not need financial compensation (i.e. DCP funded).
3. Land acquisition of the private residential property on the south-west corner can be avoided but may require some trimming of boundary vegetation to achieve best practice sight distances for the intersection.
4. Reconstruction / narrowing of the service road median is proposed which contains established vegetation to be trimmed / removed but anticipate this would be reviewed once detailed design and road safety audit are completed
5. In assessing the impacts / liability of changing the DCP Project DI_JNC_05 from a roundabout to a signalised intersection, this would cost $715,000 (approximately 60%) more to deliver.
6. The external budget allocation to cover the external demand outlined in the DCP, plus the shortfall between the DCP funding and the increased cost estimate is calculated at $1.23 million.

Attachments

1. Function / Concept Plan
2. Original DCP Cost Estimate & Indexation
3. Revised DCP Scope Cost Estimate & Indexation
4. Revised DCP Scope & Rates Cost Estimate



ISSUE/VER	AMENDMENT	DATE
P2	PEER REVIEW AND ALIGNMENT SHIFT	12/21
P1	PRELIMINARY ISSUE FOR DISCUSSION	10/21

EVERY CARE HAS BEEN TAKEN TO ENSURE THAT THE INFORMATION SHOWN ON THIS DRAWING IS ACCURATE HOWEVER SOME VARIATIONS FROM RECORDS MAY EXIST, AND COMPLETE ACCURACY CANNOT BE GUARANTEED.

PRELIMINARY

1:500 1:1000 — 10 5 0 10 20 — A1 A3

WARNING
THE LOCATION OF UNDERGROUND SERVICES SHOWN IS BASED ON INFORMATION SUPPLIED BY OTHER AUTHORITIES AND SHOULD BE PROVEN ON SITE. ALL WORKS NEAR SERVICES SHALL COMPLY WITH REQUIREMENTS OF RELEVANT AUTHORITY.

CITY OF BALLARAT

GREENHALGHS ROAD AND INNSBRUCK ROAD INTERSECTION FUNCTIONAL DESIGN

CITY OF BALLARAT

SURVEYED	–	–
DRAWN	J.HINCH	12/21
DESIGNED	J.HINCH	12/21
FILE		

CHECKED

COORDINATOR DESIGN & DRAINAGE

APPROVED

EXECUTIVE MANAGER INFRASTRUCTURE

DRAWING NUMBER
2021-X1-SK01

REVISION/ISSUE P2

1 OF 1

JNC_05: Greenhalghs Rd and New N-S Rd (South) Roundabout

			Indexation		99	119.8
					Original	**Jun-21**
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	262.2	$ 1,179.90	$ 1,427.80
	Cut place & Compact and disposal	cu m	$ 35.00	1743.63	$ 61,027.05	$ 73,848.89
	Swale drain formation	lin m	$ 10.00	423	$ 4,230.00	$ 5,118.73
	sawcut existing Pavement	lin m	$ 7.50	0	$ -	$ -
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	0	$ -	$ -
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	0	$ -	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	0	$ -	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	0	$ -	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	0	$ -	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	0	$ -	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	0	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	2241	$ 35,856.00	$ 43,389.38
	40mm Base Course Asphalt	sq m	$ 14.00	2241	$ 31,374.00	$ 37,965.71
	Prime coat	sq m	$ 2.00	2241	$ 4,482.00	$ 5,423.67
	180mm Base Course crushed rock	sq m	$ 12.42	2622	$ 32,565.24	$ 39,407.23
	280mm Subbase Course crushed rock	sq m	$ 18.90	2622	$ 49,555.80	$ 59,967.52
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	2622	$ 31,464.00	$ 38,074.62
Kerb & Channel	Type SM2	lin m	$ 40.00	423	$ 16,920.00	$ 20,474.91
Footpath	Concrete	sq m	$ 45.00	398	$ 17,910.00	$ 21,672.91
Concrete Splitter Islands		sq m	$ 75.00	27	$ 2,025.00	$ 2,450.45
Drainage	Subsoil Drains	lin m	$ 18.00	423	$ 7,614.00	$ 9,213.71
	Flush out Risers/outlets	No	$ 590.00	28	$ 16,520.00	$ 19,990.87
	Drainage Pits	No	$ 2,100.00	25	$ 52,500.00	$ 63,530.30
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00		$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	250	$ 40,000.00	$ 48,404.04
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	95	$ 19,000.00	$ 22,991.92
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00		$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	1	$ 10,000.00	$ 12,101.01
	Signage	No	$ 250.00		$ -	$ -
	Tactile pavers	No	$ 250.00		$ -	$ -
	Street Name Signs	No	$ 200.00		$ -	$ -
	w-Beam barrier	lin m	$ 110.00		$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 12,101.01
Traffic Management		item	$ 60,000.00	1	$ 60,000.00	$ 72,606.06
Landscaping		item	$ 25,000.00	1	$ 25,000.00	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	0	$ -	$ -
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	8	$ 28,000.00	$ 33,882.83
	High Pressure Sodium Lantern	item	$ 750.00	8	$ 6,000.00	$ 7,260.61
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	250	$ 45,000.00	$ 54,454.55
	Electrical pit	No	$ 1,600.00	8	$ 12,800.00	$ 15,489.29
Services Relocating/alteration	Telstra	item	$ 50,000.00	1	$ 50,000.00	$ 60,505.05
	Electrical	item	$ 20,000.00	1	$ 20,000.00	$ 24,202.02
	Water	item	$ 20,000.00	1	$ 20,000.00	$ 24,202.02
	Other	item	$ -		$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	1.00	$ 75,000.00	$ 90,757.58
				Subtotal	$ 812,522.99	$ 983,234.89
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 81,252.30	$ 98,323.49
Contingency		item	15.00%		$ 121,878.45	$ 147,485.23
				TOTAL	**$ 1,015,653.74**	**$ 1,229,043.61**

JNC_05 New: Greenhalghs Rd and New N-S Rd (South) Signalisation

			Indexation		99	119.8
					Revised Scope	Jun-21
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**
Site Establishment			$ 10,000.00	1	$ 10,000.00	$ 12,101.01
Clearing & Grubbing			$ 10,000.00	1	$ 10,000.00	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 4.50	1000	$ 4,500.00	$ 5,445.45
	Cut place & Compact and disposal	cu m	$ 35.00	1420	$ 49,700.00	$ 60,142.02
	Swale drain formation	lin m	$ 10.00	0	$ -	$ -
	sawcut existing Pavement	lin m	$ 7.50	140	$ 1,050.00	$ 1,270.61
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 28.00	1095	$ 30,660.00	$ 37,101.70
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ 13.40	0	$ -	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ 35.00	0	$ -	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ 26.60	0	$ -	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ 7.30	0	$ -	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ 10.10	0	$ -	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ 16.80	0	$ -	$ -
	Construction of Sealed Shoulders	sq m	$ 20.00	0	$ -	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 16.00	2625	$ 42,000.00	$ 50,824.24
	40mm Base Course Asphalt	sq m	$ 14.00	2625	$ 36,750.00	$ 44,471.21
	Prime coat	sq m	$ 2.00	2625	$ 5,250.00	$ 6,353.03
	180mm Base Course crushed rock	sq m	$ 12.42	2625	$ 32,602.50	$ 39,452.32
	280mm Subbase Course crushed rock	sq m	$ 18.90	2625	$ 49,612.50	$ 60,036.14
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ 14.00	0	$ -	$ -
	35mm Base Course Asphalt	sq m	$ 12.25	0	$ -	$ -
	Prime coat	sq m	$ 2.00	0	$ -	$ -
	150mm Base Course crushed rock	sq m	$ 10.35	0	$ -	$ -
	200mm Subbase Course crushed rock	sq m	$ 13.50	0	$ -	$ -
	Subgrade improvement (200mm depth)	sq m	$ 8.00	0	$ -	$ -
	Subgrade improvement (300mm depth)	sq m	$ 12.00	875	$ 10,500.00	$ 12,706.06
Kerb & Channel	Type SM2	lin m	$ 40.00	560	$ 22,400.00	$ 27,106.26
Footpath	Concrete	sq m	$ 45.00	860	$ 38,700.00	$ 46,830.91
Concrete Splitter Islands		sq m	$ 75.00	130	$ 9,750.00	$ 11,798.48
Drainage	Subsoil Drains	lin m	$ 18.00	560	$ 10,080.00	$ 12,197.82
	Flush out Risers/outlets	No	$ 590.00	12	$ 7,080.00	$ 8,567.52
	Drainage Pits	No	$ 2,100.00	13	$ 27,300.00	$ 33,035.76
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ 130.00	0	$ -	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 160.00	275	$ 44,000.00	$ 53,244.44
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ 200.00	0	$ -	$ -
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ 260.00	0	$ -	$ -
Miscellaneous	Line Marking	item	$ 10,000.00	1	$ 10,000.00	$ 12,101.01
	Signage	No	$ 250.00	0	$ -	$ -
	Tactile pavers	No	$ 250.00	0	$ -	$ -
	Street Name Signs	No	$ 200.00	0	$ -	$ -
	w-Beam barrier	lin m	$ 110.00	0	$ -	$ -
Nett Gain		No	$ 1,500.00	1	$ 1,500.00	$ 1,815.15
Environmental Management		item	$ 10,000.00	1	$ 10,000.00	$ 12,101.01
Traffic Management		item	$ 60,000.00	1	$ 60,000.00	$ 72,606.06
Landscaping		item	$ 25,000.00	1	$ 25,000.00	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 198,000.00	1	$ 198,000.00	$ 239,600.00
	Intersection Signals - T	item	$ 172,500.00	0	$ -	$ -
	Intersection Signals - divided cross	item	$ 207,000.00	0	$ -	$ -
	Intersection Signals - divided T	item	$ 184,000.00	0	$ -	$ -
Intersection Lighting	Pole	item	$ 3,500.00	12	$ 42,000.00	$ 50,824.24
	High Pressure Sodium Lantern	item	$ 750.00	12	$ 9,000.00	$ 10,890.91
	Distribution Box	item	$ 5,000.00	1	$ 5,000.00	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 180.00	300	$ 54,000.00	$ 65,345.45
	Electrical pit	No	$ 1,600.00	12	$ 19,200.00	$ 23,233.94
Services Relocating/alteration	Telstra	item	$ 50,000.00	1	$ 50,000.00	$ 60,505.05
	Electrical	item	$ 20,000.00	1	$ 20,000.00	$ 24,202.02
	Water	item	$ 20,000.00	1	$ 20,000.00	$ 24,202.02
	Other	item	$ -	0	$ -	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 75,000.00	1	$ 75,000.00	$ 90,757.58
				Subtotal	$ 1,040,635.00	$ 1,259,273.46
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 104,063.50	$ 125,927.35
Contingency		item	15.00%		$ 156,095.25	$ 188,891.02
				TOTAL	**$ 1,300,793.75**	**$ 1,574,091.83**

JNC_05 New: Greenhalghs Rd and New N-S Rd (South) Signalisation

Revised Scope & Rates

Description	Detail	Unit	Rate	Qty	Amount
Site Establishment			$ 50,000.00	1	$ 50,000.00
Clearing & Grubbing			$ 12,101.01	1	$ 12,101.01
Earth Works	Topsoil strip, stockpile & respread	sq m	$ 5.45	1000	$ 5,445.45
	Cut place & Compact and disposal	cu m	$ 42.35	1420	$ 60,142.02
	Swale drain formation	lin m	$ -	0	$ -
	sawcut existing Pavement	lin m	$ 9.08	140	$ 1,270.61
Pavement	Overlay existing pavement WC Asphalt 40mm, SIZE 14mm TYPE V (PSV56+) ASPHALT Incl Rotormilling	sq m	$ 44.00	1095	$ 48,180.00
VicRoads 740mm deep pavement	40mm, size 14, type V asphalt with C320 binder	sq m	$ -	0	$ -
	105mm, size 20, type SI asphalt with C320 binder	sq m	$ -	0	$ -
	75mm, size 20, type SF asphalt with C320 binder	sq m	$ -	0	$ -
	Base 100mm, SIZE 20 CLASS 2 (E=500MPa)	sq m	$ -	0	$ -
	Lower Base 150mm, SIZE 20 CLASS 3 (E=500MPa)	sq m	$ -	0	$ -
	Lower subbase 270mm, 20mm CLASS 4 FCR	sq m	$ -	0	$ -
	Construction of Sealed Shoulders	sq m	$ -	0	$ -
Council 540mm deep pavement	40mm Wearing Course Asphalt	sq m	$ 35.00	2625	$ 91,875.00
	40mm Base Course Asphalt	sq m	$ 35.00	2625	$ 91,875.00
	Prime coat	sq m	$ 2.42	2625	$ 6,353.03
	180mm Base Course crushed rock	sq m	$ 19.00	2625	$ 49,875.00
	280mm Subbase Course crushed rock	sq m	$ 28.00	2625	$ 73,500.00
Council 420mm deep pavement	35mm Wearing Course Asphalt	sq m	$ -	0	$ -
	35mm Base Course Asphalt	sq m	$ -	0	$ -
	Prime coat	sq m	$ -	0	$ -
	150mm Base Course crushed rock	sq m	$ -	0	$ -
	200mm Subbase Course crushed rock	sq m	$ -	0	$ -
	Subgrade improvement (200mm depth)	sq m	$ -	0	$ -
	Subgrade improvement (300mm depth)	sq m	$ 48.00	875	$ 42,000.00
Kerb & Channel	Type SM2	lin m	$ 110.00	560	$ 61,600.00
Footpath	Concrete	sq m	$ 125.00	860	$ 107,500.00
Concrete Splitter Islands		sq m	$ 160.00	130	$ 20,800.00
Drainage	Subsoil Drains	lin m	$ 21.78	560	$ 12,197.82
	Flush out Risers/outlets	No	$ 713.96	12	$ 8,567.52
	Drainage Pits	No	$ 2,541.21	2	$ 5,082.42
	Drainage Pipe 300mm dia CRB Bk Fill	lin m	$ -	0	$ -
	Drainage Pipe 375mm dia CRB Bk Fill	lin m	$ 260.00	275	$ 71,500.00
	Drainage Pipe 450mm dia CRB Bk Fill	lin m	$ -	0	$ -
	Drainage Pipe 525mm dia CRB Bk Fill	lin m	$ -	0	$ -
Miscellaneous	Line Marking	item	$ 12,101.01	1	$ 12,101.01
	Signage	No	$ -	0	$ -
	Tactile pavers	No	$ -	0	$ -
	Street Name Signs	No	$ -	0	$ -
	w-Beam barrier	lin m	$ -	0	$ -
Nett Gain		No	$ 1,815.15	1	$ 1,815.15
Environmental Management		item	$ 12,101.01	1	$ 12,101.01
Traffic Management		item	$ 72,606.06	1	$ 72,606.06
Landscaping		item	$ 30,252.53	1	$ 30,252.53
Traffic signals	Intersection Signals - cross	item	$ 250,000.00	1	$ 250,000.00
	Intersection Signals - T	item	$ -	0	$ -
	Intersection Signals - divided cross	item	$ -	0	$ -
	Intersection Signals - divided T	item	$ -	0	$ -
Intersection Lighting	Pole	item	$ 4,235.35	12	$ 50,824.24
	High Pressure Sodium Lantern	item	$ 907.58	12	$ 10,890.91
	Distribution Box	item	$ 6,050.51	1	$ 6,050.51
	Lighting Conduit & Cable (incl. trenching)	lin m	$ 217.82	300	$ 65,345.45
	Electrical pit	No	$ 1,936.16	12	$ 23,233.94
Services Relocating/alteration	Telstra	item	$ 60,505.05	1	$ 60,505.05
	Electrical	item	$ 24,202.02	1	$ 24,202.02
	Water	item	$ 24,202.02	1	$ 24,202.02
	Other	item	$ -	0	$ -
Vicroads 10 year Maintenance Fee incl Prom & controller		item	$ 90,757.58	1	$ 90,757.58
				Subtotal	$ 1,554,752.35
Professional Fees	Survey, Geotech, Pavement & Design	item	10.00%		$ 155,475.24
Contingency		item	15.00%		$ 233,212.85
				TOTAL	**$ 1,943,440.44**

XI

APPENDIX M. COST ESTIMATES AND COMPARISONS BETWEEN ORIGINAL PSP AND ACTUAL

Winterfield Estate Stage 11
JNC_08 Intersection - Tender Comparison to Estimate
Updated by COB 22/12/2021

	Council June 2021 Indexation Amount	Council June 2021 Indexation Amount (Revised Quantities)	Reeds Estimate November 2020	Difference Value (red = over-budget)	% Difference (Council 2021 Index. Amount & Reeds Estimate)	Reeds Estimate Excluding non-DCP Items	Winslow Tender Price 30 April 2021	Difference Value (red = over-budget)	% Difference (Council 2021 Index. Amount & Winslow Tender Price)	Winslow Tender Price Excluding non-DCP Items	Comments
R&D Civil Works *(breakdown below)*											
Traffic Management	$21,564.00	$21,564.00	$42,000.00	-$20,436	-95%	$42,000.00	$257,477.62	-$235,914	-1094%	$257,477.62	
Site Establishment	$11,980.00	$11,980.00	$41,500.00	-$29,520	-246%	$41,500.00	$107,711.28	-$95,731	-799%	$107,711.28	
Earthworks	$149,576.35	$143,298.83	$31,164.10	$118,412	79%	$31,164.10	$379,092.64	-$229,516	-153%	$379,092.64	
Pavement	$377,769.37	$979,465.63	$1,110,050.00	-$732,281	-194%	$1,110,050.00	$1,126,123.72	-$748,354	-198%	$1,126,123.72	
Concrete Works (Kerb, Footpath)	$82,530.22	$112,671.90	$127,250.00	-$44,720	-54%	$127,250.00	$154,110.60	-$71,580	-87%	$154,110.60	
Drainage	$108,050.02	$117,763.40	$123,940.00	-$15,890	-15%	$123,940.00	$151,077.81	-$43,028	-40%	$151,077.81	
Ancillaries	$25,757.00	$25,757.00	$22,500.00	$3,257	13%	$22,500.00	$51,379.21	-$25,622	-99%	$51,379.21	
Electrical Conduits	$0.00	$0.00	$30,000.00	-$30,000		$0.00	$28,707.61	-$28,708			Not in DCP scope
Electrical Reticulation	$94,402.40	$94,402.40	$51,800.00	$42,602	45%	$51,800.00	$50,000.00	$44,402	47%	$50,000.00	
Retaining Walls	$0.00	$0.00	$0.00	$0		$0.00	$75,000.00	-$75,000			Not in DCP scope
Service Relocations											
Telstra	$59,900.00	$59,900.00	$50,000.00	$9,900	17%	$50,000.00	$50,000.00	$9,900	17%	$50,000.00	
Electrical	$23,960.00	$23,960.00	$20,000.00	$3,960	17%	$20,000.00	$20,000.00	$3,960	17%	$20,000.00	
Water	$23,960.00	$23,960.00	$20,000.00	$3,960	17%	$20,000.00	$348,743.80	-$324,784	-1356%	$348,743.80	
New Water Main	$0.00	$0.00	$0.00	$0		$0.00	$106,093.20	-$106,093			Not in DCP scope
SUB-TOTAL CONSTRUCTION	**$979,449.36**	**$1,614,723.16**	**$1,670,204.10**	-$690,755	-71%	**$1,640,204.10**	**$2,905,517.49**	-$1,926,068	-197%	**$2,695,716.68**	
Professional Fees (10%)	$97,944.94	$161,472.32	$167,020.41	-$69,075	-71%	$164,020.41	$290,551.75	-$192,607	-197%	$269,571.67	
Contingency	$146,917.40	$242,208.47	$250,530.62	-$103,613	-71%	$246,030.62	$75,510.00	$71,407	49%	$134,785.83	Increase Tender Contingency to 5%
TOTAL	**$1,224,311.70**	**$2,018,403.95**	**$2,087,755.13**	**-$863,443**	-71%	**$2,050,255.13**	**$3,271,579.24**	-$2,047,268	-167%	**$3,100,074.18**	

DCP Cost Estimate Variation (Amount)	$0.00	$794,092.25	$863,443.43			$825,943.43	$2,047,267.54			$1,875,762.48
DCP Cost Estimate Variation (%)	0	65%	71%			67%	167%			153%
Funding										
DCP (45%)	$550,940.26	$908,281.78	$939,489.81			$922,614.81	$1,472,210.66			$1,395,033.38
External (55%)	$673,371.43	$1,110,122.17	$1,148,265.32			$1,127,640.32	$1,799,368.58			$1,705,040.80
External Liability (includes DCP shortfall)	$673,371.43	$1,467,463.69	$1,536,814.86			$1,499,314.86	$2,720,638.97			$2,549,133.92
Increase in External Liability (%)	0%	53%	58%			55%	137%			125%

APPENDIX N. ORIGINAL AND REVISED COST ESTIMATES FOR CHERRY FLAT ROAD (DI_RD_21)

RD_21 Cherry Flat Road **Original length - 190 m**

Road Type: Arterial	**Between: Schreenans Rd - Bells Rd**					99	104.7	107.1	107.4	105.1	105.9	117.1	**120.7**	121.5	**119.8**
							Jun-13	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**		**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00		$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Upgrade Existing		item	$ 344,062.91	1	$ 344,062.91		$ 363,872.59	$ 372,213.51	$ 373,256.12	$ 365,262.74	$ 368,043.05	$ 406,967.34	$ 419,478.72	$ 422,259.02	$ 416,350.87
Line Marking		lin m	$ 15.00	190	$ 2,850.00		$ 3,014.09	$ 3,083.18	$ 3,091.82	$ 3,025.61	$ 3,048.64	$ 3,371.06	$ 3,474.70	$ 3,497.73	$ 3,448.79
Miscellaneous	Signage	No	$ 35.00	190	$ 6,650.00		$ 7,032.88	$ 7,194.09	$ 7,214.24	$ 7,059.75	$ 7,113.48	$ 7,865.81	$ 8,107.63	$ 8,161.36	$ 8,047.17
	Tactile pavers	No	$ 250.00	6	$ 1,500.00		$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
	Drainage	item	$ 250.00	190	$ 47,500.00		$ 50,234.85	$ 51,386.36	$ 51,530.30	$ 50,426.77	$ 50,810.61	$ 56,184.34	$ 57,911.62	$ 58,295.45	$ 57,479.80
	Excavation of rock	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Box Culvert Crossing	m2	$ 3,600.00	50	$ 180,000.00		$ 190,363.64	$ 194,727.27	$ 195,272.73	$ 191,090.91	$ 192,545.45	$ 212,909.09	$ 219,454.55	$ 220,909.09	$ 217,818.18
Environmental Management		item	$ 5,000.00	1	$ 5,000.00		$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 17,203.15	1	$ 17,203.15		$ 18,193.63	$ 18,610.68	$ 18,662.81	$ 18,263.14	$ 18,402.15	$ 20,348.37	$ 20,973.94	$ 21,112.95	$ 20,817.54
Landscaping		lin m	$ 50.00	190	$ 9,500.00		$ 10,046.97	$ 10,277.27	$ 10,306.06	$ 10,085.35	$ 10,162.12	$ 11,236.87	$ 11,582.32	$ 11,659.09	$ 11,495.96
Lighting		lin m	$ 150.00	190	$ 28,500.00		$ 30,140.91	$ 30,831.82	$ 30,918.18	$ 30,256.06	$ 30,486.36	$ 33,710.61	$ 34,746.97	$ 34,977.27	$ 34,487.88
Services Relocating/alteration	Electrical	item			$ -		$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -		$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -		$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -		$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 652,766.05		$ 690,349.55	$ 706,174.19	$ 708,152.26	$ 692,986.99	$ 698,261.87	$ 772,110.15	$ 795,847.10	$ 801,121.97	$ 789,912.86
							$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 65,276.61		$ 69,034.96	$ 70,617.42	$ 70,815.23	$ 69,298.70	$ 69,826.19	$ 77,211.01	$ 79,584.71	$ 80,112.20	$ 78,991.29
Contingency		item	15%	1	$ 97,914.91		$ 103,552.43	$ 105,926.13	$ 106,222.84	$ 103,948.05	$ 104,739.28	$ 115,816.52	$ 119,377.06	$ 120,168.30	$ 118,486.93
				TOTAL	**$ 815,957.57**		**$ 862,936.94**	**$ 882,717.73**	**$ 885,190.33**	**$ 866,233.74**	**$ 872,827.34**	**$ 965,137.69**	**$ 994,808.87**	**$ 1,001,402.47**	**$ 987,391.08**

Road Type: Arterial **Between: Schreenans Rd - Bells Rd** **Revised length - 750 m**

						Jun-13	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Upgrade Existing		item	$ 1,358,143.06	1	$ 1,358,143.06	$1,436,339.17	$1,469,263.85	$ 1,473,379.44	$ 1,441,826.62	$1,452,801.51	$ 1,606,450.02	$ 1,655,837.04	$ 1,666,811.93	$ 1,643,490.29
Line Marking		lin m	$ 15.00	750	$ 11,250.00	$ 11,897.73	$ 12,170.45	$ 12,204.55	$ 11,943.18	$ 12,034.09	$ 13,306.82	$ 13,715.91	$ 13,806.82	$ 13,613.64
Miscellaneous	Signage	No	$ 35.00	750	$ 26,250.00	$ 27,761.36	$ 28,397.73	$ 28,477.27	$ 27,867.42	$ 28,079.55	$ 31,049.24	$ 32,003.79	$ 32,215.91	$ 31,765.15
	Tactile pavers	No	$ 250.00	6	$ 1,500.00	$ 1,586.36	$ 1,622.73	$ 1,627.27	$ 1,592.42	$ 1,604.55	$ 1,774.24	$ 1,828.79	$ 1,840.91	$ 1,815.15
	Drainage	item	$ 250.00	750	$ 187,500.00	$ 198,295.45	$ 202,840.91	$ 203,409.09	$ 199,053.03	$ 200,568.18	$ 221,780.30	$ 228,598.48	$ 230,113.64	$ 226,893.94
	Excavation of rock	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Box Culvert Crossing	m2	$ 3,600.00	150	$ 540,000.00	$ 571,090.91	$ 584,181.82	$ 585,818.18	$ 573,272.73	$ 577,636.36	$ 638,727.27	$ 658,363.64	$ 662,727.27	$ 653,454.55
Environmental Management		item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 67,907.15	1	$ 67,907.15	$ 71,816.96	$ 73,463.19	$ 73,668.97	$ 72,091.33	$ 72,640.08	$ 80,322.50	$ 82,791.85	$ 83,340.60	$ 82,174.51
Landscaping		lin m	$ 50.00	750	$ 37,500.00	$ 39,659.09	$ 40,568.18	$ 40,681.82	$ 39,810.61	$ 40,113.64	$ 44,356.06	$ 45,719.70	$ 46,022.73	$ 45,378.79
Lighting		lin m	$ 150.00	750	$ 112,500.00	$ 118,977.27	$ 121,704.55	$ 122,045.45	$ 119,431.82	$ 120,340.91	$ 133,068.18	$ 137,159.09	$ 138,068.18	$ 136,136.36
Services Relocating/alteration	Electrical	item			$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 2,357,550.21	$2,493,287.95	$2,550,440.68	$ 2,557,584.77	$ 2,502,813.41	$2,521,864.32	$ 2,788,577.07	$ 2,874,306.17	$ 2,893,357.08	$ 2,852,873.89
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 235,755.02	$ 249,328.80	$ 255,044.07	$ 255,758.48	$ 250,281.34	$ 252,186.43	$ 278,857.71	$ 287,430.62	$ 289,335.71	$ 285,287.39
Contingency		item	15%	1	$ 353,632.53	$ 373,993.19	$ 382,566.10	$ 383,637.72	$ 375,422.01	$ 378,279.65	$ 418,286.56	$ 431,145.92	$ 434,003.56	$ 427,931.08
				TOTAL	**$ 2,946,937.76**	**$3,116,609.94**	**$3,188,050.85**	**$ 3,196,980.97**	**$ 3,128,516.76**	**$3,152,330.40**	**$ 3,485,721.33**	**$ 3,592,882.71**	**$ 3,616,696.35**	**$ 3,566,092.36**

APPENDIX O. ESTIMATIONS FOR ALTERNATIVE BONSHAW CREEK CROSSING VIA JOSES LANE (DI_RD_31C)

Original Alignment

RD_31 Schreenans Lane (E-W) — **Base Year**

Road Type: Link 2 — **Between: Ross Creek Rd - Cherry Flat Rd**

						99	104.7	107.1	107.4	105.1	105.9	117.1	**120.7**	**121.5**	**119.8**
							Jun-13	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**		**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00		$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Extension		item	$ 1,826,957.93	1	$ 1,826,957.93		$ 1,932,146.41	$ 1,976,436.30	$ 1,981,972.54	$ 1,939,528.06	$ 1,954,291.36	$ 2,160,977.51	$ 2,227,412.34	$ 2,242,175.64	$ 2,210,803.63
Line Marking		lin m	$ 15.00	1305	$ 19,575.00		$ 20,702.05	$ 21,176.59	$ 21,235.91	$ 20,781.14	$ 20,939.32	$ 23,153.86	$ 23,865.68	$ 24,023.86	$ 23,687.73
Miscellaneous	Signage	No	$ 35.00	1305	$ 45,675.00		$ 48,304.77	$ 49,412.05	$ 49,550.45	$ 48,489.32	$ 48,858.41	$ 54,025.68	$ 55,686.59	$ 56,055.68	$ 55,271.36
	Tactile pavers	No	$ 250.00	10	$ 2,500.00		$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
	Drainage	item	$ 250.00	1305	$ 326,250.00		$ 345,034.09	$ 352,943.18	$ 353,931.82	$ 346,352.27	$ 348,988.64	$ 385,897.73	$ 397,761.36	$ 400,397.73	$ 394,795.45
	Excavation of rock	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Environmental Management		item	$ 5,000.00	1	$ 5,000.00		$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 91,347.90	1	$ 91,347.90		$ 96,607.32	$ 98,821.82	$ 99,098.63	$ 96,976.40	$ 97,714.57	$ 108,048.88	$ 111,370.62	$ 112,108.78	$ 110,540.18
Landscaping		lin m	$ 50.00	1305	$ 65,250.00		$ 69,006.82	$ 70,588.64	$ 70,786.36	$ 69,270.45	$ 69,797.73	$ 77,179.55	$ 79,552.27	$ 80,079.55	$ 78,959.09
Lighting		lin m	$ 150.00	1305	$ 195,750.00		$ 207,020.45	$ 211,765.91	$ 212,359.09	$ 207,811.36	$ 209,393.18	$ 231,538.64	$ 238,656.82	$ 240,238.64	$ 236,877.27
Services Relocating/alteration	Electrical	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 2,588,305.82		$ 2,737,329.49	$ 2,800,076.30	$ 2,807,919.65	$ 2,747,787.29	$ 2,768,702.90	$ 3,061,521.33	$ 3,155,641.54	$ 3,176,557.15	$ 3,132,111.49
Bridge Structure		item	$ 8,400,000	**1**	$ 8,400,000.00		$ 8,883,636.36	$ 9,087,272.73	$ 9,112,727.27	$ 8,917,575.76	$ 8,985,454.55	$ 9,935,757.58	$ 10,241,212.12	$ 10,309,090.91	$ 10,164,848.48
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 258,830.58		$ 273,732.95	$ 280,007.63	$ 280,791.97	$ 274,778.73	$ 276,870.29	$ 306,152.13	$ 315,564.15	$ 317,655.71	$ 313,211.15
Contingency		item	15%	1	$ 388,245.87		$ 410,599.42	$ 420,011.44	$ 421,187.95	$ 412,168.09	$ 415,305.43	$ 459,228.20	$ 473,346.23	$ 476,483.57	$ 469,816.72
				TOTAL	**$ 11,635,382.28**		**$ 12,305,298.23**	**$ 12,587,368.10**	**$ 12,622,626.84**	**$ 12,352,309.87**	**$ 12,446,333.17**	**$ 13,762,659.24**	**$ 14,185,764.05**	**$ 14,279,787.34**	**$ 14,079,987.85**
						$ 8,916.00	$ 9,429.35	$ 9,645.49	$ 9,672.51	$ 9,465.37	$ 9,537.42	$ 10,546.10	$ 10,870.32	$ 10,942.37	$ 10,789.26

							Jun-13	**Jun-14**	**Jun-15**	**Jul-16**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**
Section	**Length**	**%**	**Road Cost**	**Bridge Cost**	**SubTotal**	**Prof fees**	**Contingency**	**TOTAL COST**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Cherry Flat Rd - Webbs Rd	440	34%	$ 872,685.49	0	$ 872,685.49	$ 87,268.55	$ 130,902.82	$ 1,090,856.86	$ 1,153,663.77	$ 1,180,108.79	$ 1,183,414.41	$ 1,158,071.27	$ 1,166,886.28	$ 1,290,296.35	$ 1,329,963.87	$ 1,338,778.87	$ 1,320,046.99
Webbs Rd - Bridge	340	26%	$ 674,347.88	0	$ 674,347.88	$ 67,434.79	$ 101,152.18	$ 842,934.85	$ 891,467.46	$ 911,902.24	$ 914,456.59	$ 894,873.26	$ 901,684.85	$ 997,047.18	$ 1,027,699.35	$ 1,034,510.95	$ 1,020,036.31
Bridge	208	16%	$ 412,542.23	$ 8,400,000.00	$ 8,812,542.23	$ 41,254.22	$ 61,881.33	$ 8,915,677.79	$ 9,429,004.69	$ 9,645,142.33	$ 9,672,159.54	$ 9,465,027.63	$ 9,537,073.51	$ 10,545,715.85	$ 10,869,922.31	$ 10,941,968.19	$ 10,788,870.70
Bridge - Ross Creek Rd	317	24%	$ 628,730.23	0	$ 628,730.23	$ 62,873.02	$ 94,309.53	$ 785,912.78	$ 831,162.31	$ 850,214.74	$ 852,596.29	$ 834,337.71	$ 840,688.52	$ 929,599.87	$ 958,178.51	$ 964,529.33	$ 951,033.85
TOTAL	1305	1	$ 2,588,305.82	$ 8,400,000.00	$ 10,988,305.82	$ 258,830.58	$ 388,245.87	**$ 11,635,382.28**	**$ 12,305,298.23**	**$ 12,587,368.10**	**$ 12,622,626.84**	**$ 12,352,309.87**	**$ 12,446,333.17**	**$ 13,762,659.24**	**$ 14,185,764.05**	**$ 14,279,787.34**	**$ 14,079,987.85**

Joses Lane Alignment

Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Extension		item	$ 2,197,949.38	1	$ 2,197,949.38	$ 2,324,497.98	$ 2,377,781.61	$ 2,384,442.06	$ 2,333,378.59	$ 2,351,139.79	$ 2,599,796.69	$ 2,679,722.13	$ 2,697,483.33	$ 2,659,740.77
Line Marking		lin m	$ 15.00	1570	$ 23,550.00	$ 24,905.91	$ 25,476.82	$ 25,548.18	$ 25,001.06	$ 25,191.36	$ 27,855.61	$ 28,711.97	$ 28,902.27	$ 28,497.88
Miscellaneous	Signage	No	$ 35.00	1570	$ 54,950.00	$ 58,113.79	$ 59,445.91	$ 59,612.42	$ 58,335.81	$ 58,779.85	$ 64,996.41	$ 66,994.60	$ 67,438.64	$ 66,495.05
	Tactile pavers	No	$ 250.00	10	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
	Drainage	item	$ 250.00	1570	$ 392,500.00	$ 415,098.48	$ 424,613.64	$ 425,803.03	$ 416,684.34	$ 419,856.06	$ 464,260.10	$ 478,532.83	$ 481,704.55	$ 474,964.65
	Excavation of rock	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Environmental Management		item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 109,897.47	1	$ 109,897.47	$ 116,224.90	$ 118,889.08	$ 119,222.10	$ 116,668.93	$ 117,556.99	$ 129,989.83	$ 133,986.11	$ 134,874.17	$ 132,987.04
Landscaping		lin m	$ 50.00	1570	$ 78,500.00	$ 83,019.70	$ 84,922.73	$ 85,160.61	$ 83,336.87	$ 83,971.21	$ 92,852.02	$ 95,706.57	$ 96,340.91	$ 94,992.93
Lighting		lin m	$ 150.00	1570	$ 235,500.00	$ 249,059.09	$ 254,768.18	$ 255,481.82	$ 250,010.61	$ 251,913.64	$ 278,556.06	$ 287,119.70	$ 289,022.73	$ 284,978.79
Services Relocating/alteration	Electrical	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 3,110,346.85	$ 3,289,427.43	$ 3,364,829.78	$ 3,374,255.07	$ 3,301,994.49	$ 3,327,128.60	$ 3,679,006.23	$ 3,792,109.75	$ 3,817,243.86	$ 3,763,833.87
Bridge Structure		item	$ 8,400,000	**1**	$ 8,400,000.00	$ 8,883,636.36	$ 9,087,272.73	$ 9,112,727.27	$ 8,917,575.76	$ 8,985,454.55	$ 9,935,757.58	$ 10,241,212.12	$ 10,309,090.91	$ 10,164,848.48
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 311,034.69	$ 328,942.74	$ 336,482.98	$ 337,425.51	$ 330,199.45	$ 332,712.86	$ 367,900.62	$ 379,210.97	$ 381,724.39	$ 376,383.39
Contingency		item	15%	1	$ 466,552.03	$ 493,414.11	$ 504,724.47	$ 506,138.26	$ 495,299.17	$ 499,069.29	$ 551,850.93	$ 568,816.46	$ 572,586.58	$ 564,575.08
				TOTAL	**$ 12,287,933.57**	**$ 12,995,420.65**	**$ 13,293,309.95**	**$ 13,330,546.11**	**$ 13,045,068.87**	**$ 13,144,365.30**	**$ 14,534,515.36**	**$ 14,981,349.31**	**$ 15,080,645.74**	**$ 14,869,640.82**
					$ 9,416.04	$ 9,958.18	$ 10,186.44	$ 10,214.98	$ 9,996.22	$ 10,072.31	$ 11,137.56	$ 11,479.96	$ 11,556.05	$ 11,394.36

Section	**Length**	**%**	**Road Cost**	**Bridge Cost**	**SubTotal**	**Prof fees**	**Contingency**	**TOTAL COST**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Cherry Flat Rd - Webbs Rd	440	28%	$ 871,689.56	$ -	$ 871,689.56	$ 87,168.96	$ 130,753.43	$ 1,089,611.95	$ 1,152,347.19	$ 1,178,762.02	$ 1,182,063.88	$ 1,156,749.66	$ 1,165,554.61	$ 1,288,823.84	$ 1,328,446.09	$ 1,337,251.04	$ 1,318,540.53
Webbs Rd - Schreenans - Joses Lane	1130	72%	$ 2,238,657.29	$ 665,000.00	$ 2,903,657.29	$ 223,865.73	$ 335,798.59	$ 3,463,321.61	$ 3,662,724.98	$ 3,746,684.29	$ 3,757,179.20	$ 3,676,718.19	$ 3,704,704.63	$ 4,096,514.75	$ 4,222,453.72	$ 4,250,440.16	$ 4,190,968.98
Cobben St realignment	470	100%	$ 314,375.00	$ -	$ 314,375.00	$ 31,437.50	$ 47,156.25	$ 392,968.75	$ 415,594.22	$ 425,120.74	$ 426,311.55	$ 417,181.98	$ 420,357.48	$ 464,814.55	$ 479,104.32	$ 482,279.83	$ 475,531.88
Ross Creek/Joses Lane Roundabout		100%	$ 751,695.77	$ -	$ 751,695.77	$ 75,169.58	$ 112,754.36	$ 939,619.71	$ 993,719.02	$ 1,016,497.68	$ 1,019,345.01	$ 997,515.47	$ 1,005,108.35	$ 1,111,408.76	$ 1,145,576.75	$ 1,153,169.64	$ 1,137,034.76
TOTAL	1570		$ 4,176,417.62	$ 665,000.00	$ 4,841,417.62	$ 417,641.76	$ 626,462.64	**$ 5,885,522.02**	**$ 6,224,385.41**	**$ 6,367,064.73**	**$ 6,384,899.65**	**$ 6,248,165.30**	**$ 6,295,725.07**	**$ 6,961,561.91**	**$ 7,175,580.89**	**$ 7,223,140.66**	**$ 7,122,076.14**

Bridge cost estimated using cost estimation for a replacement 3 cell (3.05 x 2.04 x 19 m) box culvert structure to built in Golden Plains Shire

APPENDIX P. ORIGINAL AND REVISED COST ESTIMATES FOR ROSS CREEK ROAD UPGRADE (DI_RD_38 & DI_RD_39)

RD_38 Ross Creek Road

Road Type: Link 2 **Between: Bells Rd - DI_JNC_12 (Realigned Cobden St)**

						99	104.7	107.1	107.4	105.1	105.9	117.1	**120.7**	**121.5**	119.8
							Jun-13	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**		**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00		$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Upgrade Existing		item	$ 1,596,290.15	1	$ 1,596,290.15		$1,688,197.77	$1,726,895.71	$ 1,731,732.96	$1,694,647.43	$ 1,707,546.74	$ 1,888,137.14	$ 1,946,184.06	$ 1,959,083.37	$ 1,931,672.33
Line Marking		lin m	$ 15.00	850	$ 12,750.00		$ 13,484.09	$ 13,793.18	$ 13,831.82	$ 13,535.61	$ 13,638.64	$ 15,081.06	$ 15,544.70	$ 15,647.73	$ 15,428.79
Miscellaneous	Signage	No	$ 35.00	850	$ 29,750.00		$ 31,462.88	$ 32,184.09	$ 32,274.24	$ 31,583.08	$ 31,823.48	$ 35,189.14	$ 36,270.96	$ 36,511.36	$ 36,000.51
	Tactile pavers	No	$ 250.00	8	$ 2,000.00		$ 2,115.15	$ 2,163.64	$ 2,169.70	$ 2,123.23	$ 2,139.39	$ 2,365.66	$ 2,438.38	$ 2,454.55	$ 2,420.20
	Drainage	item	$ 250.00	850	$ 212,500.00		$ 224,734.85	$ 229,886.36	$ 230,530.30	$ 225,593.43	$ 227,310.61	$ 251,351.01	$ 259,078.28	$ 260,795.45	$ 257,146.46
	Excavation of rock	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Environmental Management		item	$ 5,000.00	1	$ 5,000.00		$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 79,814.51	1	$ 79,814.51		$ 84,409.89	$ 86,344.79	$ 86,586.65	$ 84,732.37	$ 85,377.34	$ 94,406.86	$ 97,309.20	$ 97,954.17	$ 96,583.62
Landscaping		lin m	$ 50.00	850	$ 42,500.00		$ 44,946.97	$ 45,977.27	$ 46,106.06	$ 45,118.69	$ 45,462.12	$ 50,270.20	$ 51,815.66	$ 52,159.09	$ 51,429.29
Lighting		lin m	$ 150.00	850	$ 127,500.00		$ 134,840.91	$ 137,931.82	$ 138,318.18	$ 135,356.06	$ 136,386.36	$ 150,810.61	$ 155,446.97	$ 156,477.27	$ 154,287.88
Services Relocating/alteration	Electrical	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 2,118,104.66		$2,240,056.14	$2,291,404.13	$ 2,297,822.63	$ 2,248,614.14	$ 2,265,730.14	$ 2,505,354.10	$ 2,582,376.09	$ 2,599,492.09	$ 2,563,120.59
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 211,810.47		$ 224,005.61	$ 229,140.41	$ 229,782.26	$ 224,861.41	$ 226,573.01	$ 250,535.41	$ 258,237.61	$ 259,949.21	$ 256,312.06
Contingency		item	15%	1	$ 317,715.70		$ 336,008.42	$ 343,710.62	$ 344,673.40	$ 337,292.12	$ 339,859.52	$ 375,803.12	$ 387,356.41	$ 389,923.81	$ 384,468.09
				TOTAL	**$ 2,647,630.83**		**$2,800,070.18**	**$2,864,255.17**	**$ 2,872,278.29**	**$ 2,810,767.68**	**$ 2,832,162.67**	**$ 3,131,692.63**	**$ 3,227,970.11**	**$ 3,249,365.11**	**$ 3,203,900.74**
						$ 3,114.86	$ 3,294.20	$ 3,369.71	$ 3,379.15	$ 3,306.79	$ 3,331.96	$ 3,684.34	$ 3,797.61	$ 3,822.78	$ 3,769.29

Road Type: Link 3 **Between: Bells Rd - DI_JNC_12 (Realigned Cobden St)**

Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Upgrade Existing		item	$ 1,720,697.50	1	$ 1,720,697.50	$1,819,767.96	$1,861,481.84	$ 1,866,696.08	$ 1,826,720.28	$ 1,840,624.90	$ 2,035,289.67	$ 2,097,860.49	$ 2,111,765.11	$ 2,082,217.78
Line Marking		lin m	$ 15.00	850	$ 12,750.00	$ 13,484.09	$ 13,793.18	$ 13,831.82	$ 13,535.61	$ 13,638.64	$ 15,081.06	$ 15,544.70	$ 15,647.73	$ 15,428.79
Miscellaneous	Signage	No	$ 35.00	850	$ 29,750.00	$ 31,462.88	$ 32,184.09	$ 32,274.24	$ 31,583.08	$ 31,823.48	$ 35,189.14	$ 36,270.96	$ 36,511.36	$ 36,000.51
	Tactile pavers	No	$ 250.00	8	$ 2,000.00	$ 2,115.15	$ 2,163.64	$ 2,169.70	$ 2,123.23	$ 2,139.39	$ 2,365.66	$ 2,438.38	$ 2,454.55	$ 2,420.20
	Drainage	item	$ 250.00	850	$ 212,500.00	$ 224,734.85	$ 229,886.36	$ 230,530.30	$ 225,593.43	$ 227,310.61	$ 251,351.01	$ 259,078.28	$ 260,795.45	$ 257,146.46
	Excavation of rock	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Environmental Management		item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 86,034.88	1	$ 86,034.88	$ 90,988.40	$ 93,074.09	$ 93,334.80	$ 91,336.01	$ 92,031.25	$ 101,764.48	$ 104,893.02	$ 105,588.26	$ 104,110.89
Landscaping		lin m	$ 50.00	850	$ 42,500.00	$ 44,946.97	$ 45,977.27	$ 46,106.06	$ 45,118.69	$ 45,462.12	$ 50,270.20	$ 51,815.66	$ 52,159.09	$ 51,429.29
Lighting		lin m	$ 150.00	850	$ 127,500.00	$ 134,840.91	$ 137,931.82	$ 138,318.18	$ 135,356.06	$ 136,386.36	$ 150,810.61	$ 155,446.97	$ 156,477.27	$ 154,287.88
Services Relocating/alteration	Electrical	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 2,248,732.38	$2,378,204.85	$2,432,719.57	$ 2,439,533.91	$ 2,387,290.63	$ 2,405,462.21	$ 2,659,864.25	$ 2,741,636.34	$ 2,759,807.91	$ 2,721,193.32
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 224,873.24	$ 237,820.48	$ 243,271.96	$ 243,953.39	$ 238,729.06	$ 240,546.22	$ 265,986.43	$ 274,163.63	$ 275,980.79	$ 272,119.33
Contingency		item	15%	1	$ 337,309.86	$ 356,730.73	$ 364,907.94	$ 365,930.09	$ 358,093.59	$ 360,819.33	$ 398,979.64	$ 411,245.45	$ 413,971.19	$ 408,179.00
				TOTAL	**$ 2,810,915.47**	**$2,972,756.06**	**$3,040,899.46**	**$ 3,049,417.39**	**$ 2,984,113.29**	**$ 3,006,827.76**	**$ 3,324,830.32**	**$ 3,427,045.43**	**$ 3,449,759.89**	**$ 3,401,491.65**
					$ 3,306.96	$ 3,497.36	$ 3,577.53	$ 3,587.55	$ 3,510.72	$ 3,537.44	$ 3,911.57	$ 4,031.82	$ 4,058.54	$ 4,001.75

RD_39 : Ross Creek Road

Road Type: Link 2	Between: Tait St - DI_JNC_12 (Cobden St (realigned))					99	104.7	107.1	107.4	105.1	105.9	117.1	**120.7**	**121.5**	119.8
							Jun-13	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Upgrade Existing		item	$ 375,597.68	1	$ 375,597.68	$ 397,223.00	$ 406,328.40	$ 407,466.58	$ 398,740.57	$ 401,775.70	$ 444,267.56	$ 457,925.66	$ 460,960.79	$ 454,511.14
Line Marking		lin m	$ 15.00	200	$ 3,000.00	$ 3,172.73	$ 3,245.45	$ 3,254.55	$ 3,184.85	$ 3,209.09	$ 3,548.48	$ 3,657.58	$ 3,681.82	$ 3,630.30
Miscellaneous	Signage	No	$ 35.00	200	$ 7,000.00	$ 7,403.03	$ 7,572.73	$ 7,593.94	$ 7,431.31	$ 7,487.88	$ 8,279.80	$ 8,534.34	$ 8,590.91	$ 8,470.71
	Tactile pavers	No	$ 250.00	10	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
	Drainage	item	$ 250.00	200	$ 50,000.00	$ 52,878.79	$ 54,090.91	$ 54,242.42	$ 53,080.81	$ 53,484.85	$ 59,141.41	$ 60,959.60	$ 61,363.64	$ 60,505.05
	Excavation of rock	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Environmental Management		item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 18,779.88	1	$ 18,779.88	$ 19,861.15	$ 20,316.42	$ 20,373.33	$ 19,937.03	$ 20,088.79	$ 22,213.38	$ 22,896.28	$ 23,048.04	$ 22,725.56
Landscaping		lin m	$ 50.00	200	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Lighting		lin m	$ 150.00	200	$ 30,000.00	$ 31,727.27	$ 32,454.55	$ 32,545.45	$ 31,848.48	$ 32,090.91	$ 35,484.85	$ 36,575.76	$ 36,818.18	$ 36,303.03
Services Relocating/alteration	Electrical	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 511,877.57	$ 541,349.31	$ 553,758.46	$ 555,309.60	$ 543,417.50	$ 547,553.88	$ 605,463.26	$ 624,076.99	$ 628,213.38	$ 619,423.56
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 51,187.76	$ 54,134.93	$ 55,375.85	$ 55,530.96	$ 54,341.75	$ 54,755.39	$ 60,546.33	$ 62,407.70	$ 62,821.34	$ 61,942.36
Contingency		item	15%	1	$ 76,781.64	$ 81,202.40	$ 83,063.77	$ 83,296.44	$ 81,512.62	$ 82,133.08	$ 90,819.49	$ 93,611.55	$ 94,232.01	$ 92,913.53
				TOTAL	**$ 639,846.96**	**$ 676,686.63**	**$ 692,198.07**	**$ 694,137.00**	**$ 679,271.87**	**$ 684,442.35**	**$ 756,829.08**	**$ 780,096.24**	**$ 785,266.72**	**$ 774,279.45**

Road Type: Link 2	Corrections made: revised length					99	104.7	107.1	107.4	105.1	105.9	117.1	120.7	121.5	119.8
							Jun-13	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**
Description	**Detail**	**Unit**	**Rate**	**Qty**	**Amount**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**	**Indexation**
Site Establishment		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Upgrade Existing		item	$ 431,937.34	1	$ 431,937.34	$ 456,806.46	$ 467,277.66	$ 468,586.56	$ 458,551.66	$ 462,042.06	$ 510,907.70	$ 526,614.51	$ 530,104.91	$ 522,687.81
Line Marking		lin m	$ 15.00	230	$ 3,450.00	$ 3,648.64	$ 3,732.27	$ 3,742.73	$ 3,662.58	$ 3,690.45	$ 4,080.76	$ 4,206.21	$ 4,234.09	$ 4,174.85
Miscellaneous	Signage	No	$ 35.00	230	$ 8,050.00	$ 8,513.48	$ 8,708.64	$ 8,733.03	$ 8,546.01	$ 8,611.06	$ 9,521.77	$ 9,814.49	$ 9,879.55	$ 9,741.31
	Tactile pavers	No	$ 250.00	10	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
	Drainage	item	$ 250.00	230	$ 57,500.00	$ 60,810.61	$ 62,204.55	$ 62,378.79	$ 61,042.93	$ 61,507.58	$ 68,012.63	$ 70,103.54	$ 70,568.18	$ 69,580.81
	Excavation of rock	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Environmental Management		item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 21,596.87	1	$ 21,596.87	$ 22,840.32	$ 23,363.88	$ 23,429.33	$ 22,927.58	$ 23,102.10	$ 25,545.38	$ 26,330.73	$ 26,505.25	$ 26,134.39
Landscaping		lin m	$ 50.00	230	$ 11,500.00	$ 12,162.12	$ 12,440.91	$ 12,475.76	$ 12,208.59	$ 12,301.52	$ 13,602.53	$ 14,020.71	$ 14,113.64	$ 13,916.16
Lighting		lin m	$ 150.00	230	$ 34,500.00	$ 36,486.36	$ 37,322.73	$ 37,427.27	$ 36,625.76	$ 36,904.55	$ 40,807.58	$ 42,062.12	$ 42,340.91	$ 41,748.48
Services Relocating/alteration	Electrical	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 586,034.20	$ 619,775.57	$ 633,982.46	$ 635,758.32	$ 622,143.38	$ 626,879.01	$ 693,177.83	$ 714,488.16	$ 719,223.79	$ 709,160.58
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 58,603.42	$ 61,977.56	$ 63,398.25	$ 63,575.83	$ 62,214.34	$ 62,687.90	$ 69,317.78	$ 71,448.82	$ 71,922.38	$ 70,916.06
Contingency		item	15%	1	$ 87,905.13	$ 92,966.33	$ 95,097.37	$ 95,363.75	$ 93,321.51	$ 94,031.85	$ 103,976.67	$ 107,173.22	$ 107,883.57	$ 106,374.09
				TOTAL	**$ 732,542.75**	**$ 774,719.46**	**$ 792,478.07**	**$ 794,697.90**	**$ 777,679.23**	**$ 783,598.76**	**$ 866,472.29**	**$ 893,110.21**	**$ 899,029.74**	**$ 886,450.73**

XVI

Road Type: Link 3 **Corrections made: revised length & LR3 cross section**

Description	Detail	Unit	Rate	Qty	Amount	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation	Indexation
Site Establishment		item	$ 10,000.00	1	$ 10,000.00	$ 10,575.76	$ 10,818.18	$ 10,848.48	$ 10,616.16	$ 10,696.97	$ 11,828.28	$ 12,191.92	$ 12,272.73	$ 12,101.01
Road Construction / Upgrade Existing		item	$ 465,600.50	1	$ 465,600.50	$ 492,407.80	$ 503,695.09	$ 505,106.00	$ 494,289.02	$ 498,051.44	$ 550,725.44	$ 567,656.37	$ 571,418.80	$ 563,423.64
Line Marking		lin m	$ 15.00	230	$ 3,450.00	$ 3,648.64	$ 3,732.27	$ 3,742.73	$ 3,662.58	$ 3,690.45	$ 4,080.76	$ 4,206.21	$ 4,234.09	$ 4,174.85
Miscellaneous	Signage	No	$ 35.00	230	$ 8,050.00	$ 8,513.48	$ 8,708.64	$ 8,733.03	$ 8,546.01	$ 8,611.06	$ 9,521.77	$ 9,814.49	$ 9,879.55	$ 9,741.31
	Tactile pavers	No	$ 250.00	10	$ 2,500.00	$ 2,643.94	$ 2,704.55	$ 2,712.12	$ 2,654.04	$ 2,674.24	$ 2,957.07	$ 3,047.98	$ 3,068.18	$ 3,025.25
	Drainage	item	$ 250.00	230	$ 57,500.00	$ 60,810.61	$ 62,204.55	$ 62,378.79	$ 61,042.93	$ 61,507.58	$ 68,012.63	$ 70,103.54	$ 70,568.18	$ 69,580.81
	Excavation of rock	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Retaining Wall	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Environmental Management		item	$ 5,000.00	1	$ 5,000.00	$ 5,287.88	$ 5,409.09	$ 5,424.24	$ 5,308.08	$ 5,348.48	$ 5,914.14	$ 6,095.96	$ 6,136.36	$ 6,050.51
Traffic Management		item	$ 23,280.03	1	$ 23,280.03	$ 24,620.39	$ 25,184.75	$ 25,255.30	$ 24,714.45	$ 24,902.57	$ 27,536.27	$ 28,382.82	$ 28,570.94	$ 28,171.18
Landscaping		lin m	$ 50.00	230	$ 11,500.00	$ 12,162.12	$ 12,440.91	$ 12,475.76	$ 12,208.59	$ 12,301.52	$ 13,602.53	$ 14,020.71	$ 14,113.64	$ 13,916.16
Lighting		lin m	$ 150.00	230	$ 34,500.00	$ 36,486.36	$ 37,322.73	$ 37,427.27	$ 36,625.76	$ 36,904.55	$ 40,807.58	$ 42,062.12	$ 42,340.91	$ 41,748.48
Services Relocating/alteration	Electrical	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Telstra	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Other	item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Native Vegetetion Offset requirements		item			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Subtotal	$ 621,380.53	$ 657,156.98	$ 672,220.75	$ 674,103.72	$ 659,667.61	$ 664,688.86	$ 734,986.46	$ 757,582.11	$ 762,603.37	$ 751,933.20
Professional Fees	Survey, Geotech, Pavement & Design	item	10%	1	$ 62,138.05	$ 65,715.70	$ 67,222.07	$ 67,410.37	$ 65,966.76	$ 66,468.89	$ 73,498.65	$ 75,758.21	$ 76,260.34	$ 75,193.32
Contingency		item	15%	1	$ 93,207.08	$ 98,573.55	$ 100,833.11	$ 101,115.56	$ 98,950.14	$ 99,703.33	$ 110,247.97	$ 113,637.32	$ 114,390.51	$ 112,789.98
				TOTAL	**$ 776,725.66**	**$ 821,446.22**	**$ 840,275.94**	**$ 842,629.65**	**$ 824,584.51**	**$ 830,861.08**	**$ 918,733.07**	**$ 946,977.64**	**$ 953,254.21**	**$ 939,916.50**

Planning today for the communities of tomorrow

Ballarat West Precinct Structure Plan Review – Community and Recreation Infrastructure

Final Report

May 29th, 2024

Version 6

Prepared for Ballart City Council
by ASR Research Pty Ltd
Suite 7 / 321 Chapel Street, Prahran
Author: [redacted], Director
For all enquiries in relation to the contents of this report call ([redacted] or email [redacted]

Table of Contents

List of Tables

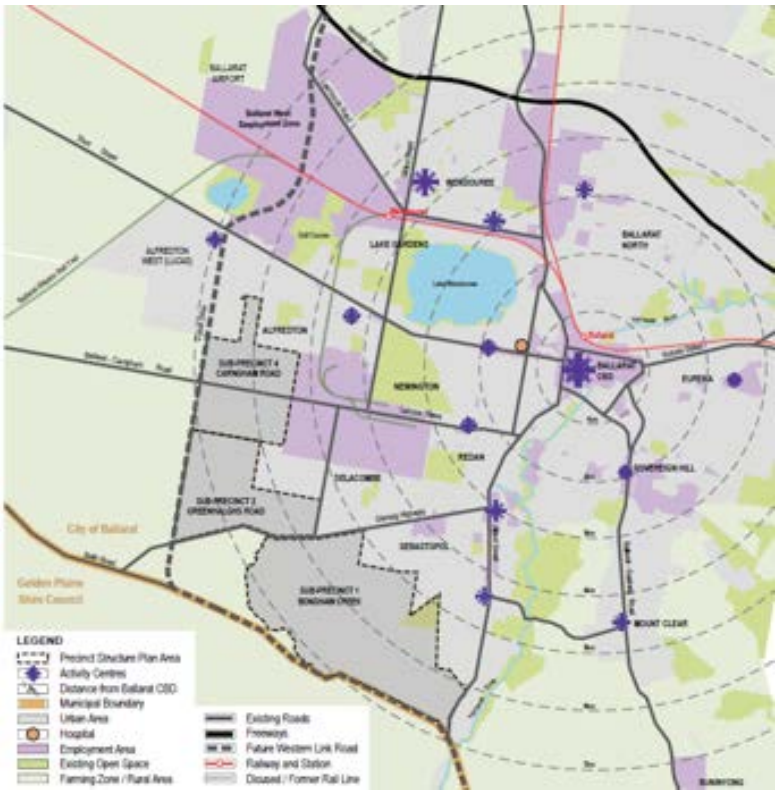
List of Figures

1 Introduction

1.1 Background

The City of Ballarat has commenced a review of the Ballarat West Precinct Structure Plan (PSP) and the Ballarat West Development Contributions Plan[1] (DCP). As part of this process Council engaged ASR Research Pty Ltd to assist with the review of community infrastructure projects in the PSP including early learning facilities, multipurpose community centres, active open space reserves, and pavilions. As shown in Figure 1 below, the Ballarat West PSP is located west of the Ballarat Central Business District (CBD).

Figure 1 – Location of Ballarat West PSP in Relation to the Ballarat Urban Area



Source: City of Ballarat, Ballarat West Precinct Structure Plan (October 2016), Plan 2

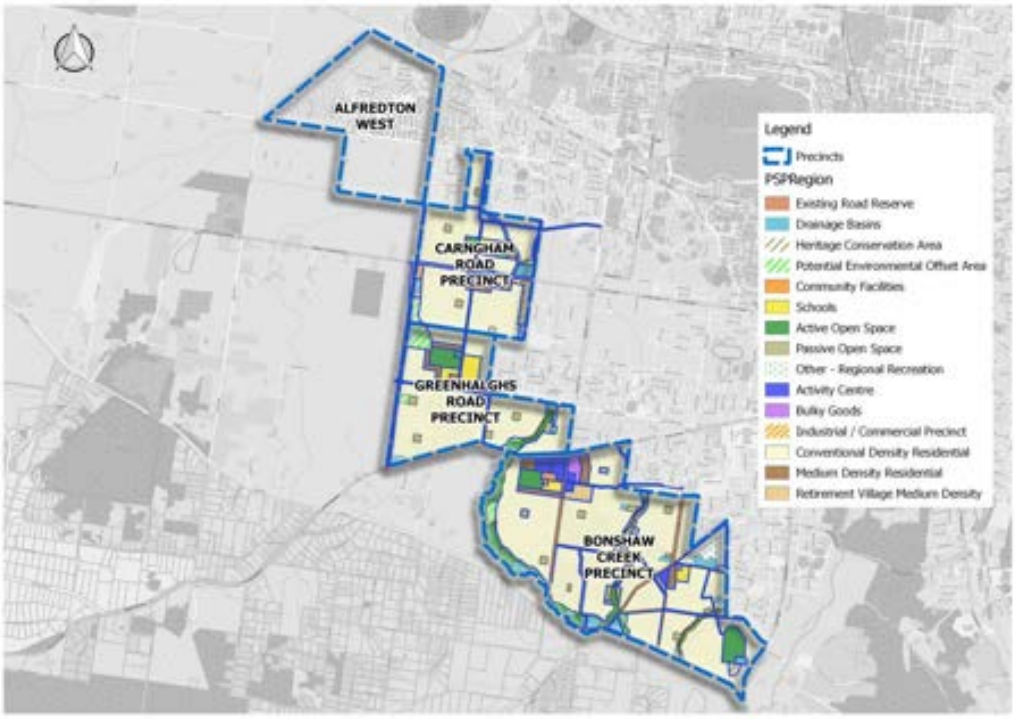
The Ballarat West PSP forms a major part of the Ballarat West Growth Area which caters for primarily residential growth and provides services and infrastructure for new communities.

[1] The original The Ballarat West Development Contributions Plan (DCP) was approved by the Minister for Planning under Amendment C167 Development Contributions Plan on 30 October 2014. The revised DCP, approved in March 2017, was prepared in response to a change to the Community Infrastructure Levy cap introduced by a Governor in Council Order on 11 October 2016.

The Growth Area, shown in Figure 2 below, will provide around 18,000 new houses at full development to accommodate a population of more than 40,000 people. It comprises 1,1717 hectares of greenfield land and includes four planning precincts located to the west of Alfredton, Delacombe and Sebastopol. The precincts are:

- Bonshaw Creek- Precinct 1;
- Greenhalghs Road - Precinct 2;
- Alfredton West (Lucas) - Precinct 3; and
- Carngham Road - Precinct 4.

Figure 2 - Ballarat West Growth Area Precincts



The Ballarat West PSP is supported by a Development Contributions Plan (DCP), which will form the basis of the levy to be paid by development proponents as part of the development of the precinct. Throughout this document, any reference to the PSP also includes the DCP.

The Ballarat West PSP and DCP is a long-term plan for urban development. It describes how the land is expected to be developed, the services planned to support development and how they will be delivered. The PSP and

DCP documents were prepared by the City of Ballarat in consultation with Council departments, government agencies, services authorities, and other major stakeholders.

The Ballarat West PSP and DCP were approved in 2016. The PSP includes a requirement at section 1.5 that Council monitor the implementation of the PSP and evaluate its effectiveness at least every five years. It states that the content may be revised and updated following the review. Section 4.6 of the DCP also states the following:

> *"The City of Ballarat will undertake ongoing accounting and review of this DCP in terms of:*
> - *The relevance of projects listed in the DCP;*
> - *The level of contributions collected;*
> - *The construction costs of infrastructure projects;*
> - *The land costs of infrastructure projects;*
> - *Updating the DCP to reflect any relevant amendments to the Planning and Environment Act, or any new Ministerial Directions relating to development contributions."*

1.2 Review Objectives

The following report was prepared to inform further consultation with City of Ballarat community infrastructure departments and external State agencies such as the Department of Education (DE) and Department of Health (DH).

The objectives of the review were to:

1. Review the population projections for the Ballarat West PSP area.
2. Review whether the community infrastructure being provided in the Ballarat West PSP and DCP is adequate having consideration for the level of development that has already been approved.
3. Apply the standard community facility, and sports and recreation designs included in the VPA's Benchmarking Infrastructure Costings to the PSP community infrastructure projects.
4. Prepare cost estimates based on the designs prepared in order to inform the review of the Ballarat West PSP and DCP.
5. Provide recommendations / options on how any changes to community infrastructure provision could be addressed through the PSP and DCP.

In addition to these primary objectives the assessment also assesses the impact of higher residential densities on community infrastructure demand, and the amount and type of community infrastructure required to support that demand.

1.3 Review Scope

The scope of community infrastructure assessed as part of this review is limited to the following the infrastructure forms:

1. Active open space and supporting amenities (e.g. pavilions and carparking);
2. Multipurpose community centres; and
3. Education facilities.

Items 1 and 2 form represent the majority of community infrastructure forms identified in the Ballarat West DCP.

Beyond these items demand estimates for a much larger suite of services and facilities is presented in this report for contextual purposes (refer to Appendix 2 for more details).

2 Methodology

The Background Report has been developed to ensure both City of Ballarat departments and external agency stakeholders have sufficient information to make informed decisions about the future community infrastructure of the Ballarat West PSP area. To achieve this objective the report includes the following:

1. An overview of the community infrastructure planning process as it applies to growth areas.
2. A review of 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.
3. A review of the original development and population assumptions for the Ballarat West PSP to determine to what extent these original assumptions remain valid and assess the implications for community infrastructure provision.
4. The main existing and planned community infrastructure within the Ballarat West PSP including those items specifically identified within the Ballarat West DCP.
5. A preliminary review of the implications of the revised dwelling and population assumptions for community infrastructure provision within the Ballarat West PSP.
6. A preliminary comparison of the key Ballarat West DCP community infrastructure cost items with the VPA endorsed benchmark costings for community infrastructure items.
7. A summary of key findings.

3 The Ballarat West PSP & Associated Strategic Work

3.1 Overview of the Ballarat West PSP

Figure 3 on the following page shows the future urban structure plan for the Ballarat West PSP area, the vision for which includes:

> *"…a place where people can enjoy healthy, affordable and sustainable lifestyles. The community will be a vibrant and prosperous series of neighbourhoods which offer housing choice and diversity supported by schools and community facilities and a network of passive and active open spaces which cater for a range of recreational pursuits. The neighbourhoods will be interconnected by a walkable street and trail network, with access to public transport to ensure that all residents have access to a range of community, retail and recreational uses within their community."*

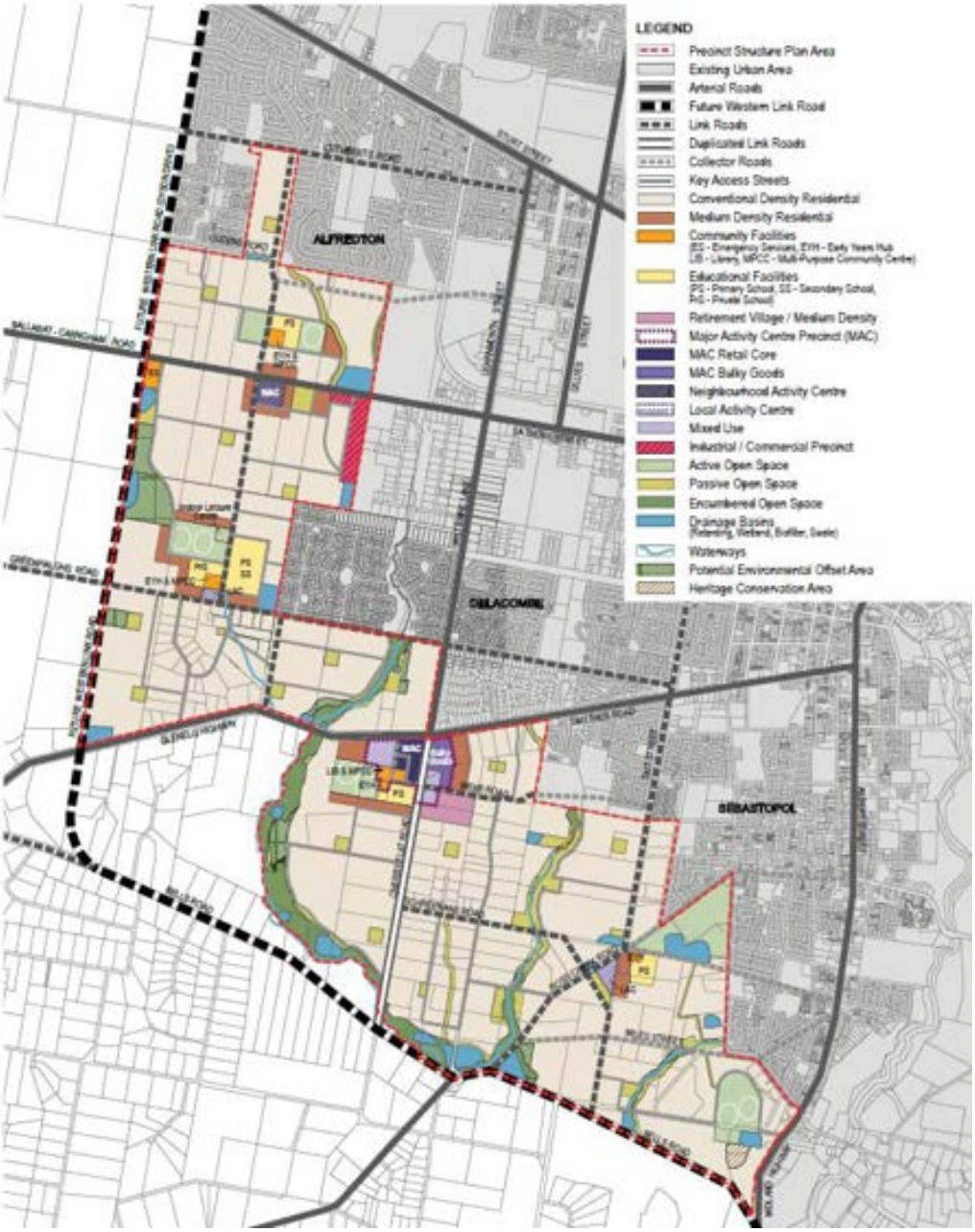
The vision is to be realised through the application of the following principles and objectives of integrated neighbourhood design:

- To establish a sense of place and community;
- To create greater housing choice;
- To create highly accessible and vibrant activity centres;
- Deliver integrated, accessible and adaptable community facilities;
- Provide for local employment and business activity;
- Provide better transport choices; and
- Deliver environmentally sustainable communities.

The Ballarat West PSP makes the following development assumptions, and a key focus of the review process, in relation to residential densities, dwelling yields and overall population yield:

- A total of 14,485 dwellings consisting of:
  - 13,359 conventional dwellings (based on an average conventional density of at least 15 dwellings per 1 hectare of net residential area – NRA); and
  - 1,083 medium density dwellings (based on an average medium density of at least 25 dwellings per 1 hectare of net residential area).
- An estimated total population of 36,212 people, based on an average household size of 2.5.

Figure 3 - Ballarat West PSP Future Urban Structure



Source: City of Ballarat, Ballarat West Precinct Structure Plan (October 2016), Plan 8

As shown in Figure 3, the Ballarat West PSP seeks to service the changing needs of the community through the provision of accessible, integrated and adaptable community facilities. The Ballarat West PSP makes provision for a range of community infrastructure to serve the diverse needs of the local community. Community facilities will be delivered as early as possible to foster a sense of community in the new neighbourhoods.

Community & Early Years Hubs

A network of community and early years hubs are provided within Ballarat West. These hubs are co-located with schools and where appropriate, activity centres, to create focal points for community activity and interaction within each neighbourhood.

The Precinct offers a wide range of education facilities; government primary and secondary and non government primary schools. Early Years Hubs are co-located with schools and provide opportunities for the provision of kindergarten, childcare, child and maternal health and flexible community spaces. All schools and Early Years Hubs within the Precinct are located on the connector street network to maximise community access by walking, cycling and public transport.

Open Space

The open space network within the Precinct will cater for the diverse ages and interests within the local community. The open spaces range from neighbourhood to regional parks and will provide for a variety of active and passive recreational pursuits.

The Winter, Kensington and Bonshaw Creek linear parks will provide a green link with a shared path network through the heart of the development. This linear park network will provide connections to open spaces and other key community uses.

Other components of the open space network include neighbourhood parks, passive open space (conservation areas and linear open space) as well as active open space (including district and regional sport reserves).

Further details on the community infrastructure provision items proposed for the Ballarat West PSP are summarised in Section 7.1 of this report.

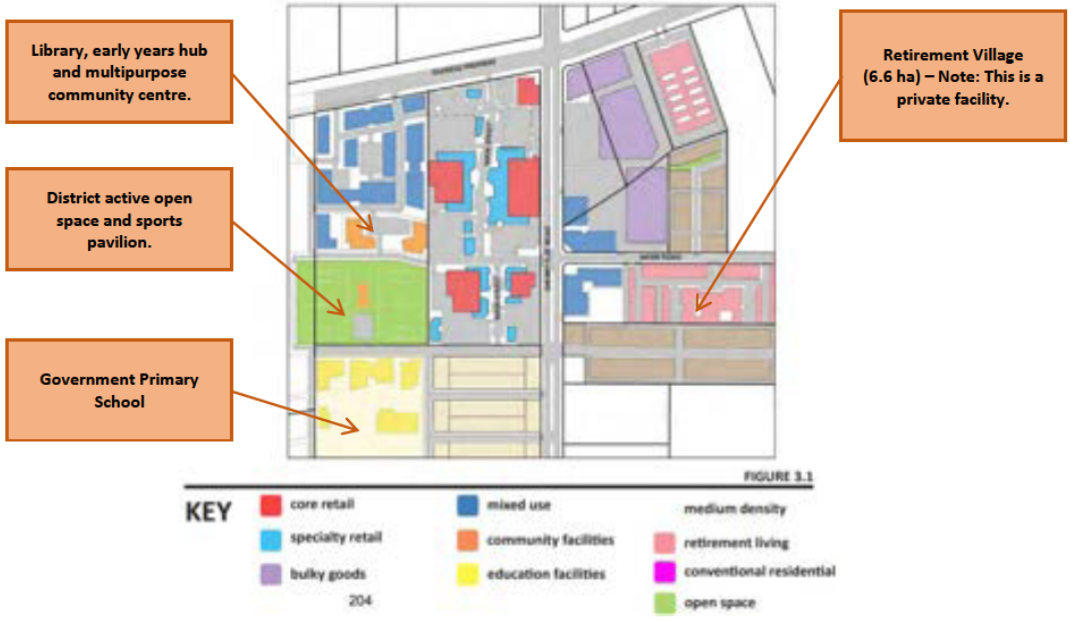
3.2 Ballarat West Major Activity Centre Urban Design Framework

The purpose of the Ballarat West Major Activity Centre Urban Design Framework (UDF) is to provide clear guidance to the community, the City of Ballarat and developers on how the Major Activity Centre (Delacombe

Town Centre) located in Sub - Precinct 1 of the Ballarat West Precinct Structure Plan (BWPSP) is to be developed and structured over an approximate timeframe of 30 years. As shown in Figure 4 below, community infrastructure forms a key part of the UDF and consists of:

- **Community facilities** - the activity centre is to provide a range of facilities that support the future community of the precinct. These community facilities are to form a cluster of buildings on the south western portion of the activity centre. **Community facilities** will **consist of a** multipurpose community facility, early years hub and a regional library;
- **An education facility** - a site of 3.5 hectares west of Cherry Flat Road and south of a key east-west link road, has been set aside in the precinct structure plan to accommodate a primary school to meet the future needs of the community; and
- **District active open space** - an area of 3.5 hectares for active open space will be provided along the western side of the activity centre. The site is to accommodate at least 2 soccer fields and a sports pavilion.
- **Retirement Village** - a significant portion of the activity centre has been reserved for retirement living.

Figure 4 - Ballarat West Major Activity Centre (Delacombe Town Centre) Urban Design Framework - January 2017 Update



Source: City of Ballarat, Ballarat West Major Activity Centre Urban Design Framework (January 2017), Figure 3.1

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 2.3 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 2.3 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. They key documents include:

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

- Kindergarten Infrastructure Needs Assessment in Greenfield Growth Areas (2015)[2];
- 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 review.

A more detailed description of the proposed Ballarat West PSP and DCP community infrastructure initiatives are presented in Section 7 of this Background report.

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 Precinct Structure Plan (PSP) location 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:

[2] 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).

- 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. 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 review the adequacy of both the number of facilities planned for within the Ballarat West PSP and the cost estimates identified in the Ballarat West PSP.

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 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 current PSP guidelines, is not well known and has not been applied uniformly across all Melbourne's growth areas.

In addition to these PSP guideline provision benchmarks this review includes demand-based estimates for organised sport derived from the AusPlay Survey[3] (AusPlay) which provides the major source of participation data for sport and other informal physical activities in Australia. These estimates are contained within Appendix 2 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.

[3] 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).

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

equates to a room with capacity to accommodate 33 licenced places (based on 3.25 square metres per licenced place). A Level 1 community centre will typically include 3 to 4 kindergarten rooms each.

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.

In relation to community centres City of Ballarat has adopted the following provision ratios

- 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.

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 2 on the following page and includes 1 July 2023 index costs.

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)

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;

- 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.

The Ballarat West PSP is located within the South West Planning District. The key findings and recommendations associated with the South West Planning District are summarised below[4].

1. Assessment of Desired Provision Standards within the planning area has identified:
    a. Adequate provision of community meeting spaces including those available to seniors' groups until at least 2031.
    b. Adequate provision of kindergarten places until 2026 where there is a deficit of 36 places, increasing to 67 by 2031.
    c. A deficit of 1 maternal and child health room in 2021, increasing to 2 rooms in 2026. An additional 2 rooms are planned as part of the Delacombe Town Centre Community Hub facility.
    d. A surplus of library service provision with a facility in Sebastopol and outreach service in Delacombe. This is appropriate given the vulnerabilities experienced within these communities.
    e. Adequate provision of youth friendly spaces with opportunity to ensure youth friendly design principles are incorporated in Delacombe Town Centre developments.

[4] Note: A number of these recommendations are reflected in the current Ballarat West PSP.

f. A deficit of football ovals with an additional oval indicated as a gap in 2021, and an additional oval required by 2031.
g. Sufficient provision of cricket ovals until 2031 when an additional oval is likely to be required.
h. A significant surplus of soccer pitches with the regional soccer facility being located within the planning district as well as several local clubs.
i. Adequate provision aquatic facilities with a splash park at Victory Park.
j. A surplus of tennis courts with the significant indoor Tennis Ballarat facility which is privately owned.
k. A deficit outdoor netball courts with 1 additional court being required currently to meet provision standards and 2 courts required by 2031.
l. Adequate provision of lawn bowling greens
m. The requirements for localised arts and cultural infrastructure should be informed by the audit currently being undertaken and fed into the draft Community Infrastructure Plan.

2. There is extensive community infrastructure provision planned within the Ballarat West Growth Area Precinct Structure Plan which will meet any of the identified gaps within the planning area over the next 10 years. This includes:
   - A multipurpose community hub at Delacombe Town Centre with design planned for 21/22 and delivery in 25/26. This will provide the additional kindergarten places required, maternal and child health rooms, and a branch library with inclusive community meeting spaces.
   - Planned recreation facilities at Delacombe Town Centre include 2 soccer fields and accompanying pavilion to be delivered in 24/25.
   - A multipurpose community centre at the Greenhalghs Rd sub-precinct including kindergarten facilities and community meeting rooms, planned for design in 27/28 and delivery in 31/32.
   - Planned delivery of recreation facilities at Greenhalghs Rd sub precinct in 28/29, including 2 football/ cricket ovals, pavilion, and a netball court, along with an indoor recreation facility in 35/36.
   - An additional sports oval, pavilion, and athletics track are also planned for delivery at MR Power Park in 25/26 - 28/29, followed by an indoor recreation facility.
   - Whilst not within the timeframe scope for the Community Infrastructure Plan, there are also plans for an additional 3 soccer fields and pavilion to be located in Mining Park Estate.
3. It should be noted that ongoing review of most appropriate community facility typology and timing within the growth areas to ensure that the right facilities are delivered at the right time is required. This review needs to consider desired provision standards but also participation rates in various sporting clubs and activities and ensure that there is not supply in surplus to demonstrated community need.
4. Fitness for purpose assessments highlight some issues with the Bonshaw Maternal Child Health and Kindergarten facility. Toilet facilities are inadequate, location of kitchenette is poor, small community

room makes programming difficult and the outdoor timber services are slippery when wet. It needs to be acknowledged that these building issues do not impact on the service, and quality of service delivery by MCH team. Due to the high utilisation of this service planning to rectify constraints with current building should be considered.

5. Other existing projects which have been identified in the South West planning district include:
    a. Replacement of current Sebastopol Senior Citizens Centre (due to poor building condition) with a new multipurpose community facility with staged early years facilities.
    b. Master Planning at Marty Busch Recreation Reserve in 21/22 considering the needs of the broad range of activities and clubs which operate from the site into the future.
    c. Expansion and amenity upgrade at Sebastopol South Kindergarten.
    d. Doug Dean – (Oval, pavilion and changerooms) concept planning undertaken at the site to address facility changeroom issues. Full upgrade to facility will be subject to future funding. Clubs currently accessing new school stadium for change rooms and Doug Dean Stadium for social space.
    e. Trekardo Park - Soccer Club pavilion and soccer pitches: Refurbishment to facility currently being undertaken. Lighting upgrade completed. Long term planning in place for improvements to pitch surfaces. (Note: Refurbishment has been completed)
    f. Pleasant St Reserve - West soccer pitch (#2): Long term planning in place for improvements to soccer pitch. (Note: Two sized soccer pitches and one junior sized soccer pitch at reserve currently being upgraded)

5.4 City of Ballarat Community Infrastructure Plan 2022-2037

The Community Infrastructure Plan was developed over an 18 month period and demonstrates evidence based decision making. The Plan will guide future planning and decision making around investment in facilities to ensure the equitable, efficient and sustainable provision of high quality community infrastructure that meets community's current and future needs.

This Plan was informed by the Community Infrastructure Needs and Gap Analysis Report. For this process, Council gathered information about existing facilities and its population forecasts to consider the service needs- and related infrastructure- that Ballarat's growing and changing population will have over the next 10 years.

Facilities included in the scope of this Plan were:

- Community hubs;
- Halls and meeting spaces;
- Library services;

- Kindergartens; and
- Maternal and Child Health services.

Many other facilities play a role in supporting Ballarat communities and will be included in future iterations of this plan or future plans.

Priorities for the South West Planning Area (which includes the Ballarat West PSP) include:

- Ensuring existing facilities are fit-for-purpose to enable service and participation continuity;
- Ensuring there are locally accessible facilities for programs, services and activities to support residents of all ages;
- Ensuring there are appropriate spaces for services to support vulnerable communities;
- Monitoring participation trends to ensure responsive planning to changing community needs; and
- Ensuring appropriate facilities are built at the correct time to meet the needs of the growing population.

Implementation of the community infrastructure planning process identifies major capital projects and timeframes for delivery, including the following Ballarat West PSP projects:

Capital Project	Proposed Design Date	Proposed Construction Date
Alfredton (Ballymanus) Community Hub	Completed	2022-24
Delacombe Library and Community Hub	2025-26	2026-28
Delacombe Early Years Facility	2025-26	2026-28
Winter Valley Community Hub	2030-31	2034-36

5.5 Implications

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

6 Ballarat West PSP Development & Population Analysis

6.1 Overview

The section provides a review of the original development and population assumptions for the Ballarat West PSP to determine to what extent these original assumptions remain valid and assess the implications for community infrastructure provision.

Although public open space provision requirements are largely determined by the amount of Net Developable Area (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 have changed then the number of community infrastructure items, or the capacity of existing planned items may need to also change.

6.2 Original PSP Development Assumptions

The Ballarat West DCP (page 7) makes the following assumptions in relation to residential densities, dwelling capacity and population capacity of the Ballarat West PSP:

- A total of 14,485 dwellings consisting of:
  - 13,359 conventional dwellings (based on an average conventional density of at least 15 dwellings per net residential hectare; and
  - 1,083 medium density dwellings (based on an average conventional density of at least 25 dwellings per net residential hectare).
- An estimated total population of 36,212 people, based on an average household size of 2.5.

6.3 Review of Development Assumptions

Table 2 below compares the difference between the original Ballarat West PSP dwelling and population estimates and the current projected dwelling and population capacities of the PSP. It is expected that for the remaining undeveloped land, densities will be closer to 20 dwellings per hectare than 15 and therefore, Council estimates that the PSP will accommodate approximately 1,000 more dwellings than originally forecast and approximately 2,700 more residents. By full development it is estimated the PSP will accommodate approximately 15,500 dwellings and be home to approximately 42,000 residents.

Table 2 – Comparison of Original and Revised Ballarat West PSP Dwelling and Population Capacities

	Original Dwelling & Population Capacity for Ballarat West PSP	Revised Dwelling & Population Capacity for Ballarat West PSP	Difference (+/-)
Dwelling yield	14,441	15,441	**1,000**
Average overall household size	2.7	2.7	**0**
Population yield	38,991	41,691	**2,700**

6.4 Current Dwelling and Population Estimate for the Ballarat West PSP

According to 2021 Census of Population and Housing[5], the Ballarat West PSP area accommodates approximately 2,200 dwellings and has a population of approximately 6,200 residents.

Based on Council's most recently updated planning data (October 2023), the Ballarat West PSP has 9,170 lots which have either been completed, partially completed or have received planning approval (approximately 59% of the total revised dwelling capacity of the PSP). This supply consists of:

- 5,380 titled lots;
- 3,790 under construction/permit issued; and
- 6,230 zoned supply.

[5] 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.

7 Existing & Planned Community Infrastructure within Ballarat West PSP

7.1 Overview

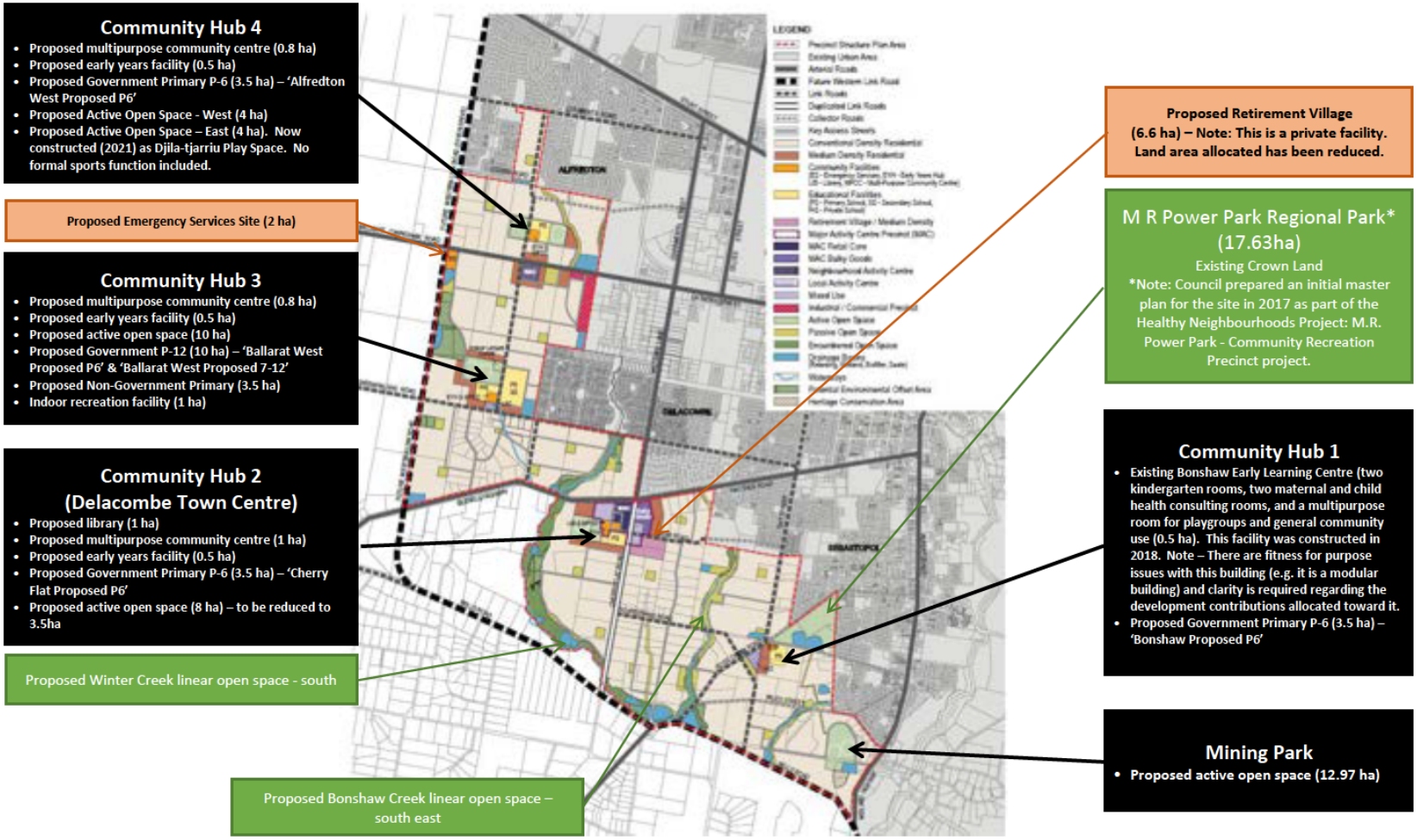
This section identifies both the main existing and planned community infrastructure within the Ballarat West PSP. Figure 5 on the following page shows the location and distribution of community infrastructure items identified by the PSP. Most of the community infrastructure is to be delivered across 4 major community infrastructure hubs. In summary, the PSP proposes to deliver the following community infrastructure:

- 26 neighbourhood / passive parks (25.35 hectares) and 1 existing regional park (17.7 hectares);
- 4 new active open space (39 hectares);
- Linear open space (30.1 ha) including Winter Creek and Bonshaw Creek;
- 4 early years hubs;
- 3 multipurpose community centres (one Level 3 and two Level 1's);
- 1 Library;
- 1 Indoor recreation facility;
- 4 Government primary schools;
- 1 Government secondary school;
- 1 non-Government school site;
- An emergency services site; and
- A privately owned / operated retirement village site.

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 review, 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 and Training (DET) or a non-government education provider such as Catholic Education Ballarat.

Figure 5 – Location of Main Existing and Planned Community Infrastructure Items within the Ballarat West PSP



7.2 Ballarat West DCP Community Infrastructure Items and Costs

The Ballarat West DCP specifies the community infrastructure items which are to be funded by development either as land or construction cost, or both. There are two main forms of community infrastructure funded by the Ballarat West DCP: 1) active recreation items (both for land acquisition and construction), and 2) multipurpose community centres (both for land and construction).

These items are summarised in Table 3 below. While identified in the Ballarat West PSP, education sites and emergency services sites are not subject to DCP funding, and therefore not identified in the table below.

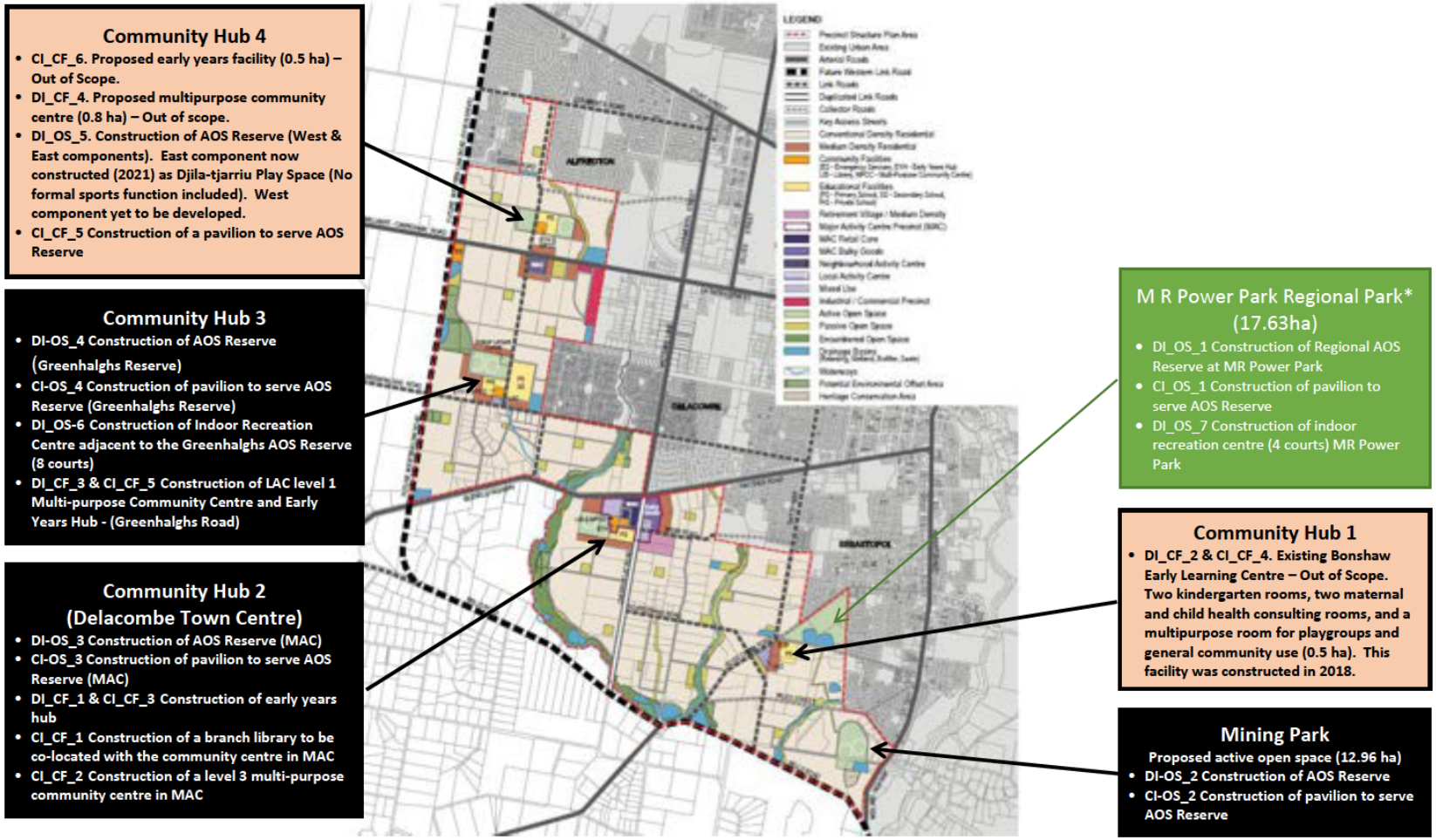
Table 3 – Current DCP Community Infrastructure Items & Costs

DCP Project Code	Project Description	Actual or Anticipated DCP delivery date	Notes
CI_CF_1	Construction of a branch library to be co-located with the community centre in MAC (DTC sub - precinct 1)	2027-2028	There is a need to understand the expected catchment that may come from Western and North Western Growth Areas and whether the capacity should be future proofed to at least partially meet this demand
CI_CF_2	Construction of a level 3 multi-purpose community centre in MAC (DTC sub-precinct 1)	2027-2028	Project is subject to review due to an adopted Urban Design Framework which has changed the land uses in the MAC and the land available is now deficient.
CI_CF_3 and DI_CF_1	Construction of early years hub - MAC - (DTC sub-precinct 1)	2027-2028	As above. The project has a CIL and DIL component.
CI_CF_5 DI_CF_3	Construction of LAC level 1 Multi-purpose Community Centre and Early Years Hub - (Greenhalghs Road sub-precinct 2)	2028-2029	This project is proximate to Western Growth Area so may create a demand from future development. A permit has been issued for subdivision so location is unable to be altered. The project has a CIL and DIL component.
CI_OS_1	Construction of a pavilion to serve Regional AOS Reserve at MR Power Park	2029	
CI_OS_2	Construction of a pavilion to serve AOS Reserve - Mining Park	2051	
CI_OS_3	Construction of a pavilion to serve AOS Reserve - Glenelg Highway reserve (MAC DTC)	2026-2028	
CI_OS_4	Construction of a pavilion to serve AOS Reserve - Greenhalghs reserve (LAC)	2029	
CI_OS_5	Construction of a pavilion to serve AOS Reserve - Carngham reserve (NAC)	2026-2028	
DI_OS_1	Construction of Regional AOS Reserve at MR Power Park (sub-precinct 1)	2027-2029	This project has had a masterplan prepared. There has been some discussion about being upgraded to AFL standard
DI_OS_2	Construction of AOS Reserve - Mining Park (sub-precinct 1)	2047-2048	
DI_OS_3	Construction of AOS Reserve - MAC (DTC sub-precinct 1)	2026-2028	This reserve is currently under review with other facilities in the MAC

DCP Project Code	Project Description	Actual or Anticipated DCP delivery date	Notes
DI_OS_4	Construction of AOS Reserve - Greenhalghs reserve (LAC)	2028	
DI_OS_5	Construction of AOS Reserve- Carngham reserve (sub-precinct 4)	2026-2028	This project is split over 2 reserves. One reserve has been delivered.
DI_OS_6	Construction of Indoor Recreation Centre (8 courts) adjacent to LAC - Carngham reserve	2050-2051	
DI_OS_7	Construction of Indoor Recreation Centre (4 courts) MR Power Park (sub-precinct 1)	2033-2036	

Figure 6 on the following page shows the location each of the DCP community infrastructure items.

Figure 6 – Location of Community Facility, Active Open Space and Recreation DCP Items within the Ballarat West PSP (Excluding Land Acquisition Items)



7.3 Ballarat West DCP Funding Mechanisms

The DCP provides for the charging of a 'development infrastructure levy' (DIL) pursuant to section 46J(a) of the Act towards works, services or facilities. It also provides for the charging of a 'community infrastructure levy' (CIL) pursuant to section 46J(b) of the Act, as some items are classified as community infrastructure under the Act.

Contributions relating to development infrastructure are to be made by developers generally at the time of subdivision or as otherwise specified by the DCP. If subdivision is not applicable payments must be made prior to construction of buildings and works.

The current DIL rate is:

- Residential Levy - $316,339.67 per net developable area; and
- Commercial Levy - $220,837.78 per net developable area.

For community infrastructure, contributions are to be made by the home-buyer at the time of building approval. Contributions relating to community infrastructure will be paid for at a 'per dwelling'. The Planning and Environment Act 1987 stipulates that the amount that may be contributed under a community infrastructure levy. For all residential development within the Ballarat West PSP, City of Ballarat currently applies a CIL of $1,346 per dwelling[6].

[6] The maximum CIL levy amount payable under a DCP is $1,346 for the 2023-2024 Financial Year.

8 Summary of Key Issues & Trends

This section summarises the main community infrastructure findings of this report and presents an indicative community infrastructure plan that will form the basis of future discussions with Ballarat City Council officers and other external agencies including State Government Departments. It provides a detailed assessment of the implications of the revised dwelling and population assumptions (presented in Section 6.4) for community infrastructure provision within the Ballarat West PSP.

8.1 Key Community Infrastructure Issues and Trends

Since the preparation of the original community infrastructure assessment in 2012 and 2017, a key background technical document used to assist with the preparation of the Ballarat West PSP, there have been a number of significant land use and demographic trends, Government policy changes and initiatives, and community infrastructure planning documents that are likely to be significant considerations for the review process. These include:

- The original cost estimates for community infrastructure in the Ballarat West PSP pre-date the VPA benchmarking costing study prepared by Cardno. Consequently, cost estimates for future facilities are likely to be higher, along with changes to facility configuration assumptions at each hub location;
- Higher residential densities in PSP areas than originally forecast by urban planners and demographers will be a key consideration;
- The Victorian Government is investing almost $5 billion over ten years so that children across the state will have access to two years of kindergarten programs. More recently, the Victorian State Government expanded on this policy through the release of its *Best Start, Best Life Policy* (June 2022). The implementation of this policy will result in children having access to 30 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week. Assessing the impact of this proposed change on all proposed community facilities within the Ballarat West PSP will form a core component of our review. This policy change will be very significant on the proposed community facilities within the Ballarat West PSP;
- Now that a residential community has begun to emerge within the Ballarat West PSP, both formal and informal recreation trends are likely to be more observable and may inform how future active open space reserves should be developed and which sports should be allocated to each.
- The impact of other recreation trends such as the growth in female sports participation, the construction of more synthetic playing fields and an increasing need for indoor multi-purpose court stadiums will also be considered;

- Changes to community infrastructure delivery models including an increasing trend toward multi-storey schools and community centres in order maximise floor area outcomes and to use land more efficiently;
- Whilst being a long talked about aspiration of government agencies, the shared use of community infrastructure (e.g. joint school / community facilities) continues to be gradually implemented across Victoria and remains a worthwhile planning strategy;
- Changes to the development planning contributions system including funding arrangements and a larger list of allowable community service forms, has potentially significant ramifications for the future planning of community facilities;
- Unlike 10 years ago, many more State agencies have, or are in the process of, developing detailed provision strategies for growth areas. The review process is very timely from this perspective and may lead to a clearer picture of provision strategies for the Ballarat West PSP; and
- The ongoing development and increasing sophistication of local government strategies and facility standards needs to also be considered by the review.

8.2 Preliminary Community Infrastructure Assessment

Table 4 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 and data sources used to inform the assessment are presented in Appendix 3 of this report.

Table 4 – Potential Requirements within the Ballarat West PSP

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
Early years services			
Kindergartens	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: • 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 - the soon to be constructed Alfredton Community Hub (0.5 ha). This facility will include three kindergarten rooms. Ballarat City Council proposes to expand the Bonshaw Early Learning Centre, an integrated children's centre which opened in 2018, from two kindergarten rooms to three.	Approximately 14 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 21 kindergarten rooms under the proposed kindergarten policy environment[7] (30 hours of four year old kindergarten per week, and 15 hours of three year old kindergarten per week). Response measures based on the implementation of the proposed policy change to kindergarten services will require further input from the Department of Education (DE) prior to confirming the kindergarten provision strategy for the Ballarat West PSP. 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[8].	Given that one early years facility has already been constructed (Bonshaw Early Learning Centre) with 2 kindergarten rooms (proposed to be expanded to 3 rooms) and the soon to be constructed Alfredton Community Hub will include 3 kindergarten rooms, the remaining 2 facilities would need to accommodate a further 8 kindergarten rooms (4 rooms per facility) under the present kindergarten policy environment. However, under the proposed kindergarten policy initiative, this figure would increase to 15 rooms (approximately 7 to 8 rooms per facility). It is recommended Council engage with DE to discuss adopting a shared approach to the delivery and funding of future kindergarten facilities within the Ballarat West PSP with a view to incorporating a minimum of 2 kindergarten rooms at every proposed government primary school (4 schools and 8 rooms).
Maternal & Child Health	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:	Although the demand estimates indicate a need for approximately 5 MCH consulting rooms located within multipurpose community centres, Council typically provides two MCH rooms in a multipurpose community centre. On this basis, if four multipurpose community centres are constructed there will be eight MCH	In light of the pressure to supply a far larger number of kindergarten rooms over the coming decade than originally anticipated, it is recommended Council identify only one further early years facility for MCH service provision within the Ballarat West PSP, preferably the Community Hub 2 early years facility located within the Delacombe Town Centre.

[7] Victorian State Government Best Start, Best Life Policy (June 2022). In 2023, families in Ballarat have access to between 5 and 15 hours a week of kindergarten programs for three-year-olds. Pre-Prep rolls out in Ballarat City from 2029 with 16 to 20 Hours per week for 40 weeks of the year, with all children receiving 30 hours by 2032.

[8] 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)

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	• Community Hub 1 Early Years Hub – the already constructed Bonshaw Early Learning Centre (0.5 ha). This facility has been built and includes two MCH consulting 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 - the soon to be constructed Alfredton Community Hub (0.5 ha). This facility will include two MCH consulting rooms.	rooms provided for within the Ballarat West PSP. These rooms are typically converted into consultant suites when MCH services are no longer required to be provided from the centre.	The Department of Health also provided feedback in relation to service provision needs aligned with MCH services. The Department confirmed that the Ballarat Early Parenting Centre is currently under construction and located at 10 Fawcett Rd, Lucas (located just outside the northwest boundary of the Ballarat West PSP) and anticipates that MCH services will be co-located in new early years hubs where spaces will be available for other complementary health services.
Long Day Child Care	The current Ballarat West PSP does not refer specifically to long day child care provision. However, provision is not included as part of the four early years hubs proposed for the Ballarat West PSP. Therefore, it can be assumed that all provision will need to be met by the private or not-for-profit community sector.	The Ballarat West PSP may generate demand for as many as 1,300 long day child care places, the equivalent of 10 to 11 large sized long day child care centres.	Continue to encourage private and community based long day child care provision across the Ballarat West PSP, especially close to community infrastructure hubs.
Youth	The Ballarat West PSP does not refer specifically to youth service or youth facility provision. A Youth Hub is proposed to be built between 2026/27 and 2027/28 as part of Council's Community Infrastructure Plan. A feasibility study for this facility is currently in progress. The proposed Youth Hub will not be built in the Ballarat West PSP area, nor any of the other future growth areas. The Hub will be established centrally in the City of Ballarat.	Although there are no specific youth service facility benchmarks or demand estimators, this assessment recommends Council identify which of the future community facilities can and should provide a youth service function.	Future community facilities in the Ballarat West PSP will be designed for flexible use and include spaces for young people based on existing examples such as the Ballarat and Sebastopol Libraries.
Education facilities			
Government Primary Schools	The Ballarat West PSP includes provision for 4 Government Primary Schools. These facilities are:	This assessment estimates the need for potentially 5 Government Primary school sites. However, there are a number of existing Government Primary Schools located a short	Based on the data regarding revised dwelling yield and densities for the Ballarat West PSP, DE has confirmed that number of Government primary school sites (four) is sufficient to satisfy future demand within the Ballarat West PSP. However, DE

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	• Community Hub 1 Government Primary School (3.5 ha) – 'Bonshaw Proposed P6'. • Community Hub 2 Government Primary School (Delacombe Town Centre) - 'Cherry Flat Proposed P6'. • Community Hub 3 Government Primary School site (included as part of a 10 ha P-12 site) – 'Ballarat West Proposed P6'. • Community Hub 4 Government Primary School site (3.5 ha) – 'Alfredton West Proposed P6'.	distance east of the Ballarat West PSP boundary which may reduce this requirement estimate. The Department of Education (DE) was consulted as part of the Review to confirm future Government primary school provision needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DE.	have identified site specific location and configuration issues with all proposed Government primary school sites that it wishes to address with Council and developers to ensure consistency with the *Victorian Government School Site Selection Criteria Guidance* document. Refer to Appendix 5 for a copy of the formal response received from DE for more details.
Government Secondary Schools	The Ballarat West PSP includes provision for 1 Government Secondary School to be located within Community Hub 2 (Major Activity Centre – included as part of a 10 ha P-12 Government School site). This site is referred to by the Department of Education (DE) as 'Ballarat West Proposed 7-12'.	This assessment estimates the need for 1.5 Government Secondary school sites. The Department of Education (DE) was consulted as part of the Review to confirm future Government secondary school provision needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DE.	Based on the data regarding revised dwelling yield and densities for the Ballarat West PSP, DE has confirmed that number of Government secondary school sites (one) is sufficient to satisfy future demand within the Ballarat West PSP. However, DE have identified site specific location and configuration issues with the proposed school site that it wishes to address with Council and developers to ensure consistency with the *Victorian Government School Site Selection Criteria Guidance* document. Refer to Appendix 5 for a copy of the formal response received from DE for more details.
Government Specialist Schools	The Ballarat West PSP does not include provision for a Government Specialist School.	The Department of Education (DE) was consulted as part of the Review to confirm future Government specialist school provision needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DE.	DE notes that the existing land holdings with Ballarat Local Government Area (LGA) is expected to be sufficient to meet specialist education demand in Ballarat over the next 20 years. The department will continue to monitor the educational needs of students with disability in the Ballarat LGA and consider opportunities to strengthen inclusive education options as appropriate.
Non-Government Schools	The Ballarat West PSP includes provision for 1 non-Government School site.	Most likely no further requirement needed. However, the following enrolment demands are anticipated for the Ballarat West PSP: • 1,200 Catholic Primary School enrolments;	Formal feedback received from Diocese of Ballarat Catholic Education Limited (DOBCEL) has confirmed the need for a Catholic primary school within the Ballarat West PSP. DOBCEL will now pursue the opportunity to acquire the non-Government school

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
		• 500 other non-Government Primary school enrolments; • 1,000 Catholic Secondary School enrolments; and • 700 other non-Government Secondary school enrolments. The Diocese of Ballarat Catholic Education Limited (DOBCEL) was consulted as part of the Review to confirm future catholic school provision needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DOBCEL.	site identified for Community Hub 3 and wish to contribute to discussions to refine the layout and siting of a Catholic primary school in this location to ensure an optimum solution for the Hub.
Higher Education	The Ballarat West PSP does not include provision for a higher education facility. The nearest higher education facilities are the Australian Catholic University (located 7 kilometres north east of the Delacombe Town Centre) and Federation University, regional Victoria's largest education institution, which has the following four campus locations in Ballarat: • Camp Street (Arts Academy located 8 kilometres north east of the Delacombe Town Centre); • Gillies Street (TAFE and vocational education located 7 kilometres north of the Delacombe Town Centre); • Mt Helen (TAFE and Higher education located 10 kilometres south east of the Delacombe Town centre); and • SMB (VCAL, TAFE and higher education located 6 kilometres north east of Delacombe Town Centre).	Most likely no requirement needed. However, the following enrolment demands are anticipated for the Ballarat West PSP: • 850 TAFE enrolments; and • 1,700 university enrolments.	Given the proximity of existing higher education facilities to the Ballarat West PSP and Federation University's focus on acquiring State / Federal Government funding to establish an integrated University Campus in the heart of the Ballarat CBD, large scale investment in additional campus facilities within the Ballarat West PSP appears unlikely. However, it is recommended that Council continue to liaise with both Federation University and the Australian Catholic University to identify potential long term provision needs in the wider Ballarat West Growth Area.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	Federation University is part of a coalition of local organisations (called "Ballarat. Now and Into the Future 2022") which are advocating for six transformational projects in Ballarat including the Ballarat University Town which aims to establish an integrated University Campus in the heart of the Ballarat CBD. This project is seeking funding to relocate Federation University's Arts Academy and developing state-of-the-art teaching facilities on the SMB campus.		
Libraries, community centres, learning centres, community meeting spaces and arts / cultural facilities			
Library	The current Ballarat West PSP includes provision for a new Library facility (1,800 square metres) within Community Hub 2 (Delacombe Town Centre) on a 1-hectare site and co-located with a Level 3 multipurpose community centre and an early years facility.	The Ballarat West PSP generates a need for 1 library facility and will generate the equivalent of 217,000 loans per annum and 177,000 visits per annum.	No change recommended. This assessment supports the need for a new library facility within the Ballarat West PSP with a minimum floor area of 1,800 square metres.
Level 1 multipurpose community centre	Although the Ballarat West PSP does not adopt a community centre hierarchy it does include provision for 3 multipurpose community centres: • Community Hub 2 (1 ha); • Community Hub 3 Multipurpose Community Centre (0.8 ha); and • Community Hub 4 Multipurpose Community Centre (0.8 ha). The Community Hub 4 facility is referred to as the Alfredton Community Hub which is currently under construction and expected to	The Ballarat West PSP generates a population catchment sufficient to justify 2 Level 1 multipurpose community centres.	For the purposes of this Review it is recommend that both the soon to be constructed Alfredton Community Hub (Community hub 4) and existing Bonshaw Early Learning Centre (Community Hub 1) be classified as Level 1 multipurpose community centres. It is also recommended that the Existing Bonshaw Early Learning Centre (Community Hub 1) be classified as a Level 1 multipurpose community centre and that it be expanded to include additional kindergarten and community meeting space capacity.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	be complete in early 2024. The purpose-built facility (which incorporates the Community Hub 4 Early Years Hub) will feature three preschool rooms to accommodate 99 children at a time, two community rooms, a meeting room, and associated staff facilities.		
Level 2 multipurpose community centre	The Ballarat West PSP does not identify any proposed Level 2 Community Centres.	The Ballarat West PSP generates a population catchment sufficient to justify 2 Level 2 multipurpose community centres.	For the purposes of this Review it is recommend that both the proposed Community Hub 3 multipurpose community centre and early years facility be amalgamated and classified as a Level 2 multipurpose community centre and incorporate a Neighbourhood House service.
Level 3 multipurpose community centre	The Ballarat West PSP does not identify any proposed Level 3 Community Centres. However, when the proposed 1 hectare Community Hub 2 Library (Delacombe Town centre) and proposed 1 hectare Community Hub 2 multipurpose community centre are viewed together, they can be classified as a Level 3 Community Centre.	The Ballarat West PSP generates a population catchment sufficient to justify 0.7 of a Level 3 multipurpose community centre.	For the purposes of this Review it is recommend that both the proposed Community Hub 2 (Delacombe Town Centre) library and multipurpose community centre be amalgamated and classified as a Level 3 multipurpose community centre.
Neighbourhood House / Learning centre	The Ballarat West PSP does not identify any proposed Neighbourhood House / Learning Centre facilities. The nearest existing Neighbourhood Houses are: • Ballarat Neighbourhood Centre (located 3 kilometres east of the Delacombe Town Centre). • Ballarat East Neighbourhood House (located 8 kilometres east of the Delacombe Town Centre); • Wendouree Neighbourhood Centre (located 9 kilometres north of the Delacombe Town Centre); and	One Neighbourhood House service incorporated within one of the three proposed multipurpose community centres.	Review community centre provision strategy to determine the feasibility of expanding / reconfiguring one of the remaining proposed multipurpose community centres as a preferred location for one Neighbourhood House service, preferably at Community Hub 3.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	• Ballarat North Neighbourhood House (located 10 kilometres north east of the Delacombe Town Centre)		
Arts / cultural facilities	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. 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: • 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 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. • 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.	By full development almost 10,000 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.	Review community centre provision strategy to determine the feasibility of expanding / reconfiguring one of the remaining proposed multipurpose community centres as a preferred location for arts and cultural activities, preferably at Community Hub 2 (Delacombe Town Centre). 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.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	Greenhaulghs Road Sub-precinct (Winter Valley). A community hub and kindergarten is planned for development in FY31-32 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)			
Local unencumbered passive open space	The current Ballarat West PSP includes provision for 58.15 hectares of unencumbered passive open space and linear open spaces.	The overall supply of proposed passive open space within the Ballarat West PSP will increase because of a number of key changes that have occurred since approval of the original PSP including Council's preference to identity and configure MR Power Park (17.63 hectares) as a predominantly passive open space performing a range of natural and informal recreational functions. These changes will result in an additional 6.73 hectares of passive open space provision for the Ballarat West PSP and increase overall supply to 64.88 hectares which equates to 6.61% of the NDA of the PSP (and 5.85% of the Gross Developable Area). The Ballarat West PSP generates a need equating to 39 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).	The overall supply of proposed passive open space within the Ballarat West PSP will increase because of a number of key changes that have occurred since approval of the original PSP. Overall supply will increase from 58.15 hectares to 64.88 hectares generating a surplus of 25.88 hectares when measured against current performance targets identified in the PSP Guidelines 2.0 (note: this surplus has been offset by a large corresponding decrease in 22.06 hectares of active open space). It is recommended Council 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.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
		This indicates a present surplus of approximately 25.88 hectares of passive open space.	
Local formal & informal active open space	The current Ballarat West PSP includes provision for approximately 57.61 hectares of active open space to be delivered across the following five sites: • M R Power Regional Park (An existing 17.63 hectare reserve will perform a dual regional / local sports reserve role). • Mining Park (a 12.97 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). 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 including: • Council's preference to identity and configure MR Power Park as a predominantly passive open space performing a range of natural and informal recreational functions and reduce the active open space function to approximately 4 hectares; • A reduction in the size of the Community Hub 2 active open space reserve (originally a proposed 8 hectare reserve, now reduced to 3.5 hectares); and	The revised Ballarat West PSP includes provision for approximately 36.94 hectares of active open space which equates to 3.76% of the NDA of the PSP (and 3.34% of the Gross Developable Area). Active open spaces are to be delivered across the following five sites: • M R Power Regional Park (a proposed 4 hectare active open space component); • Mining Park (a proposed 11.13 hectare active open space); • Community Hub 2 (a proposed 3.5 hectare reserve); • Community Hub 3 (a proposed 10.33 hectare reserve); and • Community Hub 4 (an 8 hectare reserve split across 2 sites, one already completed and one yet to be completed). The Ballarat West PSP generates a need equating to approximately 59 hectares of local active open space based on the application of 6% of NDA for active open space guideline. This indicates a present shortfall of approximately 22.06 hectares of traditional active open space, although the majority of this shortfall will still be used for informal active recreation.	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 57.61 hectares to 36.94 hectares leaving a shortfall of 22.06 hectares based on the VPA PSP benchmark of 6% of NDA (note: this shortfall has been offset by a large corresponding surplus of 25.88 hectares of passive open space). In response to this reduced supply of active open space it is recommended that Council assess implementing the following measures: • The embellishment of MR Power Park and Djila-tjarriu Park with a diverse range of informal recreation facilities. • Where feasible, it is recommended that Council identify opportunities for informal recreation opportunities as part of the development of encumbered open spaces. • Investigate opportunities to secure active open space land in the adjoining future Ballarat West Growth Area and / or Ballarat North West Growth Area; • Evaluate how current projects identified in the Ballarat West DCP toward active open space developments are to be utilised in light of the changes identified by this review.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	• Community Hub 4 active open space reserve (proposed allocation of 8 hectares of active open space across 2 separate sites) • A reduction in the size of the active open space function of Mining Park from 12.97 hectares to 11.13 hectares due to drainage requirements.		
Encumbered open spaces such as drainage reserves, drainage basins, conservation land and heritage land.	The current Ballarat West PSP indicates that the PSP will contain 108.74 hectares of encumbered open space consisting of drainage basins, drainage reserves, heritage conservation areas and environmental conservation areas.	The review of the Ballarat West PSP indicates that the total supply of encumbered public open space will decrease to 102.09 hectares (a net decline of 6.65 hectares) of drainage basins, drainage reserves, heritage conservation areas and environmental conservation areas	The review of the Ballarat West PSP indicates that the total supply of encumbered public open space will decrease to 102.09 (a net decline of 6.65 hectares). Although not classified as credited open space, these open spaces will provide a tangible contribution to the open space values and functions of the PSP including providing some additional opportunities for informal recreation infrastructure provision (e.g. trails and outdoor gym equipment).
Regional open space	The current Ballarat West PSP includes the existing MR Power Park (17.63 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 Council prepared a Master Plan for the site indicating a predominantly passive open space and informal recreation role for MR Power Park.	The revised Ballarat West PSP includes the existing MR Power Park (17.63 hectares) which is identified as a regional open space with a predominantly passive open space function (13.63 hectares) and a smaller active open space function (4 hectares).	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 function (13.63 hectares) and a smaller active open space function (4 hectares).
Indoor recreation facilities			
Multipurpose indoor court facility	The Ballarat West PSP includes two proposed Council indoor recreation centres. These are: • Community Hub 3 indoor recreation facility (8 courts) on a 1 hectare site. • MR Power Regional Park indoor recreation facility (4 courts).	The demand generated by the Ballarat West PSP is equivalent approximately 4 indoor multipurpose courts. Given that there are two indoor recreation facilities proposed to be established within the Ballarat West PSP supplying a total of 12 indoor courts, no further provision is recommended.	Given the demand and supply requirements generated by the Ballarat West PSP, and Council's current position on the future role and function MR Power Park as an informal regional passive open space, it is recommended that the proposed indoor recreation facility earmarked for MR Power Park be removed as a requirement of the Ballarat West PSP. Any development contributions collected as part of the Ballarat West DCP for this project is to be

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
			redirected toward the construction of the indoor recreation facility proposed for Community Hub 3 which Council still supports.
Aquatic leisure centres	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.	The demand generated by the Ballarat West PSP is equivalent approximately 205,000 Council aquatic leisure centre visits per annum and 0.3 Council aquatic leisure centre facilities.	Given its reasonable proximity to the Ballarat Aquatic & Lifestyle Centre no additional aquatic leisure centre provision is recommended for the Ballarat West PSP.
Health services			
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.	Possibly 12 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 in the Ballarat West PSP with an aspirational target of accommodating up to 12 facilities.
Acute / Sub-acute services	The Ballarat West PSP does not include an existing or planned acute / sub-acute health service site(s). Grampians Health, the main provider of public acute, sub-acute and mental health services in Ballarat, has several existing sites in the municipality including the Ballarat Base Hospital (located 7 kilometres north east of the Delacombe Town Centre) and the Queen Elizabeth Centre (located 6 kilometres north east of the Delacombe Town Centre). Other acute health facilities in Ballarat include St John of God Ballarat Hospital (a private hospital located 7 kilometres north east of the Delacombe Town Centre) and Ballarat Surgicentre (a private day hospital located 9 kilometres north east of the Delacombe Town Centre).	The demand generated by the Ballarat West PSP is equivalent approximately 140 public/private hospital beds. The Department of Health (DH) was consulted as part of the Review to confirm future acute / sub-acute health provision needs for the Ballarat West PSP and Ballarat more broadly. However, DH provided no formal response to acute / sub-acute health provision needs.	Although there are no existing or planned acute and sub-acute health services for the Ballarat West PSP, the proximity of the PSP to existing facilities (including Ballarat Base Hospital and St John of God Ballarat) indicates additional provision within the PSP is unlikely to be a high priority. However, it is recommended that Council engage with Grampians Health to confirm whether the Ballarat West PSP may be a suitable location option for a new Community Mental Health Facility in Ballarat it is currently seeking fund for from the State Government. Additional acute and sub-acute health provision may also be considered as part of the future planning of the Ballarat West Growth Area.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
	The most notable health infrastructure initiative underway is the $541.6 million Ballarat Base Hospital Redevelopment (which includes a new multilevel tower which includes a new emergency department, state-of-the-art theatre suite and an extra 100 inpatient and short-stay beds). This project commenced in 2023 and is anticipated to be implemented over a number of stages and finally completed by 2027. Grampians Health is also leading the campaign for a new Community Mental Health Facility to meet the rapidly growing demand for community-based mental health services in the Ballarat and Grampians region. The purpose-built facility will provide early intervention services in a contemporary and highly accessible setting, serving a catchment area of more than 300,000 people.		
Community health services	The Ballarat West PSP does not include an existing or planned community health service site. Ballarat Community Health, the main provider of community health services in Ballarat, has six existing sites in the municipality including its Sebastopol facility (located 3 kilometres east of the Delacombe Town Centre) its Lucas facility (located 8 kilometres north of the Delacombe Town Centre) and its main CBD facility in Victoria Street (located 8 kilometres east of the Delacombe Town Centre).	The demand generated by the Ballarat West PSP is equivalent approximately 1,100 community health service clients. The Department of Health (DH) was consulted as part of the Review to confirm future community health provision needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DH.	Future community health provision within Ballarat is likely to continue to be centred on Ballarat Community Health's existing six sites. However, the proposed development of the Ballarat West PSP can enhance access to public community health services and private primary care services by: • Including consulting rooms for outreach community health programs within the Level 2 and Level 3 multipurpose community centres proposed for the PSP; and • Facilitating the establishment at least one privately operated general practice clinic. The Department of Health has also indicated that long-term planning provision should also consider

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
			accommodating Aboriginal-led service delivery from new community spaces. At a minimum, organisations, such as Ballarat and District Aboriginal Cooperative should be offered co-location opportunities for any new infrastructure builds related to community hubs or early years hubs.
Cemeteries	The Ballarat West PSP does not include an existing or planned cemetery. The nearest existing cemeteries are the Old Ballarat Cemetery (approximately 8 kilometres north east of the Delacombe Town Centre), the New Ballarat Cemetery (approximately 13 kilometres north east of the Delacombe Town Centre) and the Buninyong General Cemetery (approximately 10 kilometres south east of the Delacombe Town Centre).	The Department of Health (DH) was consulted as part of the Review to confirm future cemetery provision needs for the Ballarat West PSP and Ballarat more broadly. However, DH provided no formal response to cemetery provision needs.	Although there are no existing or planned cemeteries for the Ballarat West PSP, the proximity of the PSP to existing facilities to the north east (Old Ballarat Cemetery and New Ballarat Cemetery) and south east (Buninyong General Cemetery) indicates additional provision within the PSP is unlikely to be a high priority. However, additional provision may be considered as part of the future planning of the Ballarat West Growth Area.
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.	The Department of Justice and Community Safety (DJCS) and Victoria Police were consulted as part of the Review to confirm future police station provision needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DJCS.	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), the need to establish a new Police Station within the PSP is not considered a high priority. 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 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).	The Department of Health (DH) was consulted as part of the Review to confirm future ambulance provision needs for the Ballarat West PSP and Ballarat more broadly. However, DH provided no formal response to ambulance provision needs.	Although there are no existing or planned ambulance stations for the Ballarat West PSP, the 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. Additional provision may be considered as part of the future planning of the Ballarat West Growth Area.

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
Fire Services	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.	The Department of Justice and Community Safety (DJCS) and the Emergency Services Infrastructure Authority (ESIA) were consulted as part of the Review to confirm future fire station needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DJCS.	The existing Ballarat West Fire Station will be sufficient to meet the future needs of the Ballarat West PSP. However, additional provision may be considered as part of the future planning of the Ballarat West Growth Area.
Victorian State Emergency Service (VICSES)	There is no VICSES facility located within the Ballarat West PSP. The nearest existing facility is located a 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.	The Department of Justice and Community Safety (DJCS) and the Emergency Services Infrastructure Authority (ESIA) were consulted as part of the Review to confirm future VICSES needs for the Ballarat West PSP and Ballarat more broadly. Refer to Appendix 5 for a copy of the formal response received from DJCS.	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 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 within the Ballarat West PSP.
Law courts	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).	The Department of Justice and Community Safety (DJCS) was consulted as part of the Review to confirm future law court provision needs for the Ballarat West PSP and Ballarat more broadly. However, DJCS provided no formal response to law court provision needs.	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 Ballarat West PSP is not justified. However, as the population of Ballarat continues to grow over the coming decades there may 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.	This assessment supports the needs for residential aged care provision within the Ballarat West PSP (demand equivalent to approximately 430 to 450 aged care places).	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

Community Infrastructure Category	Current Ballarat West PSP Provision	Revised Assessment of Provision Requirements	Implications for the Ballarat West PSP Review
		Although subject to market / developer interest, Council is encouraged to nominate preferred locations for future provision (potentially 3 to 4 sites).	provision in the Ballarat West PSP with an aspirational target of accommodating 3 to 4 facilities.

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 expected that for the remaining undeveloped land, densities will be closer to 20 dwellings per hectare than 15 and therefore, Council estimates that the PSP will accommodate approximately 1,000 more dwellings than originally forecast and approximately 2,700 more residents. By full development it is estimated the PSP will accommodate approximately 15,500 dwellings and be home to approximately 42,000 residents.

9.2 Public Open Space & Recreation

Passive Open Space

2. The overall supply of proposed passive open space within the Ballarat West PSP will increase because of a number of key changes that have occurred since approval of the original PSP. Overall supply will increase from 58.15 hectares to 64.88 hectares generating a surplus of 25.88 hectares when measured against current performance targets identified in the PSP Guidelines 2.0 (note: this surplus has been offset by a large corresponding decrease in 22.06 hectares of active open space).
3. It is recommended Council 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) to clearly distinguish between Neighbourhood, District and Regional open spaces.

Active Open Space

4. 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 57.61 hectares to 36.94 hectares leaving a shortfall of 22.06 hectares based on the VPA PSP benchmark of 6% of NDA (note: this shortfall has been offset by a large corresponding surplus of 25.88 hectares of passive open space).
5. In response to this reduced supply of active open space it is recommended that Council assess implementing the following measures:
    - The embellishment of MR Power Park Djila-tjarriu Park with a diverse range of informal recreation facilities.

- Where feasible, it is recommended that Council identify opportunities for informal recreation opportunities as part of the development of encumbered open spaces.
- Investigate opportunities to secure active open space land in the adjoining future Ballarat West Growth Area and / or Ballarat North West Growth Area;
- Evaluate how current projects identified in the Ballarat West DCP toward active open space developments are to be utilised in light of the changes identified by this review.

Encumbered Open Space

6. The review of the Ballarat West PSP indicates that the total supply of encumbered public open space will decrease to 102.09 (a net decline of 6.65 hectares). Although not classified as credited open space, these open spaces will provide a tangible contribution to the open space values and functions of the PSP including providing some additional opportunities for informal recreation infrastructure provision (e.g. trails and outdoor gym equipment).

Regional Open Space

7. 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 function (13.63 hectares) and a smaller active open space function (4 hectares).

Indoor Recreation

8. Given the demand and supply requirements generated by the Ballarat West PSP, and Council's current position on the future role and function MR Power Park as an informal regional passive open space, it is recommended that the proposed indoor recreation facility earmarked for MR Power Park be removed as a requirement of the Ballarat West PSP. Any development contributions collected as part of the Ballarat West DCP for this project is to be redirected toward the construction of the indoor recreation facility proposed for Community Hub 3 which Council still supports.
9. Given its reasonable proximity to the Ballarat Aquatic & Lifestyle Centre no additional aquatic leisure centre provision is recommended for the Ballarat West PSP.

9.3 Multipurpose Community Centres & Community Services

Level 1 Multipurpose Community Centres

10. For the purposes of this Review it is recommend that both the soon to be constructed Alfredton Community Hub (Community hub 4) and existing Bonshaw Early Learning Centre (Community Hub 1) be classified as Level 1 multipurpose community centres.

11. It is also recommended that the Existing Bonshaw Early Learning Centre (Community Hub 1) be classified as a Level 1 multipurpose community centre and that it be expanded to include additional kindergarten and community meeting space capacity.

Level 2 Multipurpose Community Centres

12. For the purposes of this Review it is recommend that both the proposed Community Hub 3 multipurpose community centre and early years facility be amalgamated and classified as a Level 2 multipurpose community centre and incorporate a Neighbourhood House service.

Level 3 Multipurpose Community Centres

13. For the purposes of this Review it is recommend that both the proposed Community Hub 2 (Delacombe Town Centre) library and multipurpose community centre be amalgamated and classified as a Level 3 multipurpose community centre.

Early Years Services – Long Day Child Care

14. Continue to encourage private and community based long day child care provision (potentially as many as 10 to 11 services) across the Ballarat West PSP, especially close to community infrastructure hubs.

Early Years Services – 3 & 4 Year Old Sessional Kindergarten

15. Given that one early years facility has already been constructed (Bonshaw Early Learning Centre) with 2 kindergarten rooms (proposed to be expanded to 3 rooms) and the soon to be constructed Alfredton Community Hub will include 3 kindergarten rooms, the remaining 2 facilities would need to accommodate a further 8 kindergarten rooms (4 rooms per facility) under the present kindergarten policy environment. However, under the proposed kindergarten policy initiative, this figure would increase to 15 rooms (approximately 7 to 8 rooms per facility).
16. It is recommended Council engage with DE to discuss adopting a shared approach to the delivery and funding of future kindergarten facilities within the Ballarat West PSP with a view to incorporating a minimum of 2 kindergarten rooms at every proposed government primary school (4 schools and 8 rooms).

Early Years Services – Maternal & Child Health

17. In light of the pressure to supply a far larger number of kindergarten rooms over the coming decade than originally anticipated, it is recommended Council identify only one further early years facility for MCH service provision within the Ballarat West PSP,

preferably the Community Hub 2 early years facility located within the Delacombe Town Centre.

Early Years Services – Youth

18. Future community facilities in the Ballarat West PSP will be designed for flexible use and include spaces for young people based on existing examples such as the Ballarat and Sebastopol Libraries.

Neighbourhood Houses / Adult Education

19. Review community centre provision strategy to determine the feasibility of expanding / reconfiguring one of the remaining proposed multipurpose community centres as a preferred location for one Neighbourhood House service, preferably at Community Hub 3.

Libraries

20. No change recommended. This assessment supports the need for a new library facility within the Ballarat West PSP and its proposed location (Community Hub 2 – Delacombe Town Centre) and that it includes a minimum floor area of 1,800 square metres.

Arts & Cultural Facilities

21. Review community centre provision strategy to determine the feasibility of expanding / reconfiguring one of the remaining proposed multipurpose community centres as a preferred location for arts and cultural activities, preferably at Community Hub 2 (Major Activity Centre).
22. 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.

9.4 Education

Government Primary

23. Based on the data regarding revised dwelling yield and densities for the Ballarat West PSP, DE has confirmed that number of Government primary school sites (four) is sufficient to satisfy future demand within the Ballarat West PSP. However, DE have identified site specific location and configuration issues with all proposed Government primary school sites that it wishes to address with Council and developers to ensure consistency with the Victorian Government School Site Selection Criteria Guidance document. Refer to Appendix 5 for a copy of the formal response received from DE for more details.

24. 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

25. Based on the data regarding revised dwelling yield and densities for the Ballarat West PSP, DE has confirmed that number of Government secondary school sites (one) is sufficient to satisfy future demand within the Ballarat West PSP. However, DE have identified site specific location and configuration issues with the proposed school site that it wishes to address with Council and developers to ensure consistency with the Victorian Government School Site Selection Criteria Guidance document. Refer to Appendix 5 for a copy of the formal response received from DE for more details.

Government Specialist Schools

26. DE advises that its existing school land holdings within the Ballarat Local Government Area (LGA) is expected to be sufficient to meet specialist education demand in Ballarat over the next 20 years. The Department will continue to monitor the educational needs of students with a disability in the Ballarat LGA and consider opportunities to strengthen inclusive education options as appropriate.

Non-Government Schools

27. Formal feedback received from Diocese of Ballarat Catholic Education Limited (DOBCEL) has confirmed the need for a Catholic primary school within the Ballarat West PSP. DOBCEL will now pursue the opportunity to acquire the non-Government school site identified for Community Hub 3 and wish to contribute to discussions to refine the layout and siting of a Catholic primary school in this location to ensure an optimum solution for the Hub.

Higher Education

28. Given the proximity of existing higher education facilities to the Ballarat West PSP and Federation University's focus on acquiring State / Federal Government funding to

establish an integrated University Campus in the heart of the Ballarat CBD, large scale investment in additional campus facilities within the Ballarat West PSP appears unlikely. However, it is recommended that Council continue to liaise with both Federation University and the Australian Catholic University to identify potential long term provision needs in the wider Ballarat West Growth Area.

9.5 Law Courts, Police & Emergency Services

Police

29. 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), the need to establish a new Police Station within the PSP is not considered a high priority. 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.

Fire Services

30. The existing Ballarat West Fire Station (located within the Ballarat West PSP) will be sufficient to meet the future needs of the Ballarat West PSP. However, additional provision may be considered as part of the future planning of the Ballarat West Growth Area.

Ambulance Services

31. Although there are no existing or planned ambulance stations for the Ballarat West PSP, the 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. Additional provision may be considered as part of the future planning of the Ballarat West Growth Area.

Victorian State Emergency Services (VICSES)

32. 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 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 within the Ballarat West PSP.

Law Courts

33. 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 Ballarat West PSP is not justified. However, as the population of Ballarat continues to grow over the coming decades there may be a new to expand and / or redevelop the existing Ballarat Magistrates Court and increase its operational resources.

9.6 Health

Acute / Sub-Acute Health Services

34. Although there are no existing or planned acute and sub-acute health services for the Ballarat West PSP, the proximity of the PSP to existing facilities (including Ballarat Base Hospital and St John of God Ballarat) indicates additional provision within the PSP is unlikely to be a high priority. However, it is recommended that Council engage with Grampians Health to confirm whether the Ballarat West PSP may be a suitable location option for a new Community Mental Health Facility in Ballarat it is currently seeking fund for from the State Government.
35. Additional acute and sub-acute health provision may also be considered as part of the future planning of the Ballarat West Growth Area.

Community Health Services

36. Future community health provision within Ballarat is likely to continue to be centred on Ballarat Community Health's existing six sites. However, the proposed development of the Ballarat West PSP can enhance access to public community health services and private primary care services by: 1) including consulting rooms for outreach community health programs within the Level 2 and Level 3 multipurpose community centres proposed for the PSP, and 2) facilitating the establishment at least one privately operated general practice clinic.
37. The Department of Health has also indicated that long-term planning provision should also consider accommodating Aboriginal-led service delivery from new community spaces. At a minimum, organisations, such as Ballarat and District Aboriginal Cooperative should be offered co-location opportunities for any new infrastructure builds related to community hubs or early years hubs.

Cemeteries

38. Although there are no existing or planned cemeteries for the Ballarat West PSP, the proximity of the PSP to existing facilities to the north east (Old Ballarat Cemetery and New Ballarat Cemetery) and south east (Buninyong General Cemetery) indicates additional provision within the PSP is unlikely to be a high priority. However, additional provision may be considered as part of the future planning of the Ballarat West Growth Area.

9.7 Aged Care & Other Services for Older Persons

Aged Care Places

39. 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 in the Ballarat West PSP with an aspirational target of accommodating 3 to 4 facilities.

9.8 Consistency with Statutory Policies and Other Strategic Documents

40. 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

41. 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.

9.10 Review of the Ballarat West DCP

42. The findings and recommendations of this review will have implications for the Ballarat West DCP. It is recommended that the Ballarat West DCP be reviewed to assess these implications in greater detail.

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 transitionary 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.

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 7 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:

- 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).

Table 5 – 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.**		
F 10.1 The open space network should include local parks that: • 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. Relevant VPP: Clause 56.05-2	• 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).	T11 The open space network should seek to meet the following minimum targets: • Within residential areas (including activity centres): - 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. Relevant VPP: Clause 19.02-6S, 53.01 T12 Open space and sports reserves should be located to meet the following distribution targets: • 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. Relevant VPP: Clause 56.05-2 Note: Includes sports reserves and public land that is encumbered by other uses but is capable of being utilised for open space purposes.
F 10.2 Proposed sporting reserves should be located, designed and configured to be: • 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.	• 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.	

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
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.	• A Public Realm & Water Plan should show linkages and connections, any barriers to connectivity, and measures to overcome barriers.	
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.	• 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.	
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. 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. Relevant VPP: Clause 56.05-2, 19.03-3S	• 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		
F 14. Local schools and community Infrastructure **Education and community infrastructure and facilities that are located to equitably and efficiently maximise their accessibility and shared use.**		
F 14.1 Education and community facilities (i.e. primary, secondary and specialist schools, kindergartens, community centres, health facilities and sport reserves) should: • 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. Relevant VPP: Clause 56.03-3	• 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	T18 The location of dwellings should achieve the following accessibility targets in relation to education and community facilities: • 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. Note: A health facility may include areas where a general practitioner would be capable of operating (for example, commercial or mixeduse zone).

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
	of Education and Training (DET) to determine appropriate land take and design requirements. Note: PSPs are only capable of accommodating the provision of infrastructure. Timing of delivery is subject to the discretion of the relevant service provider.	
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.	• 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.	
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.	• 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.	
F 14.4 Where feasible, education and community infrastructure should provide space for not-for-profit organisations. Opportunities should also be explored in town centres for space that not-for-profits may be able to rent	• 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.	
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.	• 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.	
F 15. Lifelong learning opportunities **Education and community infrastructure and facilities that cater for the many social needs of the community and individuals at any stage of their lives.**		

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
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. Relevant VPP: Clause 56.03-3	• 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.	Refer to T18 Targets
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.)	• 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.	
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.	• 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).	
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.	• 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.	
Infrastructure Coordination		
F 17. Staging and location of development **Directing the staging and location of development within a PSP to:** • **use available capacity in existing infrastructure** • **support the orderly and economic extension or augmentation of existing infrastructure** • **match the timely provision of new infrastructure.** **This will include directing the location and timing of development and identifying trigger points for the provision of required infrastructure.**		
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: • integration and shared-use opportunities	• 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.	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.)

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
• 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.	• 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.	
F 17.2 The staging of development within PSPs should consider: • 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.	• 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.	
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.	• Land required in the future should be identified in a Place Infrastructure Plan.	
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.	• 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.	
F 18. Innovative and sustainable infrastructure delivery		

PSP Feature & General Principles	How to Apply to PSP	PSP / Performance Targets
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.		
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.	• The PSP vision statement should identify any proposed infrastructure or service delivery innovations, as well as actions to support the vision.	Refer to Performance Target T18
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.	• 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.	

1.2 City of Ballarat & Non Council Agency Strategic Documents

A number of City of Ballarat and other non-Council agency strategies, plans and polices 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
- Ballarat 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

Table 6 - Ballarat City Council Strategic Documents Potentially Relevant to the Assessment

Strategy Type and Name
Corporate Strategies
Community Vision 2021-2031 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.
Council Plan 2021-2025 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. The plan has six goals: • 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
City of Ballarat Health and Wellbeing Plan 2021-2031 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. The Health and Wellbeing Plan 2021-2031 has six priority areas: • 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
City of Ballarat Asset Plan 2022-2032 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
Education, Early Years, Youth and Older Persons
Municipal Early Years Plan 2022-26 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: • Valued, loved and safe • Having material basics • Being healthy • Children are learning • Children are participating • Positive sense of culture and identity
Youth Strategy 2022-2026 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.
Older Persons
Ageing Well Strategy 2022-2026 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:

Strategy Type and Name
• 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
Active Ballarat Strategy 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. The overall objectives of this strategy are to: • 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.
Active Women and Girls Strategy 2018 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. 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: • Participation; • Culture and Environment; • Infrastructure; and • Media Action.
Ballarat Aquatic Strategy 2014 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. 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."
Ballarat Skate and Youth Facilities Framework (2019) 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.
Lawn Bowls Facilities Framework (2015) 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. 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.
Ballarat Open Space Strategy (2008) The Ballarat Open Space Strategy: • 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.
Playspace Planning Framework (2014)

Strategy Type and Name
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.
Libraries, Arts & Culture
Ballarat Libraries and Learning Strategy 2022-2027 Key priorities of the Strategy are: Reach out 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. Branch out 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. Stand out 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. 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)
Ballarat Arts and Cultural Infrastructure Report (2021) 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. This Report has identified six strategic priorities to guide the City of Ballarat's investment in: • 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. These six strategic priorities include: 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.
Ballarat Creative City Strategy (2019) 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: 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
Ballarat Creative Precinct Master Plan (2019)

Strategy Type and Name
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.
Ballarat Event Strategy 2018-28 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.
Ballarat Heritage Plan 2017-30 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: 1. Regeneration 2. Celebrating and inspiring with Ballarat's stories 3. Managing change and safeguarding heritage.
Other
Social Policy Framework 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: • Access to Food • Affordable Housing • Alcohol and other Drugs • Mental Health and Wellbeing • Preventing Gambling Harm • Preventing Family Violence and • Promoting Active Living
Intercultural Plan 2022-2026 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.

1.2.2 Non-Council Strategic Documents

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

- 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 7 - Non-Council Strategies and Plans

Document Name
Victorian State Government, Best Start, Best Life Policy (June 2022) The Andrews Labor Government will expand the Best Start, Best Life program with three major new initiatives: • Making kinder free across the state • Delivering a new year of universal Pre-Prep for 4-year-olds • Establishing 50 government operated childcare centres 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. 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. 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. 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.
Transforming lives and enhancing communities: Federation University Strategic Plan 2018 - 2022 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. 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. Purpose: To transform lives and enhance communities. Priorities • 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. Outcomes By 2022 FedUni will:

Document Name
1. Become a popular student destination • 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. 2. Offer a high-quality student experience • 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. 3. Make a positive impact • 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. 4. Become a university workplace of choice • 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
Health 2040: Advancing health, access and care The organisation's vision is for all Victorians to have: • 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. Better health • 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 Better access • 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 Better care • Target zero avoidable harm • Healthcare that focuses on outcomes • People are active partners in care • Care fits together around people's needs
Statewide Design, Service and Infrastructure Plan for Victoria's Health System: 2017–2037 This Plan focuses on five priority areas over the coming 20 years: 1. building a proactive system that promotes health and anticipates demand 2. creating a safety and quality-led system 3. integrating care across the health and social service system 4. strengthening regional and rural health services 5. investing in the future—the next generation of healthcare
Ballarat Health Services Strategic Plan 2017 – 2022 The BHS 2017 – 22 Strategic Plan:

Document Name
• 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.
Victoria Police Blue Paper: A Vision for Victoria Police In 2025 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: **1. Better matching of resources to demand by rethinking the traditional operating model** The Paper makes the following observations on this direction: *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"".* **2. Improving capability through workforce reform and technology** The Paper makes the following observations on this direction: *"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.* *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.* *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."* **3. Collaborating more closely through partnerships** The Paper makes the following observations on this direction: *"Different types of partnerships with the community are necessary:* • *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.* • *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.* • *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.* • *Victoria Police needs to engage with businesses in a different way for mutual benefit, based on enduring structures and processes.* • *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".*
Ambulance Victoria Strategic Plan 2017-2022 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. The Plan focuses on achieving four key outcomes and associated priorities:

Document Name
Outcome1 - An exceptional patient experience • 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 **Outcome 2 - Partnerships that make a difference** • 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 **Outcome 3 - A great place to work and volunteer** • 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 **Outcome 4 - A high performing organisation** • 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
Court Services Victoria Strategic Asset Plan:2016-2031 The purpose of this Plan is to deliver safe, secure and sustainable court and tribunal assets via excellent and expert asset management. 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. The key priority focus areas are: • 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. The strategy responds to the defined service needs of all jurisdictions, incorporating the following components over a 15 year period: • Investment in ten new court and tribunal facilities • Expansion of five existing court and tribunal facilities • Upgrade and lifecycle management across the court portfolio - 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.
Fire Rescue Victoria Strategic Plan 2022-2032 The FRV Strategic Plan is built on the following five pillars of focus over the next 10 years: 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.

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.

Appendix 2 – Community Infrastructure Audit Maps

Figure 7 - Libraries, Community Centres, Cultural Facilities and Halls

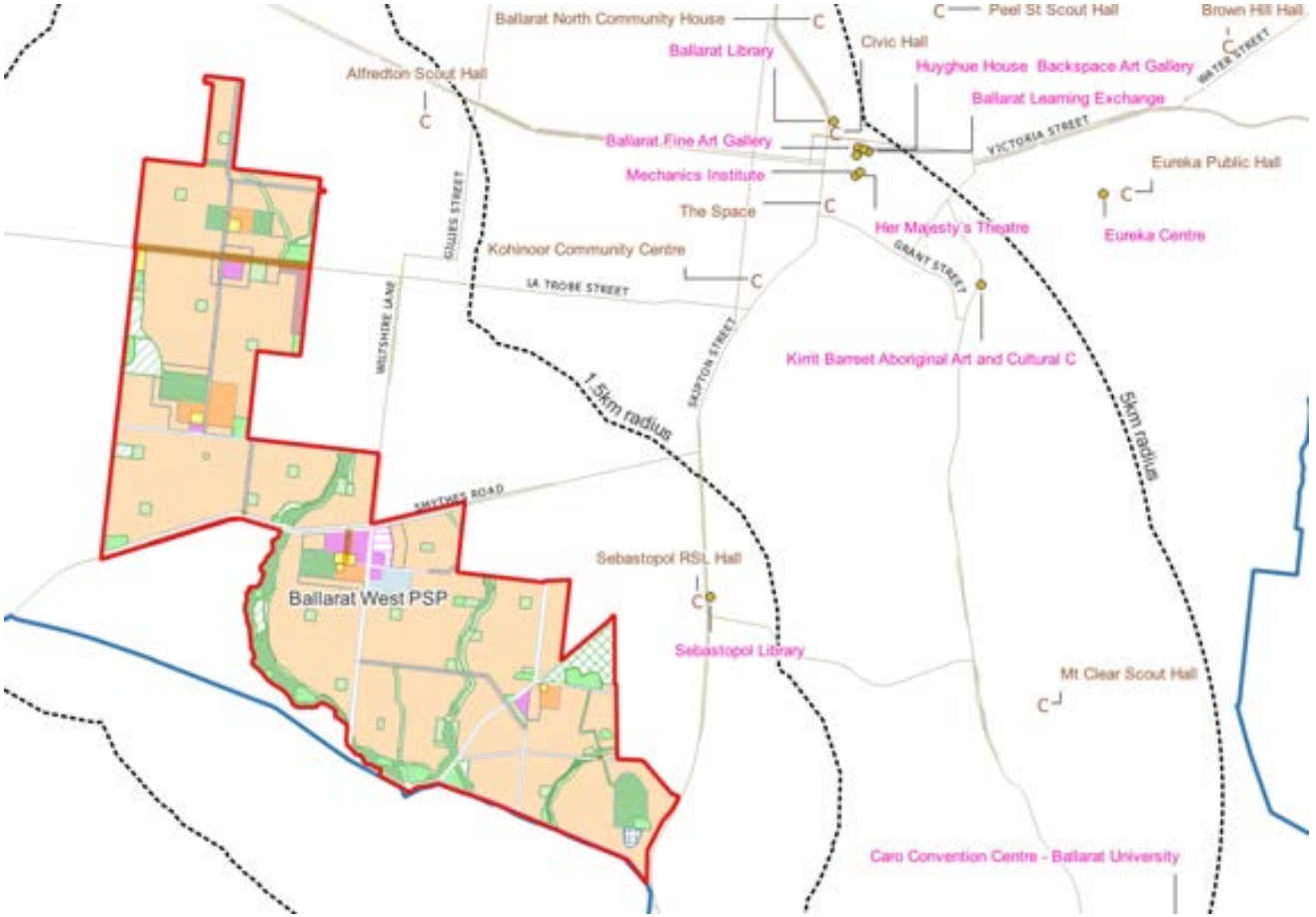


Figure 8- Early Years Facilities: Long Day Child Care (L), Sessional Kindergarten (K) and Maternal & Child Health (M)

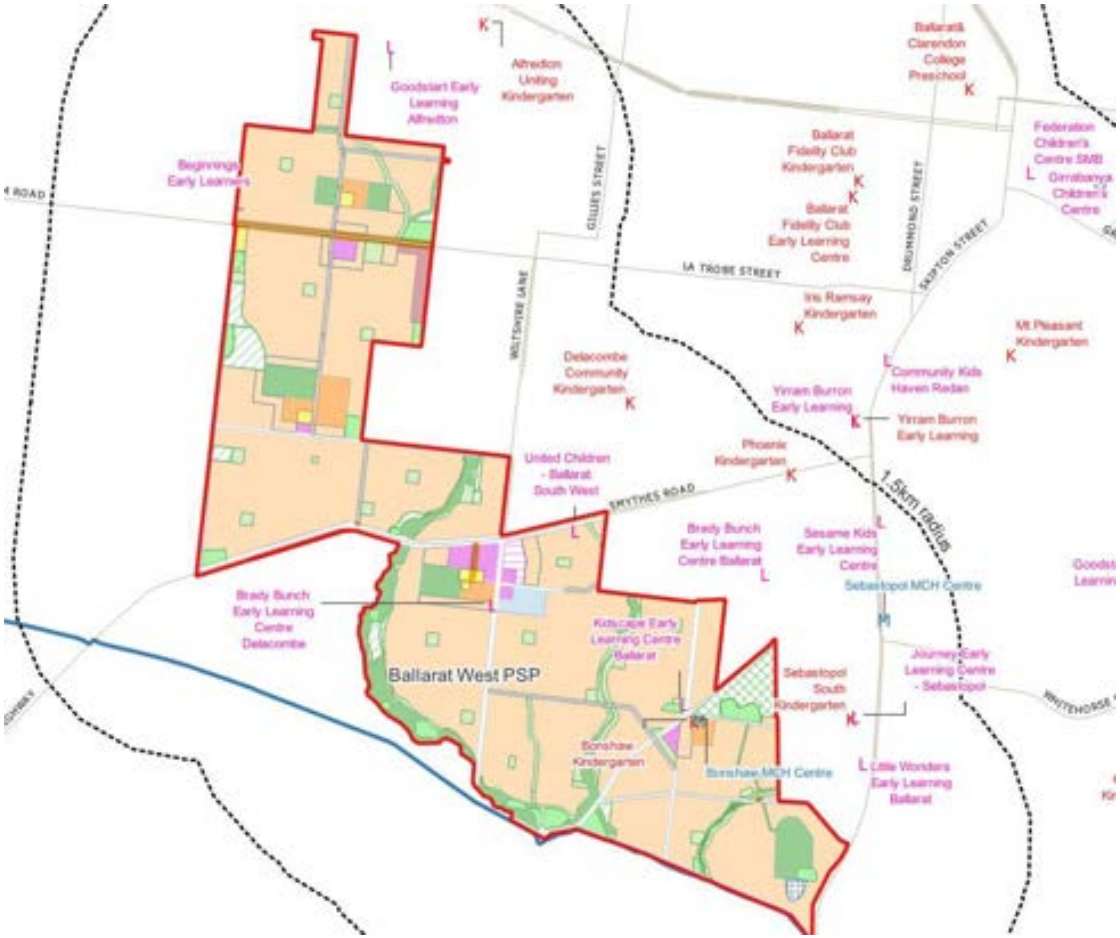


Figure 9 - Open Space and Recreation Facilities

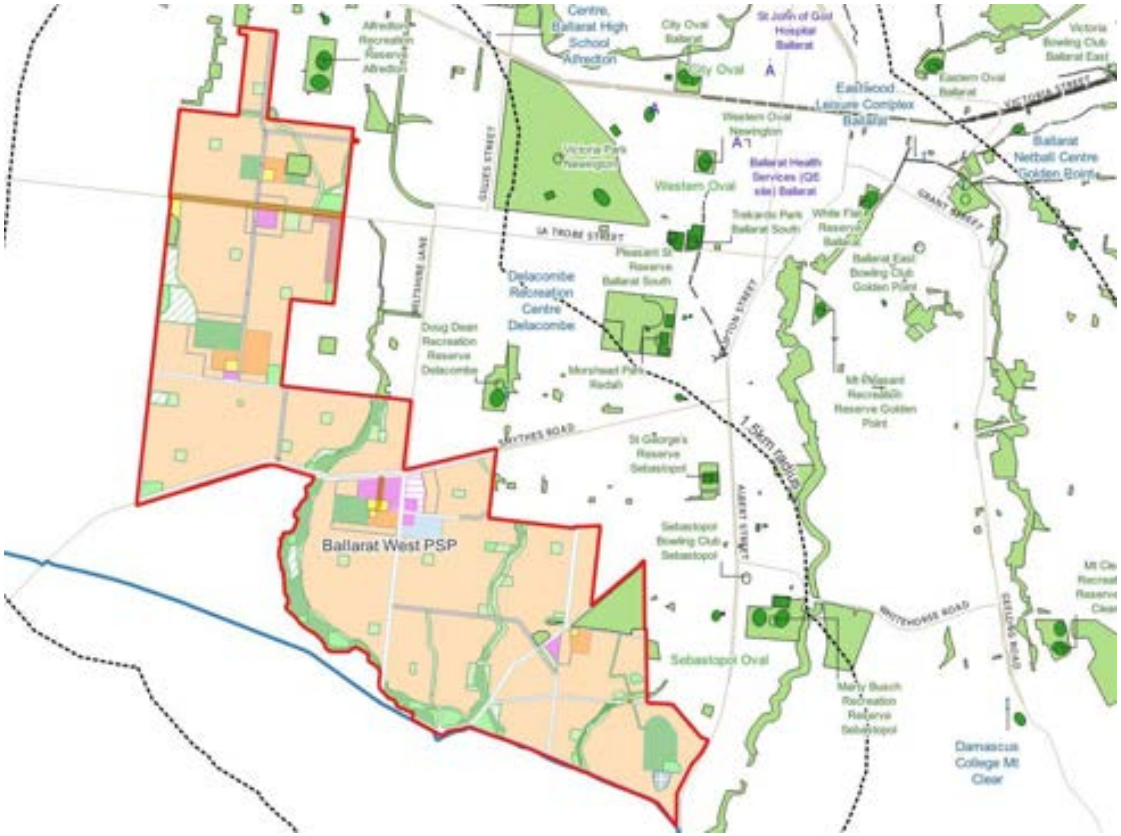


Figure 10 - Education Facilities

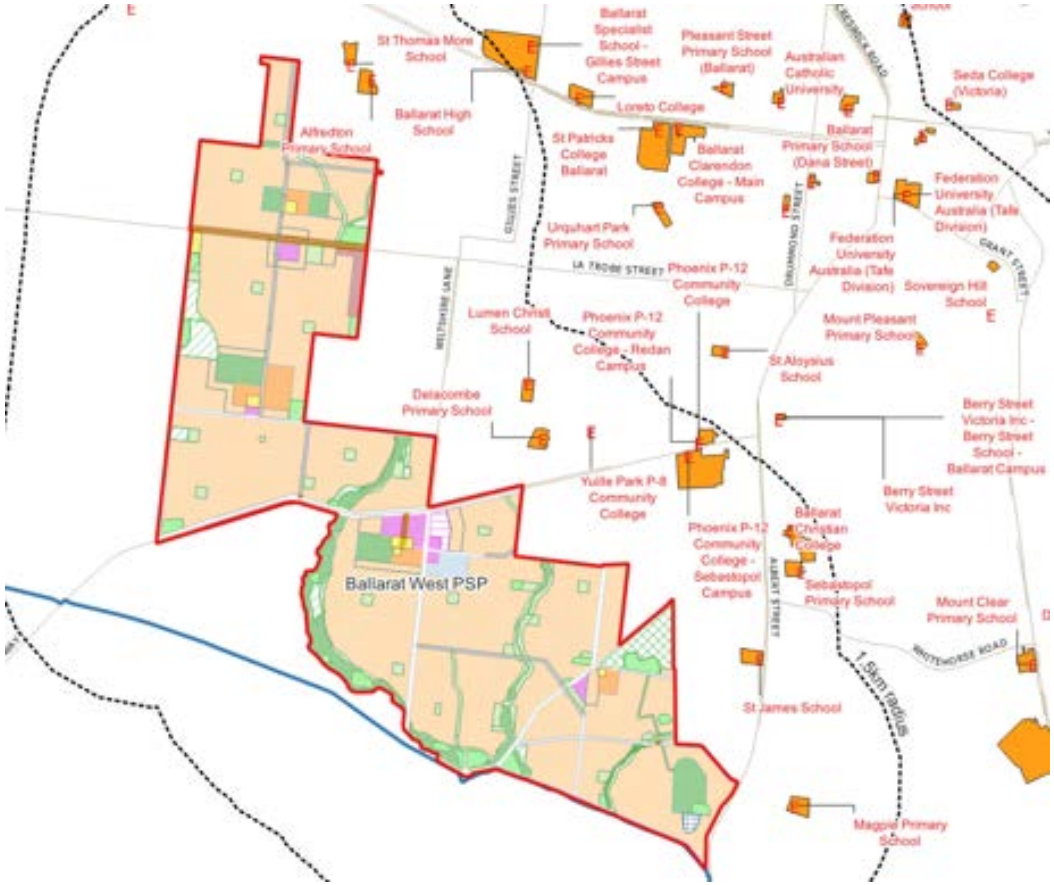


Figure 11 - Law Courts, Police and Emergency Services

Figure 12 - Acute and Community Health Services

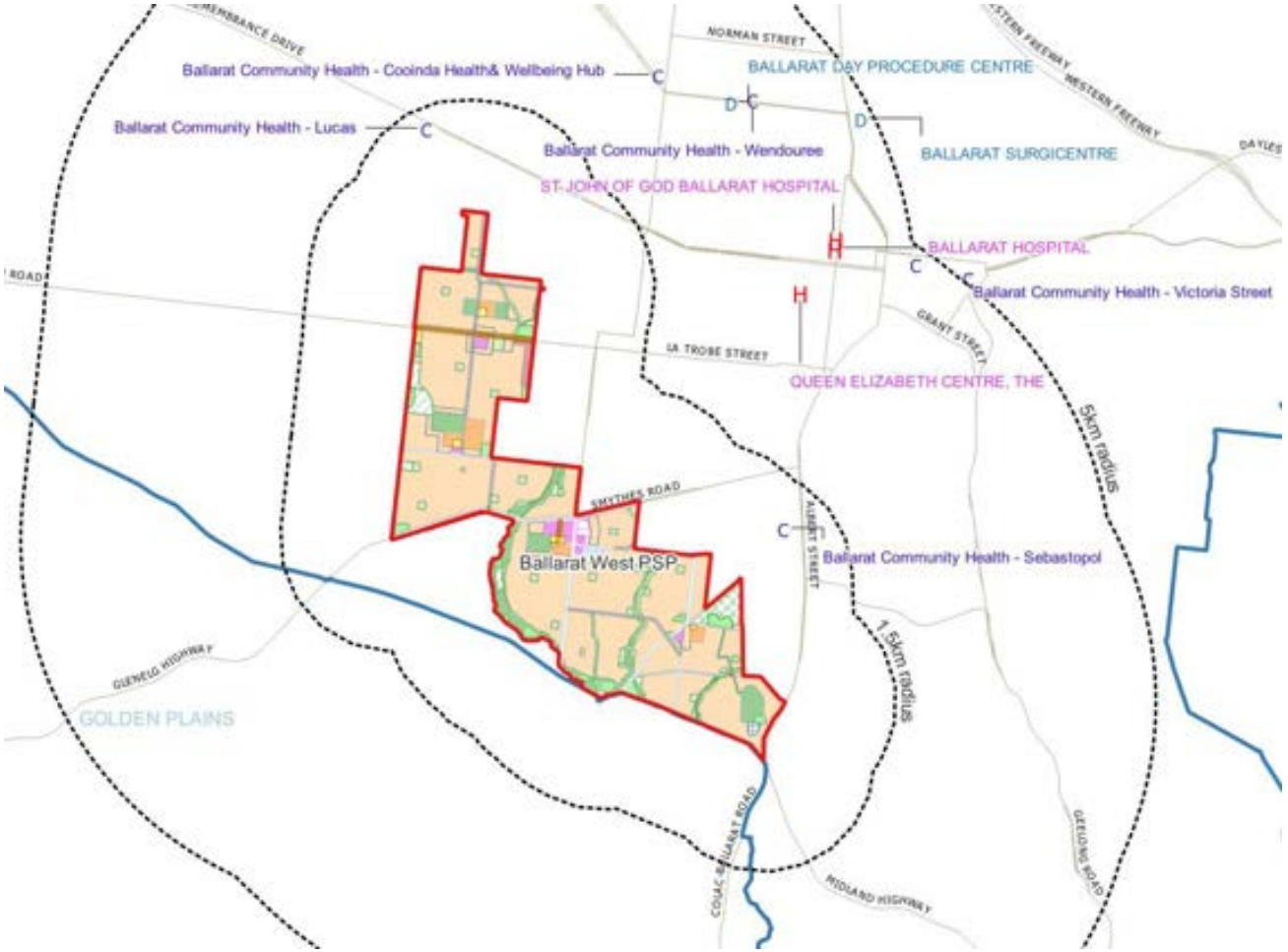


Figure 13 - Residential Aged Care (R), Supported Residential Services (S) and Planned Activity Group Venues (P)

Appendix 3 – Revised Ballarat West PSP Community Infrastructure Demand & Supply Estimates

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
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)	94.8	98.6
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)	37.9	39.5
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)	56.9	59.2
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).	3.9	4.0
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)	199,242	204,830
Council aquatic / leisure centres	116,000	Approximate total population per indoor aquatic facility	ASR Research calculation based on the City of Ballarat having 1 indoor aquatic leisure facility (note: the municipality also has 4 outdoor aquatic facilities which are not included in this calculation).	0.3	0.3
Organised Sport Participation					
Participation in organisation/venue based activity: Adults (people aged 15 and over)					
Fitness/Gym	32.2%	% 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)	9,642	9,912
Swimming	9.7%	As above	As above	2,904	2,986
Golf	4.0%	As above	As above	1,198	1,231

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
Pilates	3.9%	As above	As above	1,168	1,201
Basketball	4.1%	As above	As above	1,228	1,262
Tennis	3.1%	As above	As above	928	954
Football/soccer	3.3%	As above	As above	988	1,016
Yoga	4.2%	As above	As above	1,258	1,293
Netball	3.2%	As above	As above	958	985
Australian football	3.4%	As above	As above	1,018	1,047
Athletics, track and field (includes jogging and running)	3.9%	As above	As above	1,168	1,201
Walking (Recreational)	2.9%	As above	As above	868	893
Cycling	1.4%	As above	As above	419	431
Bowls	1.4%	As above	As above	419	431
Cricket	2.2%	As above	As above	659	677
Organised participation by activity - top 10 activities (children aged 0 to 14)					
Swimming	35.5%	% 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)	2,192	2,254
Australian football	16.8%	As above	As above	1,037	1,066
Basketball	13.7%	As above	As above	846	870
Cricket	6.4%	As above	As above	395	406
Dancing (recreational)	10.2%	As above	As above	630	648
Netball	5.8%	As above	As above	358	368
Football/soccer	10.1%	As above	As above	624	641
Tennis	6.4%	As above	As above	395	406
Gymnastics	11.8%	As above	As above	729	749
Karate	5.2%	As above	As above	321	330

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
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	602	619
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).	454	467
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	447	459
Total 3 & 4 year old enrolments attending sessional kindergarten				901	926
Number of sessional kindergarten rooms required under current kindergarten policy environment (15 hours per week for both three and four year old kindergarten)	*66*	*66 enrolments per room (33 licensed places per room) for both three year old kindergarten & four year old kindergarten.*	*ASR constructed calculation*	14	14
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*	*66 enrolments per room (33 licensed places each) for three year old kindergarten & 33 enrolments per room (33 licensed places per room) for four year old kindergarten.*	*ASR constructed calculation*	21	21
Maternal & Child Health					
Number of MCH Full-Time Nurses	120	1 FT nurse per 120 children 0 years	ASR Research estimate	4.5	4.7
Number of MCH consulting units	1	Number of MCH consulting units required per FT nurse	Based on above	4.5	4.7
Playgroup					
Number of 2 hr playgroup sessions per week	245	Total number of children aged 0-3 years required to generate	ASR Research constructed measure using Playgroup Victoria	9.3	9.5

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
		demand 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	356.2	366
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.	11.9	12.2
Long Day Child Care Centres					
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	1,242	1,276
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.	10	11
Community Centres, Meeting spaces, Neighbourhood Houses & Libraries					
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	1.9	2.0
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	1.9	2.0
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	0.7
Neighbourhood Houses					
Number of Neighbourhood House users per week	3%	Percentage of population using a Neighbourhod House in a given week	Neighbourhood Houses Victoria, Neighbourhood Houses Survey 2017	1,170	1,203
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)	1.4	1.4
Libraries					

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
Number of library loans annum	5.4	Total loans per person	Public Libraries Victoria Network, 2018-19 PLVN Annual Statistical Survey (2019), Wyndham Libraries	210,550	216,455
Number of library visits per annum	4.4	Total visits per person	Public Libraries Victoria Network, 2018-19 PLVN Annual Statistical Survey (2019), Wyndham Libraries	171,559	176,370
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)	1.0	1.1
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	2,389	2,456
Catholic Primary Enrolment	27%	% of 5-11 year old population	As above	1,175	1,208
Non Govt Primary Enrolment	12%	% of 5-11 year old population	As above	507	521
Total Primary Enrolment	94%	% of 5-11 year old population	As above	4,078	4,193
Govt Primary School	3,000	Total number of dwellings per facility	Department of Education & Training	4.8	4.9
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	1,422	1,462
Catholic Secondary Enrolment	28%	% of 12-17 year old population	As above	984	1,011
Non Gov Secondary Enrolment	20%	% of 12-17 year old population	As above	693	713
Total Secondary Enrolment	88%	% of 12-17 year old population	As above	3,102	3,189
Govt Secondary School	10,000	Total number of dwellings per facility	Department of Education & Training	1.4	1.5
TAFE					
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	129	132
TAFE Full-Time Enrolment (25+)	0.5%	% 25 + year old population	As above	122	126
TAFE Part-Time Enrolment (15 to 24)	4.4%	% of 15-24 year old population	As above	225	231

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
TAFE Part-Time Enrolment (25+)	1.4%	% 25 + year old population	As above	346	355
Total TAFE Enrolments				822	845
Universities					
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	769	790
University Full-Time Enrolment (25+)	1.3%	% 25 + year old population	As above	321	330
University Part-Time Enrolment (25 to 24)	2.1%	% of 15-24 year old population	As above	108	111
University Part-Time Enrolment (25+)	1.8%	% 25 + year old population	As above	455	467
Total University Enrolments				1,652	1,699
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	138	142
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	91	94
Community health clients	3%	Proportion of population that is a registered community health client	Victorian Auditor-General's report, Community Health Program (June 2018)	1,119	1,150
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)	31	32
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)	12	12
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)	12	12
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)	8	8

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
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)	18,567	19,088
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)	14,622	15,032
Drug & alcohol clients	5.5	Number of registered Alcohol & Drug Treatment 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)	214	220
Mental health clients	18.5	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)	721	742
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	435	447
Short Term Restorative Care Programme	2	Number of STRC places per 1000 people aged 70 years +	Australian Government Planning Ratio by 2019	7	7
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 participating in activity	Australian Bureau of Statistics, Participation in Selected Cultural Activities, Australia, 2017–18 (Catalogue Number 4921.0)	1,856	1,909
Singing or playing a musical instrument	4.3%	As above	As above	1,288	1,324
Dancing	4.8%	As above	As above	1,437	1,478
Writing	2.8%	As above	As above	838	862
Visual art activities	1.9%	As above	As above	569	585
Craft activities	1.8%	As above	As above	539	554

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Existing Ballarat West PSP	Revised Ballarat West PSP
Designing websites, computer games or interactive software	2.8%	As above	As above	838	862
Fashion, interior or graphic design	5.7%	As above	As above	1,707	1,755
Type of arts / cultural activity participated in (children aged 0 to 14)					
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)	488	502
Singing or playing a musical instrument	23%	As above	As above	1,420	1,460
Dancing	17%	As above	As above	1,025	1,054
Art and craft activities	39%	As above	As above	2,396	2,463
Creative writing	23%	As above	As above	1,389	1,428
Creating digital content	17%	As above	As above	1,019	1,047
Screen based activities	90%	As above	As above	5,576	5,732
Reading for pleasure	79%	As above	As above	4,847	4,983

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 8 - Typical PSP Active Open Space Specifications by Size

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	6	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)

Table 9 - Typical PSP Sport Pavilion Specifications by Number of Playing Fields

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)

Table 10 – Typical PSP Community Centre Configurations x Hierarchy Type

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)

Appendix 5 – State Government & Other External Agency Responses

Department of Education

Schools and Regional Services

2 Treasury Place
East Melbourne Victoria 3002
Telephone: 03 9637 2000
DX210083

COR23121574

Natalie Robertson
Director Development and Growth
City of Ballarat
natalierobertson@ballarat.vic.gov.au

Dear Ms Robertson,

RE: Ballarat West Precinct Structure Plan Review

Thank you for your email correspondence of 10 February 2023 seeking the Department of Education's (the department) feedback on the proposed 5-year review of the Ballarat West Precinct Structure Plan (PSP) and the Development Contribution Plan (DCP), as part of the state agencies stakeholder engagement and consultation process.

The department understands that its views will inform a Council decision regarding the proposed government school provision and site locations within the Ballarat West PSP.

The department has reviewed the information provided by Council and is pleased to provide the following comments and advice in relation to the proposed PSP review.

Government education infrastructure need for the Ballarat West PSP

It is noted that the following proposed government school sites are identified in the Ballarat West PSP, with school opening years not yet identified or publicly committed by the department.

- Alfredton West Proposed P6
- Ballarat West Proposed P6 and Ballarat West Proposed 7-12
- Cherry Flat Proposed P6
- Bonshaw Proposed P6

Annually, the department considers population forecasts and the capacity of existing schools to identify expected shortfalls in government primary, secondary and specialist school demand.

For Ballarat West PSP and the surrounding areas, the department will keep considering:

- Existing and forecast student demand,
- Access to designated government schools within reasonable travel time,

- Additional student demand triggered by Ballarat West PSP and other precincts, and
- Potential schools within Ballarat LGA and surrounds.

The information provided by Council indicates that the dwelling yield and densities in the Ballarat West PSP are similar to those forecast by Council at the commencement of the original PSP, and more than 70% of the PSP development is complete or near/under completion.

Based on the above data regarding revised dwelling yield and densities, the school provision within Ballarat West PSP remains current.

The department also notes that the existing land holdings with Ballarat Local Government Area (LGA) is expected to be sufficient to meet specialist education demand in Ballarat over the next 20 years. The department will continue to monitor the educational needs of students with disability in the Ballarat LGA and consider opportunities to strengthen inclusive education options as appropriate.

Kindergarten and Early Childhood Infrastructure

The department expects that the land allocated within the PSPs for community facilities should be located alongside new Primary School sites, in alignment with State government's commitment to ditch the double drop off. The Building Blocks Capacity Grants program is available to councils to support the delivery of community facilities.

The published Kindergarten Infrastructure and Services Plans (KISP) signed in March 2022 in response to Three-Year-Old kindergarten demand is available here. The department will engage with all local government authorities (LGAs) this year to update agreed KISP with demand for Pre-Prep.

In 2023, families in Ballarat have access to between 5 and 15 hours a week of kindergarten programs for three-year-olds. Pre-Prep rolls out in Ballarat City from 2029 with 16 to 20 Hours per week for 40 weeks of the year, with all children receiving 30 hours by 2032.

Since launching in 2020, Building Blocks grants have been laying foundations for these major reforms. They have helped local councils and other not-for-profit providers build, expand and modernise kindergartens across the state. The Building Blocks Capacity Building grants stream provides funding for projects that create additional kindergarten places for 3-year and 4-year-olds by building new, or expanding existing, infrastructure. With joint investment from the sector, the department is creating more kindergarten places. Building Blocks is also making kinder buildings, playgrounds and equipment more inclusive for children of all abilities.

Besides the grants streams, the department also offers the Building Blocks Partnerships program, and works closely with local governments and not-for-profit providers to plan and build kindergartens in the areas that need them.

The KISP planning processes will be underpinned by Building Blocks Partnerships. These are long-term, in-principle agreements between the department and LGAs or not-for-profit providers for co-investment in multi-site 'project pipelines'. Partnerships will build capacity for both Three and Four-Year-Old Kindergarten, through multiple projects over several years under agreed funding parameters. Building Blocks Partnerships will be a critical means of working with large partners, particularly LGAs to build large numbers of facilities over time.

The department and Council will continue to discuss Council's strategy and response to the Best Start Best Life reforms.

Proposed School Sites

The department considers a range of principles and requirements when selecting new school sites. Each proposed government school site brings with it a range of risks, opportunities and constraints and its suitability needs to be assessed on a case-by-case basis. The *Victorian Government School Site Selection Criteria Guidance* outlines the key factors considered by the department when assessing proposed government school site options. The *Victorian Government School Site Selection Criteria Guidance* can be found here.

In order to inform the review, all proposed school sites identified within the Ballarat West PSP have been assessed for suitability against the *Victorian Government School Site Selection Criteria.*

In reviewing the proposed school sites, it has come to light that the land use changes in the PSP have resulted in deviations from the PSP identified school sites, being not consistent with the department's site selection criteria nor the approved Ballarat West PSP.

Ballarat West Proposed P-12

The subject site is located within the Greenhalghs Road sub precinct of the PSP. The department is planning for two schools on this site including a primary and a secondary school respectively. Prior to funding, in the interim, the department refers to the proposed government schools that would be on this site as **Ballarat West Proposed P6** and **Ballarat West Proposed 7-12**.

It is understood that the subdivision permit PLP/2017/225 that has created the proposed school site has been issued, altering the location of the proposed school from that identified in the PSP.

The new school location is still within the community hub. The department officers advised Council officers on 21 April 2023 that while the location of this proposed government school site has already been established through the subdivision process is not consistent with the department's site selection criteria nor the approved Ballarat West PSP. The department would be agreeable and open to further considering the option of a proposed government school site in this sub precinct that would enable the kinder facility to be collocated with the proposed government school site. The department understands there may be opportunity to make minor alterations to the subdivision layout to address the department's concerns, such

as swapping the leisure centre and community centre locations to enable co-location of the kinder facilities with the school in line with state government policy.

Further to Council's response of 27 April 2023, the department looks forward to working collaboratively with Council to improve the suitability of the proposed school, particularly in relation to co-location with a kinder facility.

Alfredton West Proposed P6

The subject site is located within the Carngham Road sub precinct of the PSP. Prior to funding, in the interim, the department refers to the proposed government school that would be on this site as **Alfredton West Proposed P6**.

It is understood that the subdivision permits that have created the proposed school site have been issued. The school site straddles two planning permits as follows:

- Permit PLP/2013/686/C – part school site 2.86 hectare
- Permit PLP/2021/356 – part school site 0.6086 hectare
- Total school site – 3.47 hectare

An assessment of the proposed site was undertaken against the *Victorian Government School Site Selection Criteria* and in the context of the current land use arrangements in this sub precinct approved by Council via various planning permits. This indicates that although the original school site in the PSP has been relocated to a new site, it still meets the department's criteria for school site selection. The new school location is still located within the community hub co-located with a kinder facility.

Cherry Flat Proposed P6

The subject site is located within the Major Activity Centre (Delacombe Town Centre) Sub-Precinct Carngham Road sub precinct of the PSP. Prior to funding, in the interim, the department refers to the proposed government school that would be on this site as **Cherry Flat Proposed P6**.

The department has previously expressed concerns via its letter COR22103549 dated 11 July 2022 to a planning permit (PLP/2021/335) regarding the subdivision of land at 88 Cherry Flat Road that among other aspects, impacted this proposed government school site. A copy of this correspondence is attached for reference.

It is understood that the subdivision permit that have created the proposed school site has been issued and notes that this has implications for the Cherry Flat Proposed P6 site.

During a meeting held between the representatives of the department and Council on 30 August 2022, the department had reiterated that while the location and size proposed by Council is not consistent with the department's site selection criteria, the department would be agreeable and open to further consider the option of a proposed government school site

at 54 Cherry Flat Road, Smythes Creek on the proviso that the additional parcel of land 0.46 hectare (as identified in the Planning Permit PLP/2021/335) on land to the south at 88 Cherry Flat Road is identified as part of the proposed government school site in the reviewed Ballarat West PSP.

Please note that the department does have concerns that the proposed site still does not support the co-location of new government primary schools with kindergartens.

The department wishes to ensure that the kindergarten capacity created through the proposed community facility is aligned to need and is keen to work closely with Council as Council plans the community facility to understand the level of kindergarten facilities to be provided related to anticipated demand for services. It would be appreciated if Council could make contact with the department at the appropriate time to further these discussions.

Bonshaw Proposed P6

The subject site is located within the Bonshaw sub precinct of the PSP. Prior to funding, in the interim, the department refers to the proposed government school that would be on this site as **Bonshaw Proposed P6**.

The department was notified of a planning permit application PLP/2022/393 - 19 Cobden Street, Sebastopol by Council. This application among other aspects, proposes to create part proposed government school site. The department provided a response via its letter COR22104812 dated 28 August 2022. A copy of this correspondence is attached for reference.

Thank you once again for the opportunity to provide comments.

I would encourage Council to further contact the department as the review of the Ballarat West PSP progresses or if Council has any other queries regarding planning for government schools more broadly.

If you have any further queries please contact Mr Mukul Hatwal, Senior Planner, Infrastructure and Planning Branch, Department of Education on 03 7022 0608 or by email: provision.planning@education.vic.gov.au.

Yours sincerely

Jonathan Hopley
Acting Director
Infrastructure and Planning
School Provision and Establishment Division
Department of Education

22/06/2023

cc: *Chris Duckett, Manager Sustainable Growth*
chrisduckett@ballarat.vic.gov.au

Vicky Lu, Sustainable Growth Planner
vickylu@ballarat.vic.gov.au

Ethos Urban

16 March 2023

3220324

Rob Panozzo
Director
ASR Research Pty Ltd
Mezzanine Level
Suite 7, 321 Chapel Street
Prahran VIC 3181

Sent via email: rpanozzo@asrresearch.com.au

Dear Rob,

RE: Ballarat West PSP - Provision of Catholic Schools

Ethos Urban act on behalf of the Diocese of Ballarat Catholic Education Limited (DOBCEL). DOBCEL is the governing body for Catholic education within the Diocese of Ballarat and oversee the provision and operation of Catholic schools at both the primary and secondary level across the western region of Victoria, including within the regional centres of Ballarat, Warrnambool and Mildura.

Ethos Urban has assisted DOBCEL in understanding the future strategic provision and operation of Catholic schools in Ballarat. The population growth and future planning occurring in Ballarat means there is a significant benefit in undertaking a strategic approach to planning for the infrastructure that will support these growing communities. As one of the three forms of organised education, planning for Catholic schools similarly needs to be approached strategically. A strategic approach to the provision of Catholic schools includes considering the current supply of Catholic schools, as well as considering the additional need for these schools to support the future population in regional areas.

DOBCEL can confirm that the current provision of a Catholic primary school within the existing Ballarat West PSP area is required. DOBCEL have previously had discussions in relation to the acquisition of a site located within the PSP however will now pursue the opportunity provided in Community Hub 3. DOBCEL are eager to contribute to discussions to refine the layout and siting of a Catholic primary school in this location to ensure an optimum solution for the Hub.

We note that there is a substantial growth front proposed in the western and north western growth areas. As these areas are further planned DOBCEL will consider the appropriate strategic provision for Catholic schools. The strategic work undertaken by Ethos Urban suggests that a further Catholic primary and secondary school will be required to service these new areas. DOBCEL are eager to collaborate with Ballarat City Council to facilitate the necessary Catholic primary and secondary school provision as further planning occurs in these new growth areas.

Please don't hesitate to contact me if you have any questions or concerns.

Yours sincerely,

Tim Peggie
Director
+61 419 944 934
Tpeggie@ethosurban.com

Department of Justice and Community Safety

Community Safety Building Authority

Level 7
121 Exhibition St
Melbourne Victoria 3000
justice.vic.gov.au

Date: 9 March 2023

Our ref: EBC 23030702

Mr Chris Duckett
Manager Sustainable Growth
City of Ballarat
chrisduckett@ballarat.vic.gov.au

cc: Evan King CEO, City of Ballarat

Dear Mr Duckett,

Re: Ballarat West PSP Review – Community and Recreation Infrastructure Needs

Thank you for the opportunity to provide input for the review of the Ballarat West Precinct Structure Plan (PSP). The Department of Justice and Community Safety (DJCS) offers the following comments.

The current PSP, which was adopted in 2016, had 2 hectares of land allocated for emergency services infrastructure along Ballarat-Carngham Road in the north-western part of the PSP. This allocation recognised the necessary provisioning for emergency services to service the forecast population growth in the Ballarat municipality.

During the recent PSP review consultation, DJCS discovered that this land has since been used for residential development, potentially leaving the precinct and surrounding areas without adequate emergency services coverage in the future.

DJCS therefore requests the re-instatement of 2 hectares of land into the PSP to allow for emergency services facilities, in order to accommodate the following critical infrastructure:

- A Victorian State Emergency Service (VICSES) facility (Council has indicated it will not renew the lease at the existing site, leaving the municipality with no SES facility)
- An additional fire station (may be Country Fire Authority (CFA) or Fire Rescue Victoria (FRV), depending on boundary review)
- A 24 hour police station (may replace or complement the operations of the existing 16 hour police station at Ballarat West, depending on future police service delivery requirements)
- DJCS is unable to comment in relation for provisioning of Ambulance Victoria infrastructure, which is managed by the Department of Health, however the substantial increase in population would likely drive a need for an expanded ambulance presence.

The provisioning is not required as a single 2 hectare parcel of land, but could be distributed across the PSP in accordance with the following requirements:

- Pending confirmation of future service delivery requirements, Victoria Police will require a site of a minimum 5,000 sqm. This would be best located within a Major Activity Centre, both for community accessibility and the passive law enforcement impact of having a visible policing presence in the community.
- Volunteer emergency responders, such as the CFA and VICSES require a site of approximately 3,500 – 4,000 sqm and are best located on the periphery of residential areas or in industrial areas to avoid disturbing residents with training and operational activities, while preserving response times.
- All emergency services agencies require ready access to main roads to facilitate emergency response times.

DJCS is aware that there is significant development occurring in the Ballarat municipality, beyond the PSP that is the subject of this review, and that will impact the adequacy of emergency services provisioning for the municipality. This includes:

- additional greenfield development in the Northern, Western and North-western areas at 832, 1,156 and 559 hectares respectively.
- urban infill projects totalling 535 hectares in the CBD, Saleyards area, Wendouree Village and the Delacombe, Creswick Road, Scott Parade and Selkirk precincts
- the 438 hectare Ballarat West Employment Zone (BWEZ), which will see a large contingent of commercial and industrial enterprises alongside an Intermodal Freight Hub accommodated in and around the Ballarat Airport
- upgrade of the Ballarat Airport runway to accommodate larger aircraft.

Depending on the forecasting model used, these developments will see the population of Ballarat grow anywhere between 40 and 80 percent over the next 25 years, to somewhere between 160,000 and 205,000 residents living in the greater Ballarat region.

Urban infill will increase residential density, potentially heightening the risk of fire and increasing demand on existing emergency services provision within the CBD area. Residential development in the greenfield locations will expand the urban boundary of Ballarat, requiring existing services to travel further to respond to emergencies in the new communities. Without additional provisioning, this may compromise service response times, which increases the risk of unnecessary injury, and loss of life and property.

The development of the BWEZ, with its high concentration of industry and upgraded intermodal freight terminal is of significant interest to emergency services, given likely increased demand driven by the expected 9,000 people working in and around this area with the associated occupational hazards of the industry types listed in the Development Plan for the zone. These include manufacturing, construction, transportation and logistics, wholesale trade and enabling industry sectors, and explicitly limit the inclusion of lower risk enterprises such as retail, offices and warehousing.

Council appears to have recognised the impact the planned developments will have on demand for some types of community infrastructure through the generous provisioning for parks and open spaces, early years hubs, community centres, an indoor recreation facility, schools and a library.

DJCS advises that the amenity provided to residents by these facilities should be safeguarded by proportionate provisioning for the services that respond to calls for assistance and keep people safe in their homes and communities. There will be a substantial under-provisioning of emergency services infrastructure if the 2-hectare allocation is not restored in the updated PSP.

Should you wish to discuss the matter, please do not hesitate to contact Robyn Gould, Senior Business Analyst, Department of Justice and Community Safety on 0413 124 010 or by email robyn.gould@justice.vic.gov.au.

Yours Sincerely,

Sam Werner
A/CEO
Community Safety Building Authority
Department of Justice and Community Safety

Department of Health

From: Natalie Weerawardane (Health) <Natalie.Weerawardane@health.vic.gov.au>
Sent: Monday, March 20, 2023 2:37 PM
To: Robert Panozzo <rpanozzo@asrresearch.com.au>
Subject: FW: OFFICIAL: Requirements for land/ health services/facilities in Ballarat West - advice required by COB 17 March

Natalie Weerawardane (she/her)
Manager Strategy and Policy
Health Infrastructure Policy
Health Infrastructure Division
Department of Health
health.vic.gov.au
0448 103 646 **|** **Natalie.weerawardane@dhhs.vic.gov.au**

OFFICIAL

From: Elysia Delaine (Health) <Elysia.Delaine@health.vic.gov.au>
Sent: Thursday, 16 March 2023 5:11 PM
To: Natalie Weerawardane (Health) <Natalie.Weerawardane@health.vic.gov.au>
Cc: Kiewa L Lovett (Health) <kiewa.l.lovett@health.vic.gov.au>; Ann Hindell (Health) <ann.hindell@health.vic.gov.au>; Camilla Macdonell (Health) <Camilla.Macdonell@health.vic.gov.au>
Subject: RE: OFFICIAL: Requirements for land/ health services/facilities in Ballarat West - advice required by COB 17 March

Hi Nat

Thanks for the opportunity to provide input into the Ballarat West community infrastructure needs.

From an Early Parenting Centre (EPC) perspective, the Ballarat EPC currently which is under construction will be located at 10 Fawcett Rd, Lucas, in the heart of Ballarat West Growth Zone.

Regarding slide 10, we expect that the MCH service will be co-located in the new early years hubs These spaces also have the opportunity for other health services to partner operate in the space.

Long-term planning provision should also be made for Aboriginal-led service delivery from new spaces. At a minimum organisations such as Ballarat and District Aboriginal Cooperative should be offered co-location opportunities for any new infrastructure builds related to community hubs or early years hubs.

Please let me know if you would like to chat further about any of the above feedback.

Kind regards

Elysia Delaine (she/her)
Acting Manager | Early Parenting Centres Expansion Project
Community Based Health Services, Policy and Improvement
Commissioning and System Improvement Division
Department of Health
T (03) 8633 4917 | elysia.delaine@health.vic.gov.au
www.health.vic.gov.au

From: Jimmy K Chan (DJPR)
To: Robert Panozzo
Subject: OFFICIAL: RE: Ballarat West PSP Review of Community Infrastructure and Open Space
Date: Thursday, 16 March 2023 11:04:38 AM
Attachments: image001.png

OFFICIAL

Hi Robert,

Thanks for the meeting a few weeks ago and for the opportunity to provide input into the Ballarat West PSP.

We can confirm that from our perspective, there are no regional scale sport and recreation priorities within the boundaries of the PSP.

In terms of local requirements and priorities, we are confident that the Ballarat City Council are best positioned to provide information that will inform the local community sport and active recreation infrastructure requirements for this PSP. Any information/support of specific open space land allocations that we would be able to provide to inform the development of the PSP would be derived from information we receive from Ballarat City Council.

We understand that there is strong community sport support and current and emerging participation and programming (particularly for basketball and netball) to support demand for the provision of an indoor recreation facility in the area. Identifying the *Construction of Indoor Recreation Centre adjacent to the Greenleighs AOS Reserve (8 courts)* at Community Hub 3, we believe this will help meet this demand and support its continued inclusion in this PSP.

We would encourage the VPA to work with Ballarat City Council to further explore the demand and supply for indoor recreation in Ballarat West and the surrounding future growth areas, particularly with consideration of the network of facilities across the municipality and broader inter-municipal interdependencies.

Thanks again for the opportunity to provide input into this PSP.

Jimmy Chan
Principal Adviser, Precincts and Priority Projects | Community Infrastructure and Place
Sport and Recreation Victoria

Department of Jobs, Skills, Industry and Regions
Level 15, 121 Exhibition Street, Melbourne, Victoria Australia 3000
M: 0438 720 643

djsir.vic.gov.au

LinkedIn | YouTube | Twitter

ENGENY

BALLARAT WEST PSP REVIEW

Drainage Strategy Update

Prepared on behalf of City of Ballarat

VC2031_001-REP-001-5

11 APRIL 2024

ENGENY

DISCLAIMER

This Report has been prepared on behalf of and for the exclusive use of City of Ballarat and is subject to and issued in accordance with City of Ballarat instruction to Engeny Australia Pty Ltd (Engeny). The content of this Report was based on previous information and studies supplied by City of Ballarat.

Engeny accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this Report by any third party. Copying this Report without the permission of City of Ballarat or Engeny is not permitted.

Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	26/09/2023	Client Issue	[redacted]			
1	21/12/2023	Client Issue				
2	16/02/2024	Client Issue				
3	27/02/2024	Client Issue				
4	5/03/2024	Client Issue				
5	11/04/2024	Client Issue				
Signatures:						

ENGENY

CONTENTS

Tables

ENGENY

Figures

Appendices

ENGENY

INTRODUCTION

The City of Ballarat is undertaking a review of the Ballarat West Precinct Structure Plan (PSP) and Development Contributions Plan (DCP).

As part of the PSP and DCP review Engeny was engaged by the City of Ballarat (Council) to undertake an update of the Ballarat West PSP drainage strategy, which comprises Precinct 1, Precinct 2 and Precinct 4. The drainage strategy provides inputs to the PSP in terms of the required drainage and stormwater treatment infrastructure and to the DCP with cost estimates undertaken for the proposed assets. Some changes have been made since the strategy was first developed in 2011 and to date, they were largely to accommodate construction staging and implementation of drainage works. The 2023 update focuses more on the changes that maybe required to the drainage strategy to reflect with the most recent updated guidelines and standards that have been released since 2011. The updated guidelines include Australian Rainfall and Runoff 2019 (ARR 2019), updated design guidelines, updated Urban Stormwater Management Guidelines (EPA Victoria, June 2021) and the Ballarat Integrated Water Management Plan (Feb 2018).

While some changes have been made since the original strategy was developed in 2011, the objectives and location of key infrastructure is still largely in line with the original strategy. This updated strategy will supersede all previous strategy documents and be the working strategy for the implementation of the remaining assets in the drainage strategy.

1.1 Scope of Works

The scope of works for this drainage strategy update includes the following:

1.1.1 Part A – Review of Current Status

A determination of the current status of the drainage strategy and its implementation. This involved the following:

- Review documentation including plans and report regarding changes to the drainage strategy which have occurred since the previous reviews were undertaken or the strategy was setup (as appropriate).
- Determining which assets were already constructed or committed due to the level of progression design or construction work already completed in accordance with the previous strategy.
- Determine which areas still required drainage, treatment or retardation assets to be constructed in order to service those parts of the development.
- Summarising this work in a memo to Council the details of which are included in this report.

1.1.2 Part B – Modelling Updates

- Update the RORB hydrologic model to reflect the following:
  - Current development status, including all changes made to the scheme.
  - The storage available above the extended detention depth level of the wetland where wetlands and retarding basins are co-located (in line with current MW guidance).
- Update the RORB model to be compliant with Australian Rainfall and Runoff 2019
  - Update the land use types to reflect effective impervious areas, indirectly connected areas and pervious areas.
  - Update the intensity, frequency and duration rainfall data from the Bureau of Meteorology.
  - Update the model to an initial and continuing loss model (from runoff coefficient).
  - Update the flow validation of the RORB model based on guidance from the Corangamite CMA or other regional validation methods.
  - Expand the RORB model to include the whole Winter Creek catchment.
  - Rerun the RORB model for the 20% and 1% AEP events and determine if the Retarding Basin (RB) sizing is acceptable to meet the flow targets
  - Rerun the RORB model for the 20% and 1% AEP events for climate change scenario.

- Update the MUSIC water quality model to include the following:
  - To reflect the current development status.
  - Consideration of Gross Pollutant Traps (GPTs) at the entries to wetlands.
  - To reflect the guidance provided by Melbourne Water in their Wetland Design Manual (reducing the extended detention depth to 350 mm from 500 mm and adjusting the sedimentation basin sizing to be based on a Fair and Geyer calculation).
- Consideration of implementation of rainwater tanks on lot scale and / or stormwater harvesting for the oval from the adjacent wetland/retarding basin to try to achieve the goals set out in the Urban Stormwater Best Practice Environmental Guidelines issued by the EPA. These guidelines have strong total flow volume reduction targets, which can be challenging to achieve with traditional wetlands and sedimentation basins alone.
- Consideration of staging and delivery of future assets to guide the priority of the delivery of as yet unconstructed assets
- Noting the assumptions and exclusions used in updated this strategy.

1.1.3 Part C – Final report

- Summary of development completed within the PSP and the drainage infrastructure delivered along with any changes to the drainage strategy
- Overview of the current works completed relative to the updated guidelines
- Details of the proposed changes to make the remaining undeveloped parts of the scheme compliant with the updated guidelines, including justification for why the changes are needed

  High level cost estimates of the proposed wetland, sedimentation basin, retarding basin and pipe assets. We note that we are not quantity surveyors and are not proposing to engage quantity surveyors but will use previous construction rates we are aware of and also information provided by the City of Ballarat relating to local construction costs. The more recent local information that can be provided the better our cost estimates will be. We will also require information from the City of Ballarat to inform likely land acquisition costs based on recent previous acquisitions. Engeny has significant experience in costing drainage schemes for Melbourne Water and undertook a project on behalf of Melbourne Water to review and update the standard rates to cost drainage schemes.
- Details on the proposed staging and development of works including a table showing which infrastructure is required to support each property to develop.
- Staging plan for the next 10 years to help deliver good stormwater management outcomes in the remainder of the drainage scheme.

1.2 Previous Drainage Strategy Reports

The following previous drainage strategy reports have been used to guide this updated drainage strategy as they have materially changed the PSP stormwater management strategy direction. There are other adjustments to the delivery of on ground infrastructure which have been implemented as the designs have progressed from concept design to detailed design but are considered to be generally in accordance with the intent of the scheme design and so are not listed below:

- Ballarat West Growth Area PSP Drainage Report by SMEC Urban / Engeny Management (February 2011)

  Engeny was previously engaged in 2011 by SMEC and the City of Ballarat to inform the Ballarat West Development Contributions Plans (DCP) in relation to drainage infrastructure. Engeny undertook the hydrologic and water quality modelling, developed concept layouts for pipes and retarding basins, and prepared preliminary cost estimates for the drainage assets.
- Updated functional designs of retarding basins 11, 12 and 13 by Neil Craigie (2015)

  The location and designs of retarding basins 11, 12 and 13 were updated to help facilitate development in the north western area of Precinct 1. This included areas of the Delacombe Town Centre and adjacent residential development.
- Review of Main Drain proposals for the Power Park Catchment in Precinct 1 by Neil Craigie (August 2015)

  An update to the proposed drainage layout and layout of RB 28 which is proposed within the Power Park reserve. This review recommended the removal of RB30 and replaced it with an online sedimentation basin.
- Lot32 and 32A Tait Street IWMS by Niel Craigie (September 2015)

Proposed a staged approach to the construction of RB18 to help facilitate development

- RB26 Catchment and Outfall IWMS by Neil Craigie (July 2016)

  A variation to the original stormwater management strategy which amalgamated RB25 and RB26 into a single basin as part of the Ploughmans Arms development.

- Memorandum: Update of Engeny RORB Modelling and Adjustments to the SWMS Across the BWGA by Neil Craigie (April 2019)

- Ballarat West Growth Area PSP by Engeny (November 2021)

  Engeny was engaged by the City of Ballarat to undertake a review of the Ballarat West Precinct Structure Plan (PSP) drainage catchment design. An update was required to reflect changes to the drainage network caused by the need to build new infrastructure to support developments built "out-of-sequence". This included drainage upgrades needed for the delivery of Webb Road (East) and Ascot Gardens Drive resulting in runoff being directed west of Webb/Cherry Flat Road. This report was prepared to assist Council with:

  - Determining the development contributions needed to facilitate a timeline for implementation of drainage assets (i.e. identifying when and where the infrastructure will be needed).
  - Optimising the sequence of development to ensure timely provision of infrastructure.
  - Budget forecasting using estimated costs associated with the drainage assets.

- Ballarat West Growth Area PSP: Precinct 2 Review by Engeny (April 2022)

  This report update was required to reflect changes to the drainage network caused by the need to build new infrastructure to support developments built "out-of-sequence". This included drainage upgrades needed for the delivery of Webb Road (East) and Ascot Gardens Drive resulting in runoff being directed west of Webb/Cherry Flat Road.

- Memorandum: Ballarat RB04 and RB05 Review – Initial Drainage Review Findings by Engeny, (September 2022)

  This memo review focuses on the drainage of the southern portion of the Alluvium Estate and the drainage of the adjacent parcels of land in Precinct 2. The key updates included an updated strategy developed by Neil Craigie in 2019 and a review of the strategy in Precinct 2 in 2020 by Engeny. The Engeny review largely adopted the recommendations of the work by Neil Craigie.

ENGENY

2. DRAINAGE ASSETS REVIEW

Council has provided engineering drawings and related documentation for most of drainage infrastructure assets, which includes retarding basins, wetlands and biofiltration systems. Layout plans of the asset locations are shown in the following Figure 2.1 and Figure 2.2 and the drainage assets list and status are provided in Table 2.1. Appendix D displays the pipe layout plans with diameter and pipe ID visible for each precinct.

The retarding basins outside of the PSP area have been added to the hydrology model to ensure that their impact on the timing of peak flows is accounted for in the modelling.

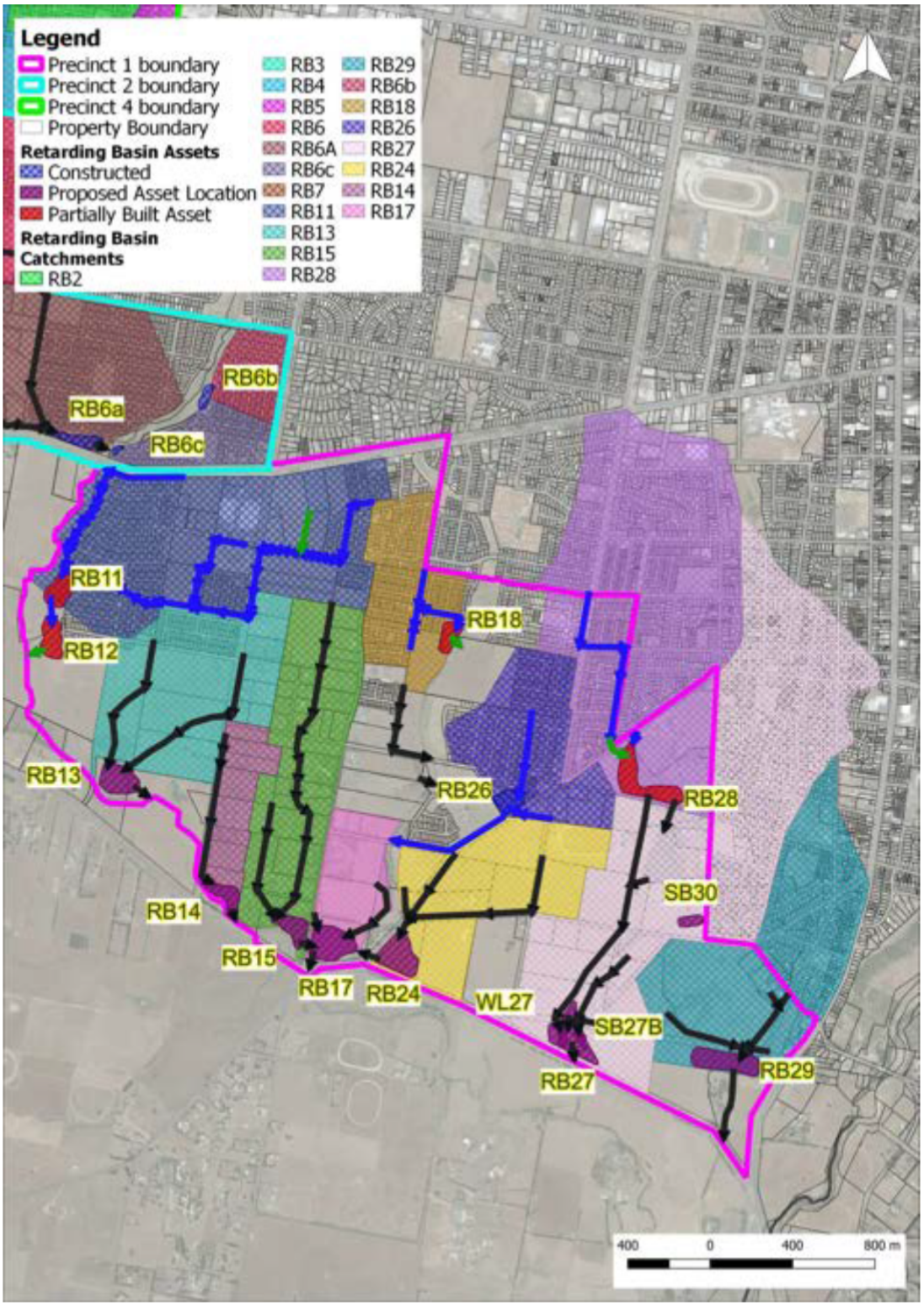


FIGURE 2.1: BALLARAT WEST PSP PRECINCT 1 LAYOUT PLAN

ENGENY

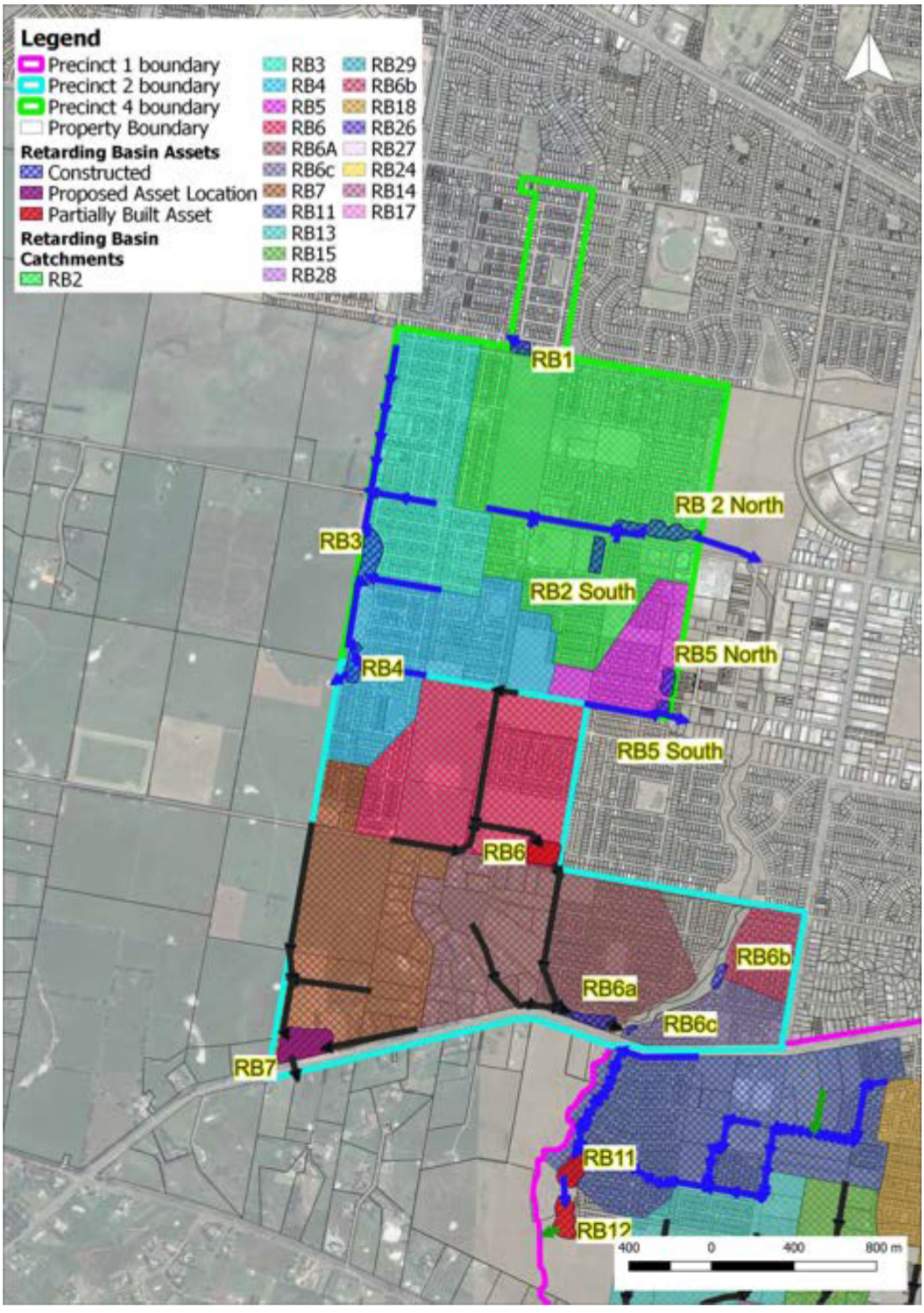


FIGURE 2.2: BALLARAT WEST PSP PRECINCT 2 AND PRECINCT 4 LAYOUT PLAN

ENGENY

TABLE 2.1: DRAINAGE ASSETS LIST

Drainage Asset	Residential Estate	Asset Status	Asset catchment size (km^2)	Available Data	Designer	Notes
RB DZ	The Chase	Completed		Drawings (design): in PDF	TGM	Outside of the Ballarat West PSP
RB EB	Alfredton Park	Completed		Drawings (design): in PDF	City of Ballarat	Outside of the Ballarat West PSP
RB FW	Winter Creek	Completed		Drawings (design): in PDF	City of Ballarat	Outside of the Ballarat West PSP
RB 1 (RB DY)	Winter Valley Rise Estate	Completed		Drawings (as built): in PDF and CAD Memo: Update of RB1 Catchment Main Drainage Proposal (Neil Craigie, June 2018)	Cardno TGM	-
RB 2	Alluvium Estate	Completed	1.4	Drawings (as built): in PDF and CAD	Reeds Consulting	-
RB 3	Winter Valley Rise Estate	Completed	0.6	Drawings (as built): in PDF	Cardno TGM	-
RB 4	Winter Valley Rise Estate	Partially Completed	0.6	Drawings (as built): in PDF	Cardno TGM	RB 4 has been partially completed.
RB 5	Carringum Estate	Completed	0.24	Drawings (design): in PDF and CAD Memo: RB 5 specifications	Beveridge Williams	-
RB 6	Winterfield Estate	Partially Completed	0.75	n/a	n/a	Functional layout plan endorsed and interim sedimentation basin works commenced.
RBs 6A, 6B & 6C (previously Biofilters 8, 9 & 10)	Winterfield Estate	Completed	6A - 0.87 6B - 0.12 6C - 0.16	Drawings (design): in PDF	KLM spatial	-
RB 7	n/a	Not Built/ Committed	0.7	n/a	n/a	-
RB 11	Pinnacle Estate	Partially Completed	1.02	Drawings (design): in PDF Memo: RB 11 & 12 specifications	Spiire	Design has been completed and endorsed. Minor construction of sedimentation has been undertaken to enable some development.

Drainage Asset	Residential Estate	Asset Status	Asset catchment size (km^2)	Available Data	Designer	Notes
RB 12	Pinnacle Estate	Partially Completed	1.13	Drawings (design): in PDF Memo: RB 11 & 12 specifications	Spiire	See comments for RB 11.
RB 13	n/a	Not Built	0.61	n/a	n/a	
RB 14	n/a	Not Built	0.2	n/a	n/a	
RB 15	n/a	Not Built	0.6	n/a	n/a	
RB 17	n/a	Not Built	0.22	n/a	n/a	
RB 18	n/a	Partially Completed	0.33	n/a	n/a	
RB 24	n/a	Not Built	0.53	n/a	n/a	
RB 25 (combined with 26)	Ploughmans Arms Estate	Completed	0.41	Drawings (design): in PDF	Scott Campbell Design & Drafting Pty Ltd	
RB 27	n/a	Not Built	1.68	n/a	n/a	
RB 28	n/a	Partially Completed	1.44	Drawings (design): in PDF and CAD	Axiom Consulting Engineers	Full design has been completed and outfall has been constructed.
RB 29	n/a	Not Built	0.81	n/a	n/a	
SB 30 (RB30 has been replaced with a sedimentation basin in an adjacent location)	n/a	Not Built		n/a	n/a	

3. HYDROLOGY

3.1 Hydrology Model Update

Hydrological modelling for the original 2011 drainage strategy was undertaken using RORB software and based on Australian Rainfall and Runoff (ARR) 1987. Since then, a new version of Australian Rainfall and Runoff (ARR 2019) has been released and the current RORB modelling update for the strategy has been undertaken in accordance with ARR 2019 guidelines. The updated RORB modelling for the existing condition scenario was undertaken to assess the existing peak flow at the model outlet, LK2 (confluence of Winter Creek and Yarrowee River) and Winter Creek, LT1 which is just upstream of the confluence of Winter Creek and Yarrowee River as shown in Figure 3.1.

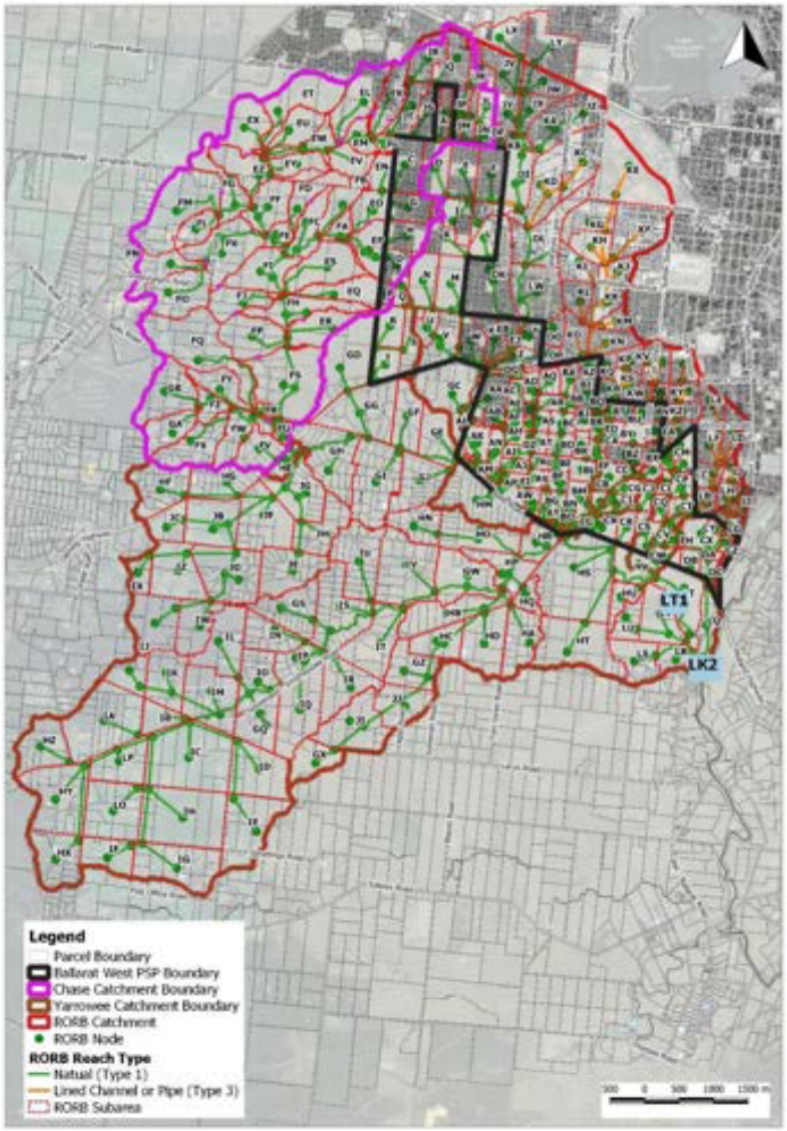


FIGURE 3.1: RORB MODELLING FOR BALLARAT WEST PSP CATCHMENT PLAN

In addition to the ARR update, the RORB modelling catchment for the existing conditions scenario has also been expanded to include the whole Winter Creek catchment area. This expanded catchment is to provide consistency that will be required at a later stage to properly understand the impact that the retarding basins may be having to the peak flows in Winter Creek for the post developed scenario.

The updated RORB model includes data from the "Chase catchment" RORB model and the existing Yarrowee River RORB model, which were previously developed for the Council on previous projects (refer to Figure 3.1 for catchments boundaries). Both Chase and Yarrowee River RORB modellings (ARR 2019) for existing conditions were previously prepared by Water Technology and were provided by Council for Engeny's use in this project. These models have also been used for calibration purposes.

To assess the existing Winter Creek catchment (80 km^2), which includes the Ballarat West PSP area and the impact on the receiving waterway (Winter Creek), the existing RORB model for "the Chase catchment" has been combined with the existing Ballarat West RORB model as shown in Figure 3.1, with additional subareas taken from Yarrowee River RORB model. The subareas from the Yarrowee River RORB model have been split to improve the resolution of the model in the area of interest, the Winter Creek catchment. The delineation of reaches and the fraction impervious in existing conditions have been updated as follows:

- For sub-catchments within the Ballarat West PSP (shown by a thick black line in Figure 3.1) have largely been classified as "Type 1 – Natural" reaches with a total fraction impervious of 0.1 in line with the existing RORB models (this impervious fraction has been modelled as indirectly connected area due to the lack of pit and pipe drainage systems in these areas).
- For sub-catchments within the existing Chase RORB modelling area (shown by a pink line in Figure 3.1 have largely been classified as "Type 1 – Natural" reaches with total fraction impervious of 0.1 in line with the existing RORB models prepared by Water Technology.
- Sub-catchments immediately to the east of Ballarat West PSP in the existing township areas of Ballarat have largely been classified as "Type 3 – Lined Channel or Pipe" reaches with some area classified as "Type 1 – Natural" reaches, with total fraction impervious ranging from 0.1 to 0.75 in line with existing conditions.
- Sub-catchment immediately to the southwest of Ballarat West PSP have largely been classified as "Type 1 – Natural" reaches with total fraction impervious of 0.1, in line with the existing RORB model of the Yarrowee River prepared by Water Technology.
- A detailed breakdown of the subareas size, impervious fraction and location can be found in Appendix A:.

The existing RORB model was run for two scenarios as follows:

- Existing / Baseline Conditions
- Existing / Baseline Conditions with climate change scenario.

3.2 Modelling Parameters and Modelling Input for Retarding Basins

The RORB model parameters adopted are as summarised as follows:

3.2.1 Intensity-Frequency-Duration (IFD) Rainfall Data

- Rainfall data was adopted based on the centroid of the updated extended Ballarat West RORB model as per Table 3.1 (-37.6037°S, 143.76647°E).
- Point rainfall temporal patterns were adopted. It is noted that point temporal patterns are generally recommended for catchment areas that do not exceed 75 km^2. The total catchment area for the extended Ballarat West RORB model is 80 km^2. Engeny has run a sensitivity analysis using the areal and point temporal patterns and found that the peak flows at the model outlet using either pattern were very similar.
- In addition, while the total catchment is 80 km^2, the sub-catchments draining from the Ballarat West PSP are around 1 km^2 in area. Hence point temporal patterns have been used for all durations, which Engeny believes is appropriate for the purposes of this assessment.

TABLE 3.1: BOM IFD TABLE FOR OVERALL SITE CATCHMENT (-37.6037°S, 143.76647°E).

	Annual Exceedance Probability (AEP)					
Duration	50 %	20 %	10 %	5 %	2 %	1 %
10 minutes	7.48	11	13.6	16.4	20.5	23.9
15 minutes	9.07	13.4	16.6	20	25	29.2
30 minutes	12	17.6	21.8	26.2	32.7	38.1
1 hour	15.2	21.9	27	32.4	40	46.3
2 hours	19.2	27.1	33	39.1	47.8	54.9
3 hours	22.2	30.9	37.3	43.9	53.2	60.8
6 hours	28.9	39.3	46.7	54.4	65.4	74.4
12 hours	37.8	50.9	60	69.5	83.1	94.2
18 hours	43.9	59.1	69.8	80.7	96.6	109
24 hours	48.5	65.5	77.6	89.8	107	121

ENGENY

3.2.2 Spatial Variation

- A uniform spatial distribution for rainfall was adopted.
- It is noted that per ARR 2019, it is recommended that non-uniform spatial distributions are considered for catchments exceeding 20 km^2. Engeny has assessed and compared the variation in rainfall depth across the catchment using IFD data based on the centroid of the whole catchment, and centroid of subareas KE, FM, LQ, and HX (refer to Figure 3.1), which represents sub-catchments in the northeast, northwest, southeast and southwest edges of the catchment respectively. As shown in Table 3.2, there is a marginal difference (ranging between 1% to 3%) in IFD rainfall depths of other areas in the catchment compared to the catchment centroid, thus, a uniform spatial variation was deemed appropriate for this study.

TABLE 3.2: COMPARISON OF THE BOM IFD TABLE ACROSS THE RORB MODEL CATCHMENT (20% AEP)

Duration	Subarea KE	Subarea FM	Subarea LQ	Subarea HX	Catchment Centroid
10 minutes	11.2	11.0	10.9	11.2	11.0
15 minutes	13.6	13.4	13.3	13.6	13.4
30 minutes	17.8	17.6	17.4	17.9	17.6
1 hour	22.2	22	21.7	22.3	21.9
2 hours	27.3	27.2	26.6	27.4	27.1
3 hours	31.0	30.9	30.2	31.2	30.9
6 hours	39.3	39.3	38.2	39.5	39.3
12 hours	50.6	50.7	49.3	50.9	50.9
18 hours	58.7	58.8	57.4	58.9	59.1
24 hours	64.9	65	63.7	65.1	65.5

3.2.3 Pre-burst application

- For this study, a complete storm approach has been modelled in RORB to account for pre-burst rainfall. This was achieved by appending pre-burst rainfall depths obtained from the ARR Data Hub to the BoM IFD burst rainfall. Based on the flow results calibration, median pre-bursts (rather than 75th percentile pre-bursts) were adopted.
- The recent Benchmarking ARR 2019 for Victoria study undertaken by HARC (2020) found that the 75th percentile pre-burst rainfall magnitudes provided by ARR Data Hub provided a better fit across catchments in loss region 3 when compared to the median pre-burst rainfall magnitudes. The RORB model catchment falls within this loss region 3. Engeny compared the peak flows at key locations from the RORB model using the 50th and the 75th percentile pre-burst rainfall and found that the flows generated from application of 50th percentile pre burst rainfall compared better to the calibrated Yarrowee River RORB Model. As such the 50th pre-burst rainfall depths have been adopted for this study.

3.2.4 Initial and Continuing Losses

- The model adopts a rural initial loss of 25 mm and a continuing loss of 2.0 mm/h. These losses were determined from the calibrated Yarrowee River and 'The Chase' RORB Models and have been adopted for the current model.
- In addition to utilising the rural initial loss and continuing losses from the ARR Data Hub, ARR 2019 also provides a methodology to calculate the initial loss and continuing loss values for other land uses. Losses in RORB were assigned based on three surface types:
  - Effective Impervious Area (EIA) – comprising areas which are impervious and are directly hydraulically connected to the drainage system (e.g., a roof connected to an underground drain by downpipes)
  - Indirectly Connected Area (ICA) – comprising impervious areas which are not directly connected to the drainage system (e.g., a paved patio or footpath) and pervious areas that interact with impervious areas which are not directly connected (e.g., nature strips and garden areas)
  - Pervious area – comprising large parklands and bushlands reserves but not small pocket parks in urban areas.

Table 3.3 summarises the loss values adopted for each surface type modelled.

TABLE 3.3: SUMMARY OF ADOPTED LOSS VALUES BY SURFACE TYPE

Surface Type	Initial Loss (IL)	Continuing Loss (CL)	Source
Pervious Area (from ARR Datahub)	25.0 mm	2.0	Yarrowee River and The Chase RORB model (calibrated)
Effective Impervious Area (EIA)	1.0 mm	0 mm/h	ARR Data Hub and ARR 2016, Book 5, Chapter 3 - Section 3.5.3.2.1
Indirectly Connected Area (ICA)	16.8 mm	2.0 mm/h	ARR Data Hub and ARR 2016, Book 5, Chapter 3 - Section 3.5.3.2.1

3.2.5 Areal Reduction Factor (ARF).

With regards to areal reduction factors (ARFs), two scenarios have been considered as follows:

- ARF for a catchment size of 360 km^2, which is the area of the Yarrowee River catchment, was adopted to allow for the comparison of flows between the existing Yarrowee River RORB model and the current RORB model at Winter Creek just upstream of the confluence with the Yarrowee Creek.
- ARF for a catchment size of 80 km^2, which is the catchment area of the current RORB model through to the confluence of Winter Creek and Yarrowee River, adopted when analysing the impact of developing the Ballarat West PSP on the receiving waterways (Winter Creek and Yarrowee River).

3.2.6 Routing Parameter

The routing parameter (k_c) was determined using the same k_c divided by Distance average (D_{av}) based on the previous Yarrowee River RORB model. The Yarrowee River RORB model has been calibrated to a flood frequency analysis at the (Mt Mercer - 233215). By utilising the same k_c divided by D_{av} ratio consistency in the flow estimates produced by the models can be achieved. Corangamite Catchment Management Authority have provided in principle support to use a k_c divided by D_{av} estimation for the k_c of the catchment within a larger calibrated RORB model (the existing Yarrowee_Gnarr RORB modelling). The m routing parameter was maintained at the recommended default of 0.8.

Table 3.4 provides a summary of the k_c, d_{av} and k_c/d_{av} ratios from the Yarrowee_River RORB modelling.

TABLE 3.4: CALCULATED K_C/D_{AV} RATIOS FOR THE RORB MODELS

Source RORB Model	k_c	d_{av}	k_c/d_{av} Ratio
Yarrowee_River RORB Model (ARR 2019 Watertech Model)	30	14.76	2.03
Ballarat West PSP RORB (ARR 2019 Engeny Model)	19.56	9.59	2.04

3.3 Modelling Results

3.3.1 Pre-Development Conditions

Engeny has compared the 1 % AEP peak outflows at at the Node LK2 on Winter Creek, just upstream of the confluence of Winter Creek and Yarrowee River (refer to Figure 3.1) to the pre-developed flows from the Yarrowee River RORB model for both existing climate conditions (based on the IFD data available from the Bureau of Meteorology) and the Year 2100 climate conditions (incorporating an 18.5 % rainfall intensity increase, in line with the guidance provided within Melbourne Water's Technical Specifications). Table 3.5 provides a summary of the resultant peak flows.

TABLE 3.5: 1% AEP EXISTING CONDITIONS PEAK FLOWS AT CONFLUENCE OF WINTER CREEK

RORB Model	Existing Condition Peak Flow (m^3/s)
Yarrowee_River RORB Model (ARR 2019 Watertech Model)	72.3
Ballarat West PSP RORB (ARR 2019 Engeny Model)	83.5*

*the Engeny model has been run with an ARF of 360 km^2 to match these flows as the Yarrowee River RORB model was also run with an ARF of 360 km^2. This value is only relevant for this validation comparison, the existing conditions flow for PSP assessment purposes is shown in Table 3.8.

As shown above, the flow result from the updated ARR 2019 RORB model for Ballarat West PSP shows a comparable result (with difference of 14%) from the Yarrowee River RORB model result. The minor difference in the flows is due to the following:

- **Reaches -** Sub-catchments immediately to the east and north of Ballarat West PSP in the existing township areas of Ballarat have largely been classified as "Type 3 – Lined Channel or Pipe" reaches and "Type 2 – Excavated but Unlined" reaches respectively in the current model. These reaches have however been modelled as "Type 1 – Natural "in the Yarrowee River RORB model and thus contribute to the differences in peak flows.
- **Losses –** The losses in the current RORB model were assigned based on three surface types (i.e., pervious Area, EIA, and ICA), while in the Yarrowee River RORB model, the losses only represented on a single value for each sub-catchment instead of assigned to different surface types. This could also account for the difference in peak flow.

In addition to the above results, peak flows results have also been compared with the previous Engeny model. Engeny's original RORB model (2011) had a total of ten discharge locations that capture all flows into the waterways and discharge points for precincts 1, 2 and 4, as shown in Figure 3.2. Engeny has compared 1% AEP peak flows between the existing conditions for the 2011 study and current model as presented in Table 3.6. The results show comparable predicted pre-development flows in most locations. The current RORB modelling update for the strategy has been undertaken in accordance with the ARR 2019 guidelines, which largely account for the differences in flows. In addition, the current model has included the Wensleydale retarding basin, which was not modelled in the 2011 study and thus also accounts for the large difference in peak flows in Location 4 (flows to the Kensington Creek at Glenelg Highway).

ENGENY

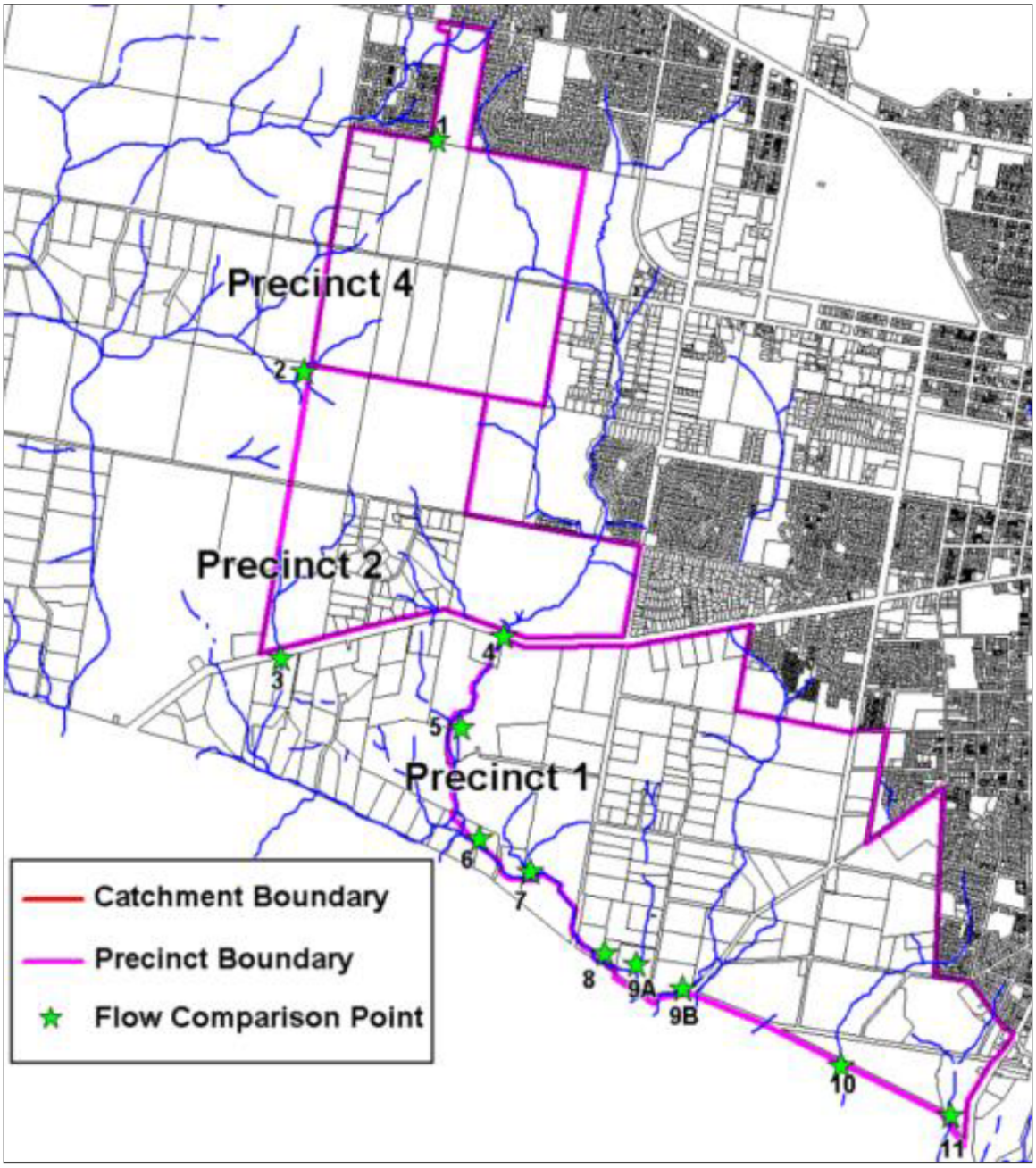


FIGURE 3.2: FLOW COMPARISON LOCATIONS

TABLE 3.6: ENGENY 1% AEP PRE-DEVELOPMENT PEAK FLOW TARGETS COMPARISON FROM BALLARAT DCP STUDY IN 2011

Comparison Locations	2011 Ballarat DCP study in 2011 (ARR 1987) (m^3/s)	Current Study (ARR 2019) (m^3/s)
Location 1	3.40	3.26
Location 2	4.10	3.78
Location 3	3.20	3.14
Location 4	32.20	28.69
Location 5	2.40	4.07
Location 6	1.10	2.18
Location 7	4.30	3.63
Location 8	1.30	1.17
Location 9a	3.40	3.00
Location 9b	23.40	23.68
Location 10	13.20	13.89
Location 11	4.80	4.60

3.3.2 Post Development Condition

Engeny has updated the developed condition RORB model to include details of the already built retarding basins and adjusted the sizing of the retarding basins which have not yet been built to try and achieve the best retardation outcomes possible. Table 3.7 shows the pre and post developed flows at the flow comparison locations where were referenced in Figure 3.2. The table shows that the pre-development flow rate is maintained or reduced at 8 of the locations but increases at 4 locations.

The increases have occurred as the original RORB modelling which informed the design of the retarding basins which have already been built was undertaken in ARR 1987 methodologies in 2011, whereas the current assessment uses ARR 2019 methodologies.

The updated modelling also accounts for an increase in development density that is reflected in the higher yields of 17-18 lots/ha which have been occurring in more recent development within the precinct. Overall, the current Ballarat West precinct average is 16 lots/ha. The modelling also accounts for an expected future increase in development density outlined in the *Precinct Structure Planning Guidelines: New Communities in Victoria, (VPA, October 2021)* that has been introduced by the VPA. These guidelines increased the proposed development density of greenfield development from 15 dwellings per hectare which was assumed for the initial drainage strategy to 20-25 dwellings per hectare under the new guidelines. The increase in density has translated to a total impervious fraction of 0.75 up from the previous assumption of 0.6. The increases to development density have not been considered retrospectively in catchments in which development and assets have already been constructed. There is not considered scope to change those assets, as they were built to the appropriate engineering standard at that time. In areas where the basins have not been constructed the basins sizes and outfalls have been adjusted to try and meet the predevelopment flows. In some parts of the catchment there is a mixture of constructed and not constructed basins. In these areas it may not have been possible to achieve predeveloped flow targets.

Table 3.7 also includes a comparison at the downstream end of Winter Creek just before it enters the Yarrowee River. The table shows that there is a 1.2 m^3/s increase in flows. This increase represents a 1.3% increase on the predevelopment flow rate. There are a few factors which are leading to this increase in flow.

(1) Change in hydrology methodology. The original drainage strategy was setup using ARR 1987 methodology while the current strategy has been reviewed using ARR 2019 methodology. The update to ARR 2019 represents a significant change in hydrologic methods which

would be expected to show some difference in flows. This is support by the comparison shown in Table 3.6 which compares the developed flow targets using ARR 1987 and ARR 2019. The general trend is for lower target flows. Location 4 is a key callout as the target flow has dropped by almost 4 m^3/s.

(2) Partial completion of drainage scheme. Approximately half of the retarding basins in the drainage scheme have already been constructed or committed to construction. The sizing of those basins was based on ARR 1987 methodologies. When the performance of those basins is reassessed using ARR 2019 methodologies they are not always meeting the new current design criteria (however they did meet the design criteria which was current when they were built or approved). This is effectively applying a new design criteria to an already constructed asset. In most cases the performance is similar to what the new design criteria would propose, however it is not fully compliant (this is to be expected). Using the example of location 4 above, under the ARR 1987 methodologies the flow target was 32.2 m^3/s, under the ARR 2019 methodologies it is 28.69 m^3/s. Given that all of the basins upstream of location 4 have already been constructed or committed using ARR 1987 methodology this increase in flow under the updated hydrology design criteria is locked in.

To offset this increase in flows would require a significant oversizing of basins in the as yet undeveloped areas of the scheme. This has equity issues from a development contributions point of view as land owners who have yet to develop are effectively paying to offset the impacts of previous development. The previous development was also compliant with the appropriate standard at the time of design acceptance. Some minor (and the overall increase of 1.3% is minor) change in flow rates should be expected with such a significant change in methodology and should not undermine the integrity of the previous built assets which used the best available information at the time.

(3) Increase in development density. There has also been a gradual increase in development density as the drainage scheme has progressed. It is likely that some of the earlier developments were at or below the design density of 15 lot/ha which was used to inform the modelling. As the density has increased, if the basins have not also increased in size then they may be spilling more flow, as either an increase in peak flow or as an increase in total volume of flow. The total volume of flow can become more important when the overall impact on Winter Creek is assessed as it can impact the timing of peak flows.

As there is an increase in peak flows predicted, hydraulic modelling of Winter Creek and the downstream Yarrowee Creeks has been undertaken to determine the impact of the increased flows on flood depths and extents. This is discussed further in section 8 but the overall impacts are considered negligible in the context of the overall modelled flooding. Some areas record minor increases in peak flood depths and other areas record minor reductions.

TABLE 3.7: ENGENY 1% AEP PRE-DEVELOPMENT AND POST DEVELOPMENT FLOW COMPARISON

Comparison Locations	Predeveloped flow (m^3/s)	Post developed retarded flow (m^3/s)
Location 1	6.12	6.31
Location 2	3.59	3.55
Location 3	2.90	2.57
Location 4	23.66	20.77
Location 5	3.64	5.57
Location 6	1.26	Outfalls at location 7 under developed conditions
Location 7	4.53	3.84
Location 8	1.39	0.83
Location 9a	2.57	1.55
Location 9b	22.13	22.19
Location 10	10.94	10.86
Location 11	4.36	4.2
Winter Creek upstream of Confluence with Yarrowee Creek*	91.5	92.7

* model run with ARF set to 80 km^2 for this flow comparison point only. All others run with ARF set to 1 km^2

The developed conditions assets have been designed to current climate conditions. Consideration of climate change shows that there will be a significant increase in peak flows if there is an 18.5% increase in rainfall intensity as predicted at the year 2100. Without explicitly designing assets for the climate change event, the best approach to managing to risk of large flows as a result of climate change (and also the risk of storms rarer than a 1% AEP under current climate conditions) is to ensure that unimpeded overland flow paths are available along all flow paths and that no areas are designed with trapped low points serviced only by pipe connections. Overland flow paths typically are able to convey larger flows than they are designed for due to the allowance of freeboard (typically 300 mm) before any dwellings are flooded. Underground drainage pipes are typically only able to convey the design flow, with any additional flow above the design flow rate causing flooding or overland flow.

This should be a key consideration in the assessment of development layout plans and plans which propose trapped low points or increased pipe sizes to minimise overland flows should be subject to additional security to ensure that flows larger than the 1% AEP event will not immediately flood private properties or dwellings (i.e. minimum freeboard requirements must still be maintained).

The figures in Appendix D show where the key overland flow paths required in the development areas are. These overland flow paths need to be accounted for in the development layouts and the functional and detailed designs of the developments.

3.3.3 Climate change

Engeny has undertaken climate change modelling to understand the likely impact of climate change in the PSP. The rainfall has been increased by 18.5% for the 2100 climate change modelling scenario, in line with the guidance from ARR 2019. The results from the modelling are shown in Table 3.8. This results in an 34% increase of flow from the existing climate conditions for Ballarat West PSP compared to the 2100 climate change conditions. The increase in flows is notably larger than the increase in rainfall intensity, which is 18.5%. Predicting a larger increase in flows than the increase in rainfall intensity is common for climate change modelling. This also demonstrates that increases in rainfall do not provide a like for like increase in total expected flows.

TABLE 3.8: CLIMATE CHANGE MODELLING RESULTS (RORB MODEL ARF 80 KM²)

Existing Condition Peak Flow (m^3/s)	Developed conditions Peak Flow (m^3/s)	Developed conditions 2100 Climate Condition Peak Flow (m^3/s)		
	1 %	1% Climate Change	2 % Climate Change	5 % Climate Change
91.5	92.7	125.0	100.4	72.1

3.4 Retarding Basins

Table 3.9 shows the key design criteria for the retarding basins that have not been constructed or designed and committed at the time this review was completed. It also shows details of the basins which were constructed with a design that is not considered in accordance with the original PSP. Basins constructed generally in accordance with the original drainage strategy and PSP are not shown. Only the outstanding retarding basins are subject to change as part of this review. The retarding basins have been designed to a detailed concept level only and so additional design work is required prior to the construction of the basins. The table shows the storage volume required in the 1% AEP event, the peak outflow in the 1% AEP event and the estimated cut volume that is needed to achieve this storage volume. It may be possible to reduce the require cut volumes with further design work however future designs must demonstrate that they are generally in accordance with the key design criteria of the basins and meet the minimum performance requirements.

ENGENY

TABLE 3.9: RETARDING BASIN KEY DESIGN CRITERIA

Drainage Asset	1% AEP storage volume (m^3)	Assumed outlet pipe Diameter (mm)	Peak 1% AEP outflow (m^3/s)	Estimated Cut Volume (m^3)	Notes
RB7	19,600	2 x 675	2.57 (Pipe flow)	35,800	
RB 13	17,400	2 x 825	3.84 (Pipe flow)	39,300	RB location slightly adjusted to reduce number of parcels contributing land
RB 14	9,860	525	0.83 (Pipe flow)	14,500	RB location slightly adjusted
RB15	12,000	2 x 650	2.42 (Pipe flow)	26,000	
RB 17	25,200	675	1.56 (Pipe & Spillway)	43,400	
RB 24	25,900	600	3.03 (Pipe & Spillway)	38,600	
RB 27	21,200	1 x 600 1 x 1050	10.86 (Pipe flow)	N/A	Retarding basin is proposed as an embankment across the waterway. Pipe dimensions are sized based on the RB27 design reverting flows back to the pre-development in the 1 % AEP
RB 29	17,200	2 x 750	2.86 (Pipe flow)	36,500	
SB 30 (RB30 has been replaced with a sedimentation basin in an adjacent location)	N/A	N/A	N/A	N/A	RB 30 has been removed and replaced with a sedimentation basin only. No retardation is required at this asset

ENGENY

TABLE 3.10:RETARDING BASIN LAND UPATKE

RB Name	Area of RB (m^2)	# of Parcel 1	Area Parcel 1 (m^2)	# of Parcel 2	Area Parcel 2 (m^2)
RB1	8939	211	8939		
RB2 North	31803	213	31803		
RB2 South	10543	215	10543		
RB3	25020	220	25020		
RB4	15663	220	15663		
RB5 North	10050	214	10050		
RB5 South	6589	214	6589		
RB6	20000	157	20000		
RB6a	15960	158	15960		
RB6b	5697	160	5697		
RB6c	1417	159	1417		
RB7	38616	209	38616		
RB11	20267	1	20267		
RB12	19679	1	19679		
RB13	23695	12	19188	11	4507
RB14	17413	81	17016	82	397
RB15	22516	83	22516		
RB17	35631	96	35631		
RB18	12727	65	6309	67	6418
RB24	35958	101	33990	102	1968
RB26	13970	87	13970		
RB27	44818	134	11270	154	33548
RB28	62042	114	5036	116	57006
RB29	34328	154	10913	153	23415
SB30	5865	128	5865		

3.4.1 RB1

Retarding basin 1 has already been constructed. The design was adjusted to increase the overall footprint. The basin is split into two parts, a wet sediment basin section in the northern half and a "dry creekbed" section in the southern half. The retarding basin was made larger than was originally proposed in the 2011 drainage strategy.

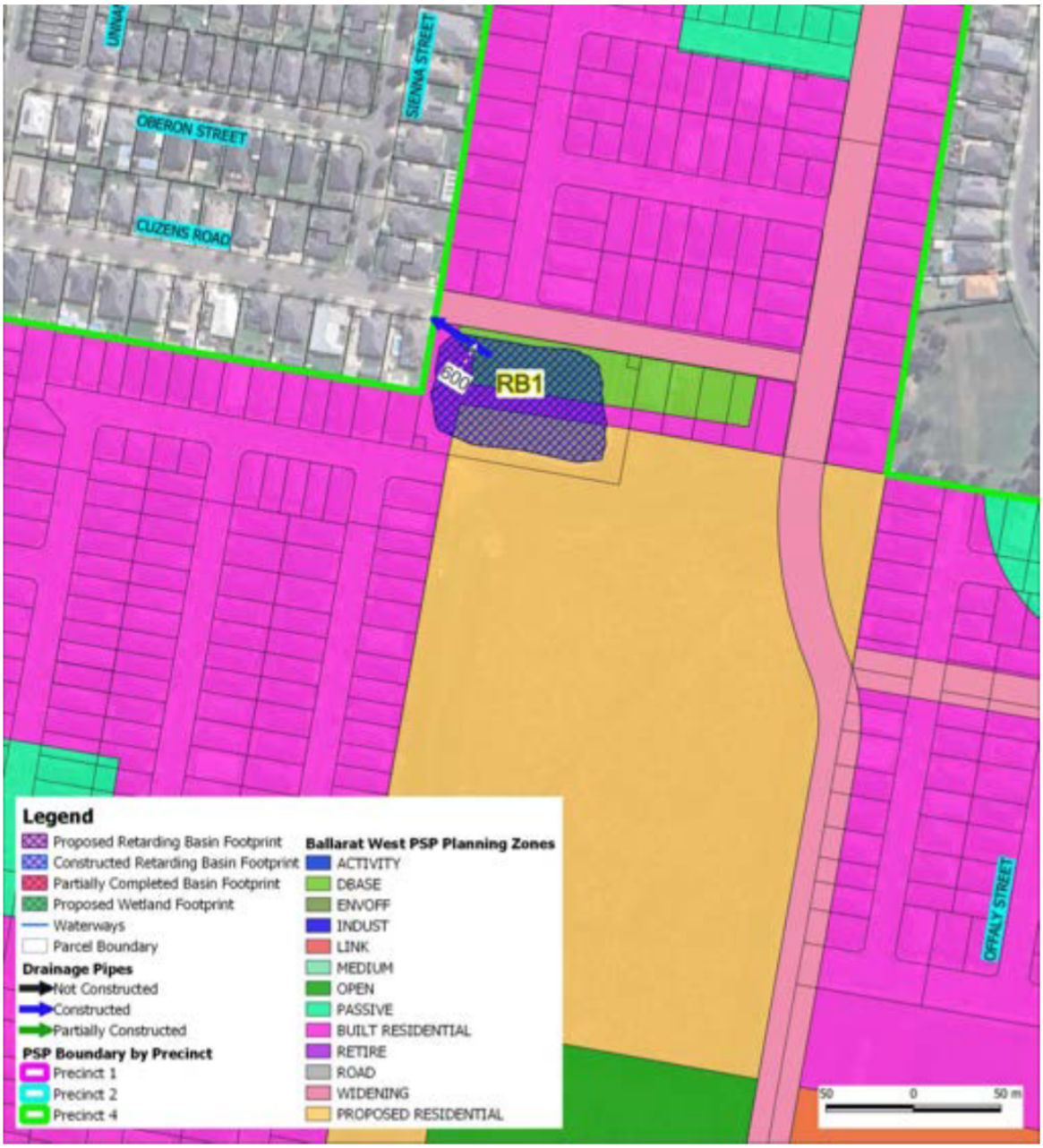


FIGURE 3.3: RETARDING BASIN 1 LAYOUT

3.4.2 RB2

Retarding basin two has already been constructed. The basin has been split into two halves. The northern half was constructed first as it was required by the earlier development stages and was the downstream section. The southern half was constructed second when the adjacent development also occurred. The key reason for the split in the basin and adjusting it to straddle both sides of Ballarat Carngham Road was to help facilitate drainage outfalls in this area. There is very little fall between RB2 south and the outfall to Kensington Creek to the East. By creating long linear wetlands an effectively flat water grade can be created. This can significantly reduce the fill required for the remaining part of the development as the pipes can discharge to a lower level further away from the creek without compromising the required hydraulic conveyance.

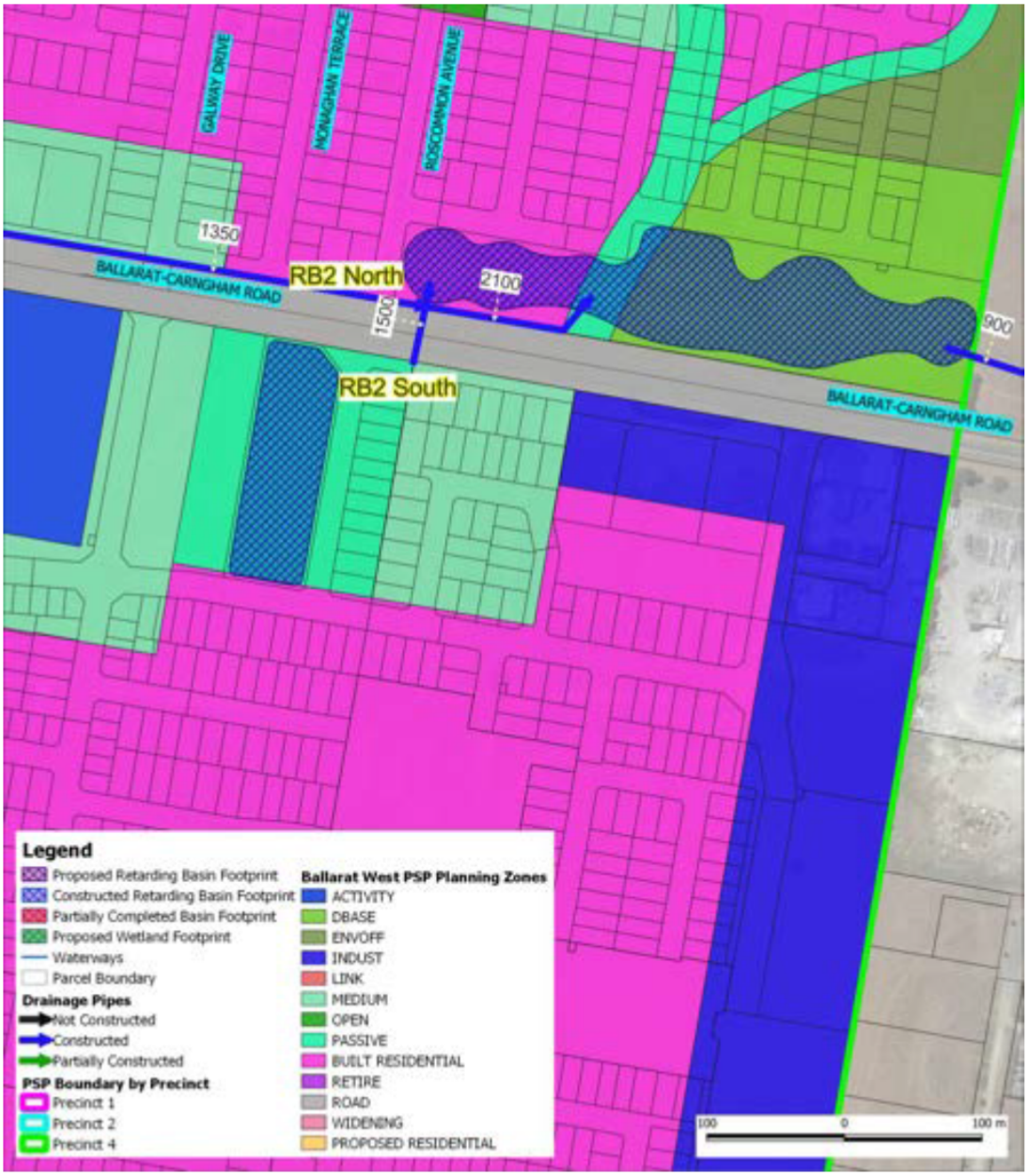


FIGURE 3.4: RETARDING BASIN 2 LAYOUT

3.4.3 RB4

Retarding basin four has been constructed. The retarding basin was moved and constructed in two parts to help facilitate development staging. The basin was moved north from its original position. The northern half, which was a sedimentation basin and retarding basin, was constructed first to facilitate the adjacent development. The southern half, which includes the wetland and additional retardation volume, was constructed a few years later when that estate reached the point at which it needed the drainage asset. Figure 3.5 shows the detailed design playout plan of retarding basin 4.

FIGURE 3.5: RETARDING BASIN 4 LAYOUT

3.4.4 RB5

Retarding basin 5 has been committed and is under construction. The asset has been split into two parts with a road running through the middle. Figure 3.6 shows the detailed design drawing of the basin. The northern part of the basin includes the sedimentation basin and part of the wetland, while the southern part includes the remainder of the wetland. The northern and southern parts combined provide the retardation function of the basin. The basin is generally in the same location as proposed in the 2011 drainage strategy, however the road through the middle has been included to provide a better development outcome, including providing better road links between adjacent estates.

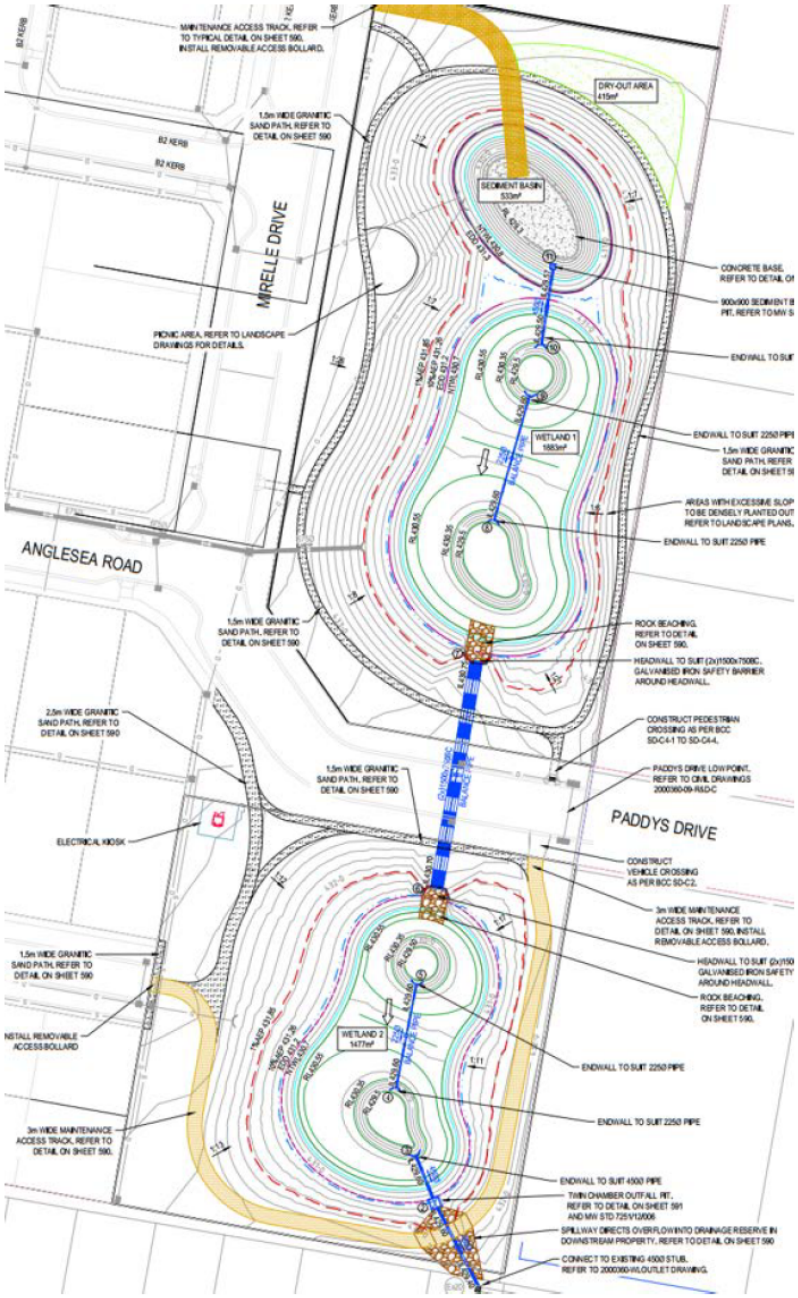


FIGURE 3.6: RETARDING BASIN 5 LAYOUT

3.4.5 RB6

Retarding Basin 6 is currently in the process of being delivered as part of the development of the land on which it is located. Figure 3.7 shows the proposed functional design layout. The asset if being delivered in a location which is broadly in accordance with what was proposed in the 2011 drainage strategy. The size of the wetland asset strategy has been reduced significantly compared to what was proposed in the 2011 drainage strategy due to the introduction of RB6A which is discussed below.

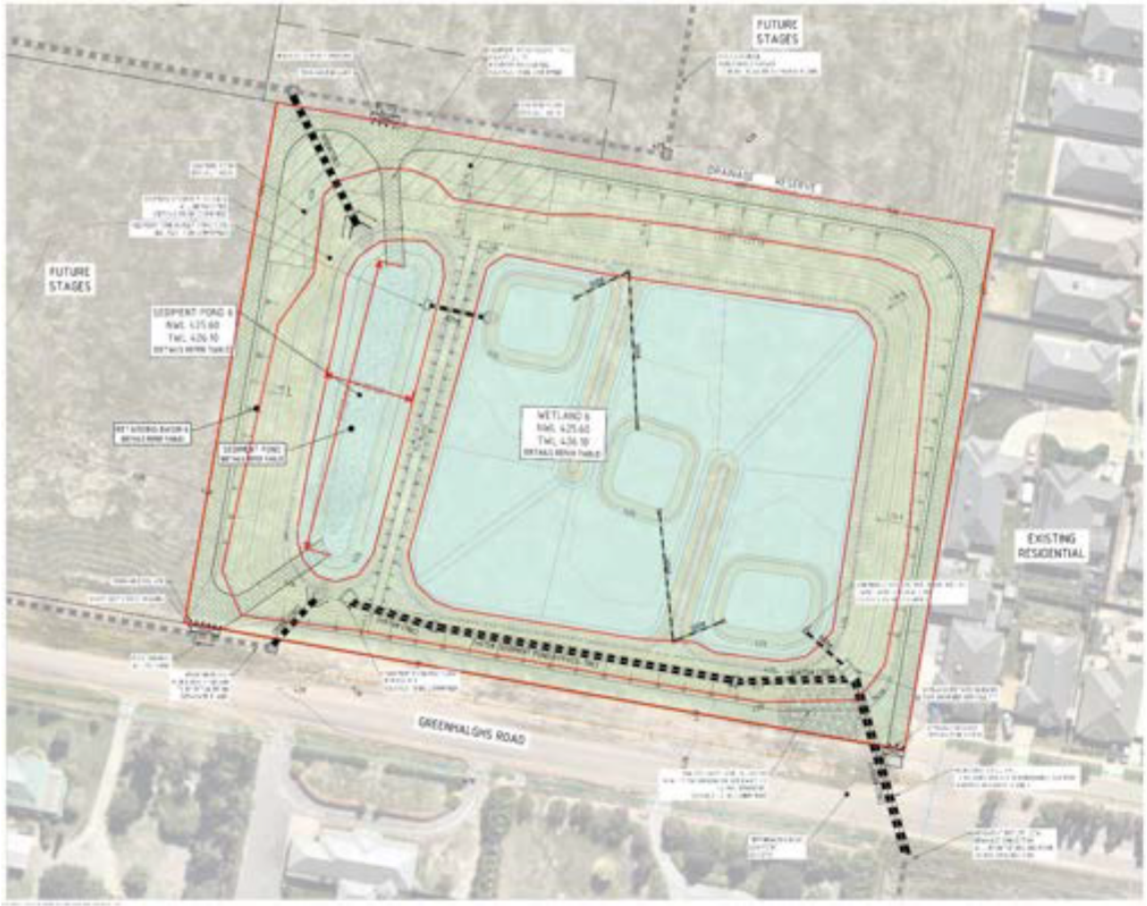


FIGURE 3.7: RETARDING BASIN 6 FUNCTIONAL DESIGN LAYOUT

There was a modification to the drainage strategy proposed by Neil Craigie (Kensington Creek Catchment – Review of drainage proposals between Greenhalghs Road and Glenelg Highway date 21 April 2016) as part of some proposed adjustments to retarding basin 6 and also the raingardens which were proposed adjacent to Kensington Creek. Basins 6A, B and C were developed based on this report and are discussed further in section 3.4.6 below. This proposal suggested that a longer narrower basin for RB6 which extended along Greenhalghs Road. The key benefit this would provide is in reducing the length of incoming pipe runs which could reduce the amount of excavation needed for the basin and wetland. This option was assessed by the developer of the site but not pursued due to commercial reasons for wanting to maximise the developable land fronting onto Greenhalghs Road.

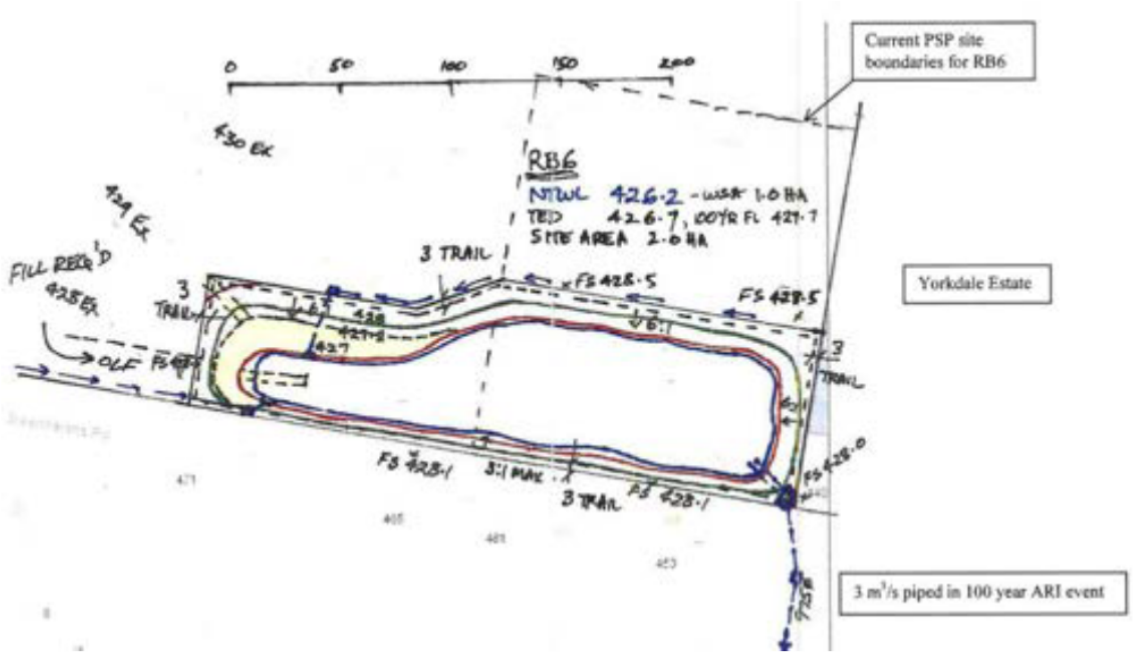


FIGURE 3.8: RETARDING BASIN 6 ALTERNATIVE DESIGN LAYOUT – NOT PURSUED

3.4.6 RB6A, B and C

The integrated sediment ponds/retarding basins RB 6A, 6B and 6C have been proposed to replace a series of biofilters as part of the stormwater treatment measures of Precinct 2. Neil Craigie completed a functional design of RB 6A which is shown in Figure 3.9. This asset has a land area of 1.85 hectares and also incorporates a 5200 m^2 sediment basin and 200 m^2 biofilter. This asset replaces Biofilter 9 that was proposed in the original drainage strategy. The combination of a sedimentation basin and biofilter will be easier for Council to maintain than a biofilter alone which would be subject to high loads of sediment and likely to have issues with surface blockage. In line with Neil Craigie's design, Engeny has also modelled the existing 1800 x 900 diameter box culvert on Glenelg Highway to carry a maximum of 3.8 m^3/s from the retarding basin to the downstream property south of Glenelg Highway, whilst the remainder of the retarding basin's outflows will be piped east to Kensington Creek. The existing box culvert discharges to a property located outside of the PSP development area.

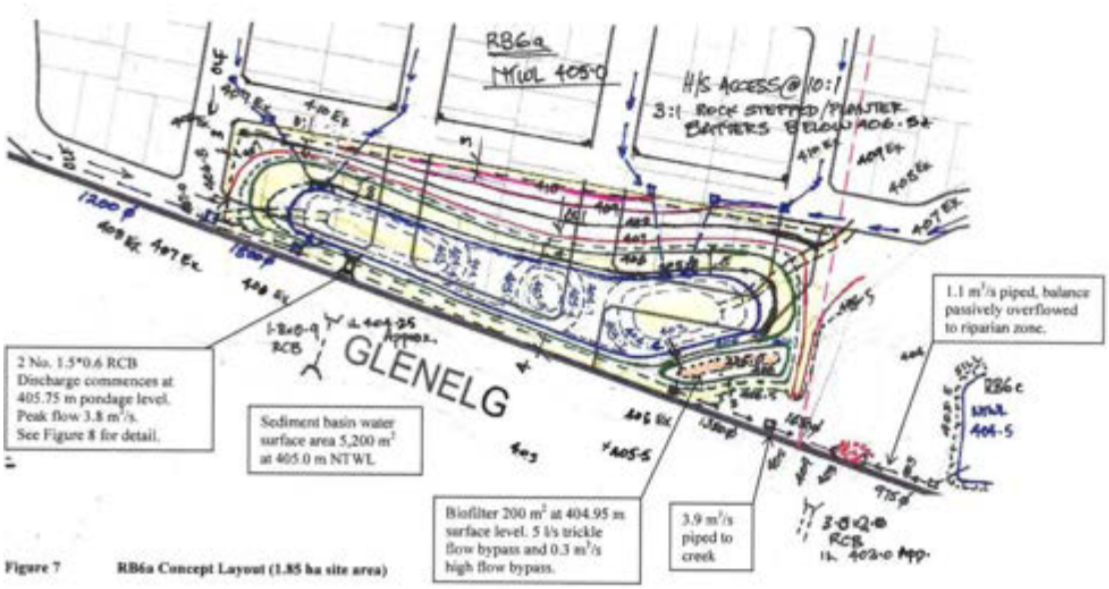


Figure 7 RB6a Concept Layout (1.85 ha site area)

FIGURE 3.9: RETARDING BASIN 6A FUNCTIONAL DESIGN LAYOUT

RB 6B and RB 6C were constructed to replace Biofilters 8 and 10 respectively. Design plans by KLM Spatial which were provided to Engeny by Council were used for used for hydrological and water quality modelling in this study. As proposed by Neil Craigie, who undertook the functional designs, RB6B and RB6C are proposed to be offline RBs, meaning that they are not situated within the main Kensington Creek waterway. Figure 3.10 shows the layout of RB6B and Figure 3.11 shows the layout of RB6C. RB6B caters for the 1 % AEP flows arising from sub-catchment Z1 in addition to a further 2 m^3/s coming from the 21.5 hectares external catchments east of Wiltshire Lane (sub-catchments DO and DP) and sub-catchment Y. As shown in Figure 3.10, it is proposed that by using a flow diversion structure, 2 m^3/s will be piped to RB 6B and the balance will overflow into Kensington Creek. As with RB6A replacing biofilters with sedimentation basins will provide for assets that are easier to maintain. While they do not achieve the same nitrogen removal rates as biofilters, including the treatment of the external catchments has boosted the pollutant removal to a level that it meets the aims of the strategy.

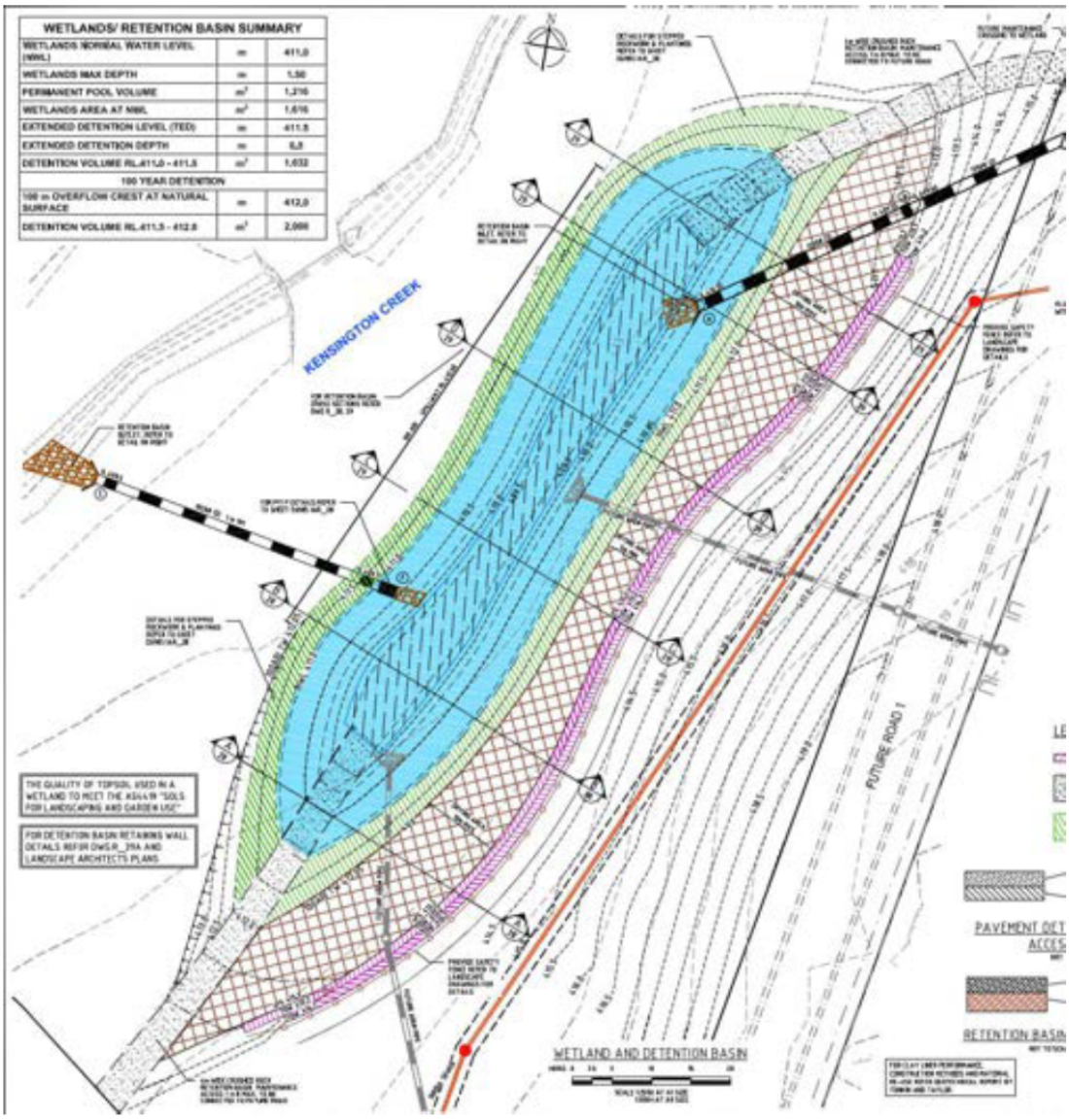


FIGURE 3.10: RETARDING BASIN 6B FUNCTIONAL DESIGN LAYOUT

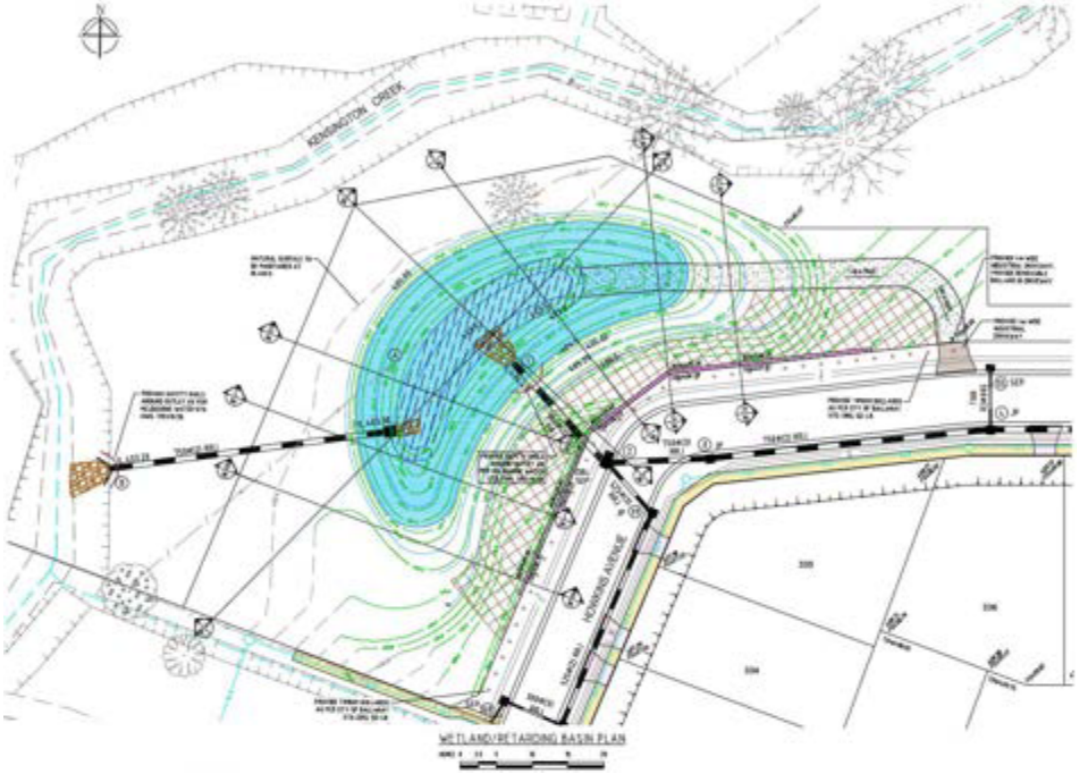


FIGURE 3.11: RETARDING BASIN 6C FUNCTIONAL DESIGN LAYOUT

3.4.7 RB7

Figure 3.12 shows the updated layout of RB7. The wetland and retarding basin are in the same general location as in the previous strategy, however the footprint has been expanded to account for the changes in wetland design standards (such as a reduction in extended detention depth from 0.5 m to 0.35 m, larger, dedicated areas for sedimentation drying, etc) and changes in the hydrology design from ARR 1987 to ARR 2019. Table 3.9 and Table 4.1 contain the key design criteria for the basin and wetland.

FIGURE 3.12: RETARDING BASIN 7 CONCEPT LAYOUT

3.4.8 RB11 and RB12

Retarding basins 11 and 12 have been moved and resized to help facilitate the staging of development. the catchments draining to RB11, RB12 and RB13 have also been adjusted. The original drainage strategy proposed that runoff from properties along Webb Road be piped south following the pre development fall of the land to Retarding basins 12 and 13 adjacent to Winter Creek. Pipe upgrades along Webb Road captured runoff from subcatchments north of Webb Road and divert piped flows to RB11 via the Cherry Flat Road Outfall Drain. These pipe diversions have been constructed because the areas to the south, where the 2011 strategy directed the pipe drainage, were not yet developing and therefore constructing pipes through these areas would be disruptive and expensive with the infrastructure not required in the short to medium term. The pipe diversions increase the flow to RB11 and RB12, and reduce the flow to RB13.

Figure 3.13 and Figure 3.14 shows the adopted layouts of RB11 and RB12. These figures have been sourced from the "Review of main drainage proposals for the precinct 1 MAC and Abiwood Lands – Version 3" by Neil Craigie dated 22/082016

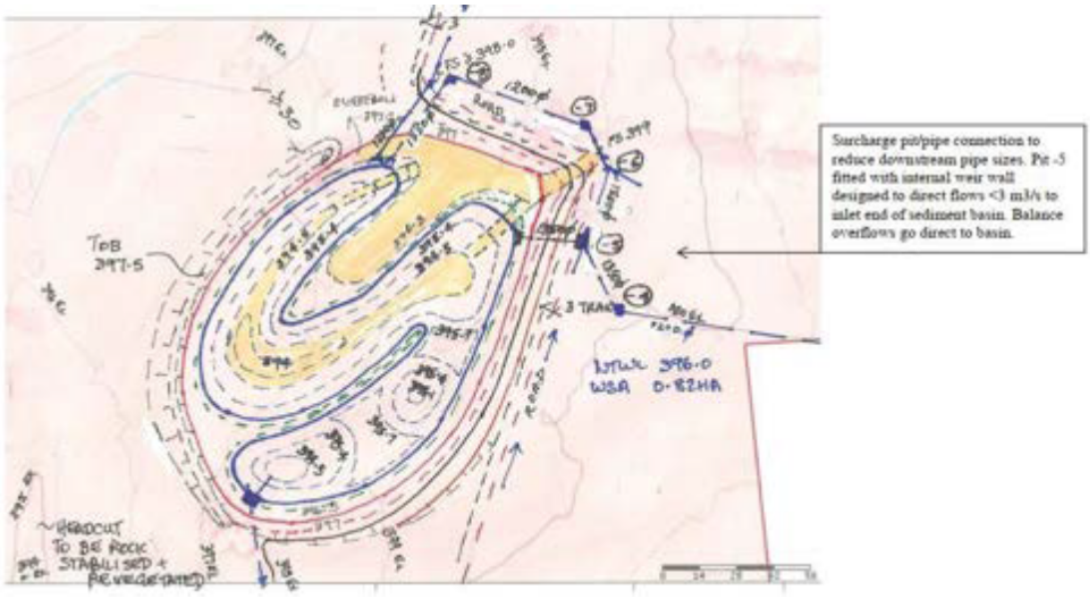


FIGURE 3.13: RETARDING BASIN 11 LAYOUT

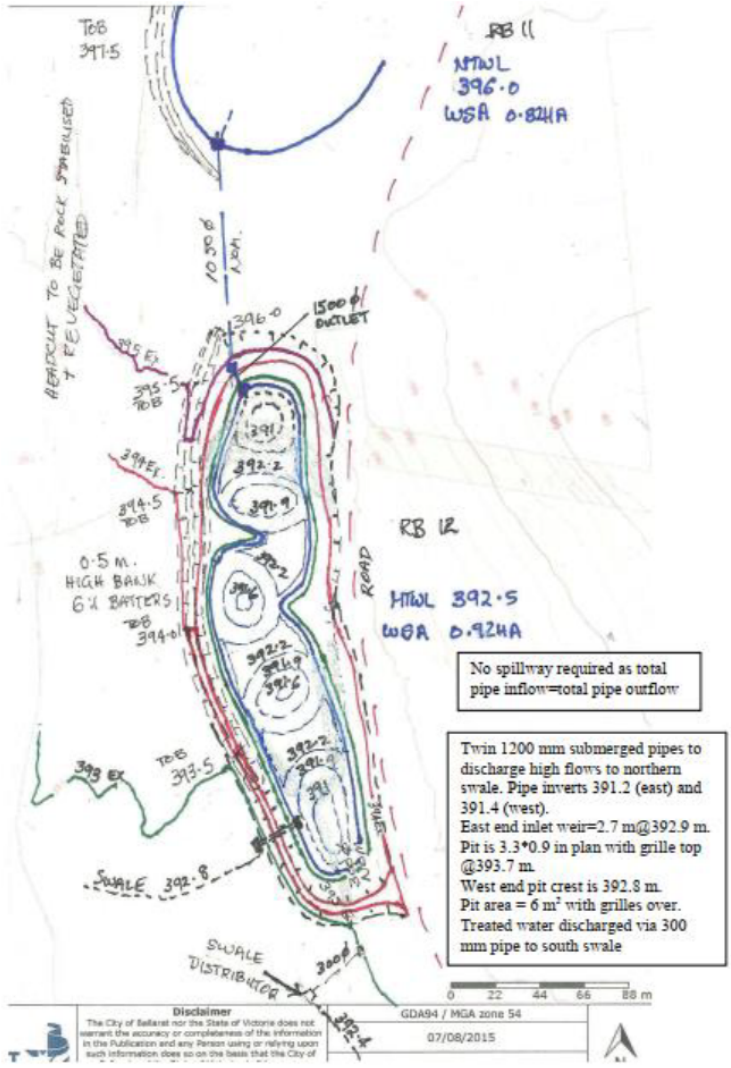


FIGURE 3.14: RETARDING BASIN 12 LAYOUT

3.4.9 RB13

As discussed in section 3.4.8 RB 13 has been resized to help accommodate staging of earlier development in north of the catchment around Webb Road. The catchment flowing to RB 13 has been reduced while the catchment flowing to RBs 11 and 12 was increased. The RB13 design has also been updated to account for the changes in the wetland design guidelines and the updated hydrological modelling. Figure 3.15 shows the updated layout of RB13. Table 3.9 and Table 4.1 contain the key design criteria for the basin and wetland.

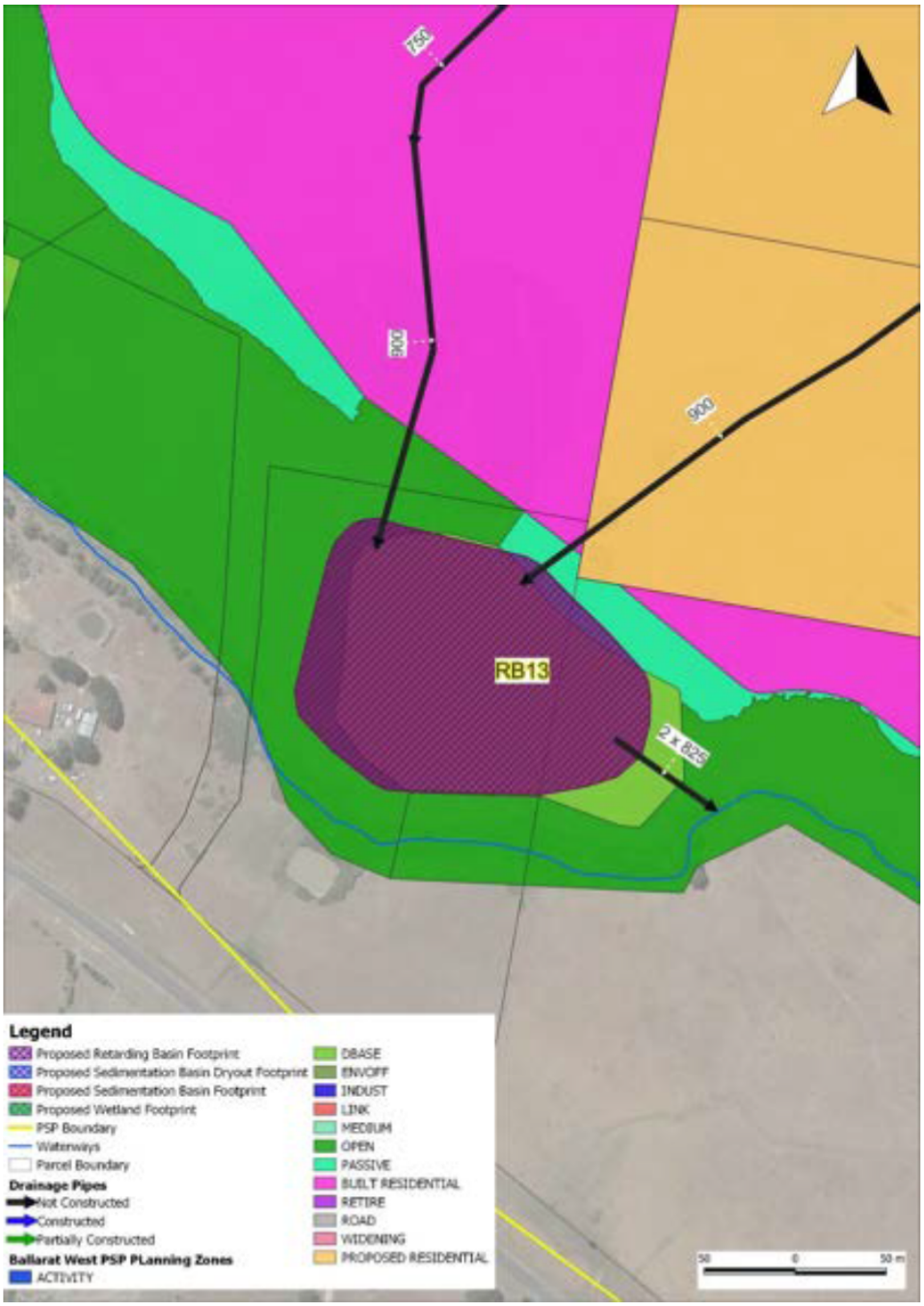


FIGURE 3.15: RETARDING BASIN 13 CONCEPT LAYOUT

ENGENY

3.4.10 RB14

Figure 3.16 shows the updated layout of RB14. RB 14 has been moved further west and is now proposed to be located within a single parcel. This move should assist with the development staging in the area and should help to simply the construction by reducing the need for multiple land owners to be involved. The basin is still located within open space adjacent to Winter Creek so there is no loss of developable area. The RB14 design has also been updated to account for the changes in the wetland design guidelines and the updated hydrological modelling. Table 3.9 and Table 4.1 contain the key design criteria for the basin and wetland.

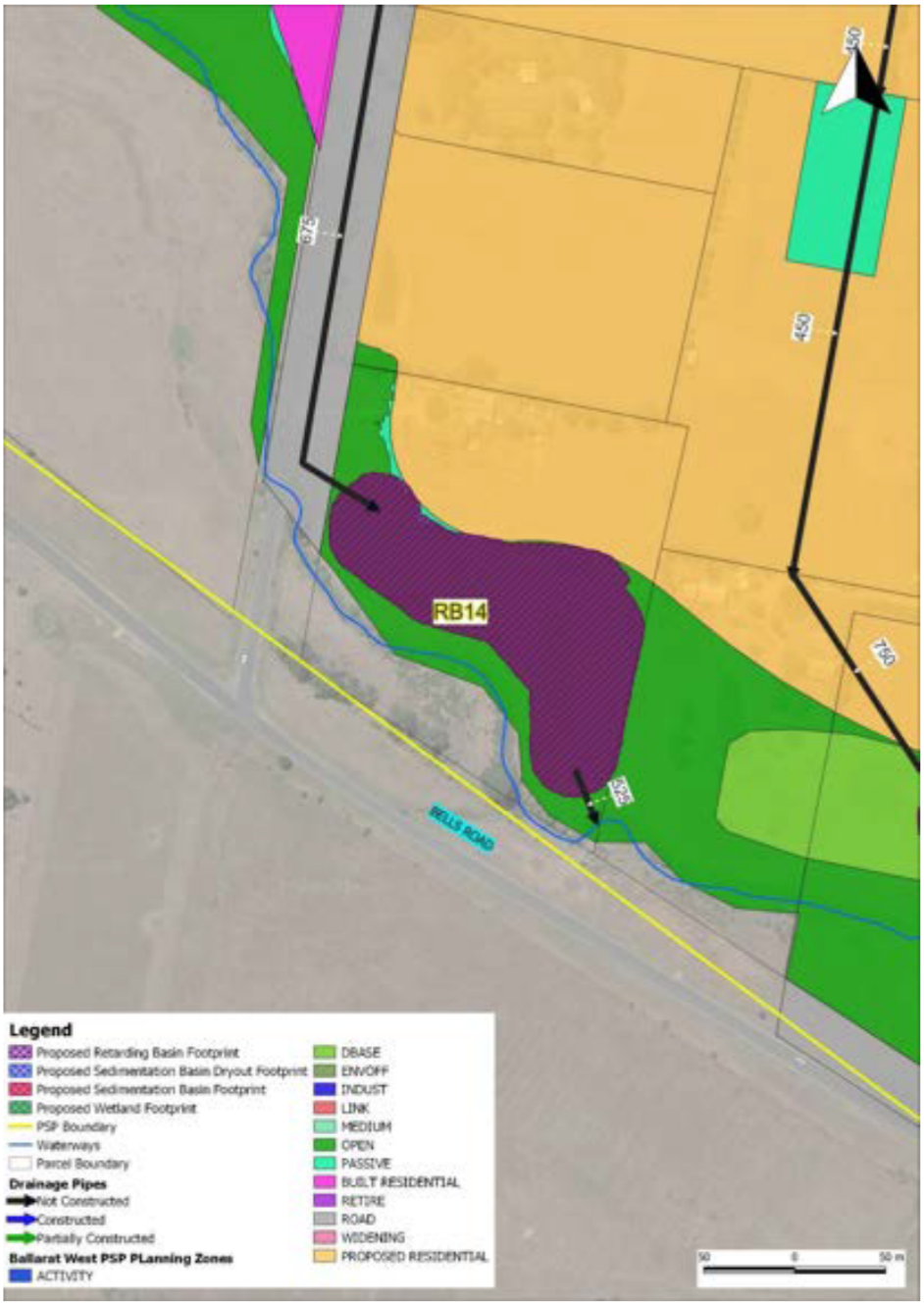


FIGURE 3.16: RETARDING BASIN 14 CONCEPT LAYOUT

3.4.11 RB15 and RB17

Figure 3.17 shows the updated layout of RB 15 and RB17. The proposed location and size of RB15 and RB 17 is very similar to the previous 2011 drainage strategy. The main change is that the footprint has been enlarged to respond to the updated design criteria in particular the lower extended detention depth in the wetland. Offsets from Winter Creek have also been further considered which has also adjusted the shapes slightly. Table 3.9 and Table 4.1 contain the key design criteria for the basin and wetland.

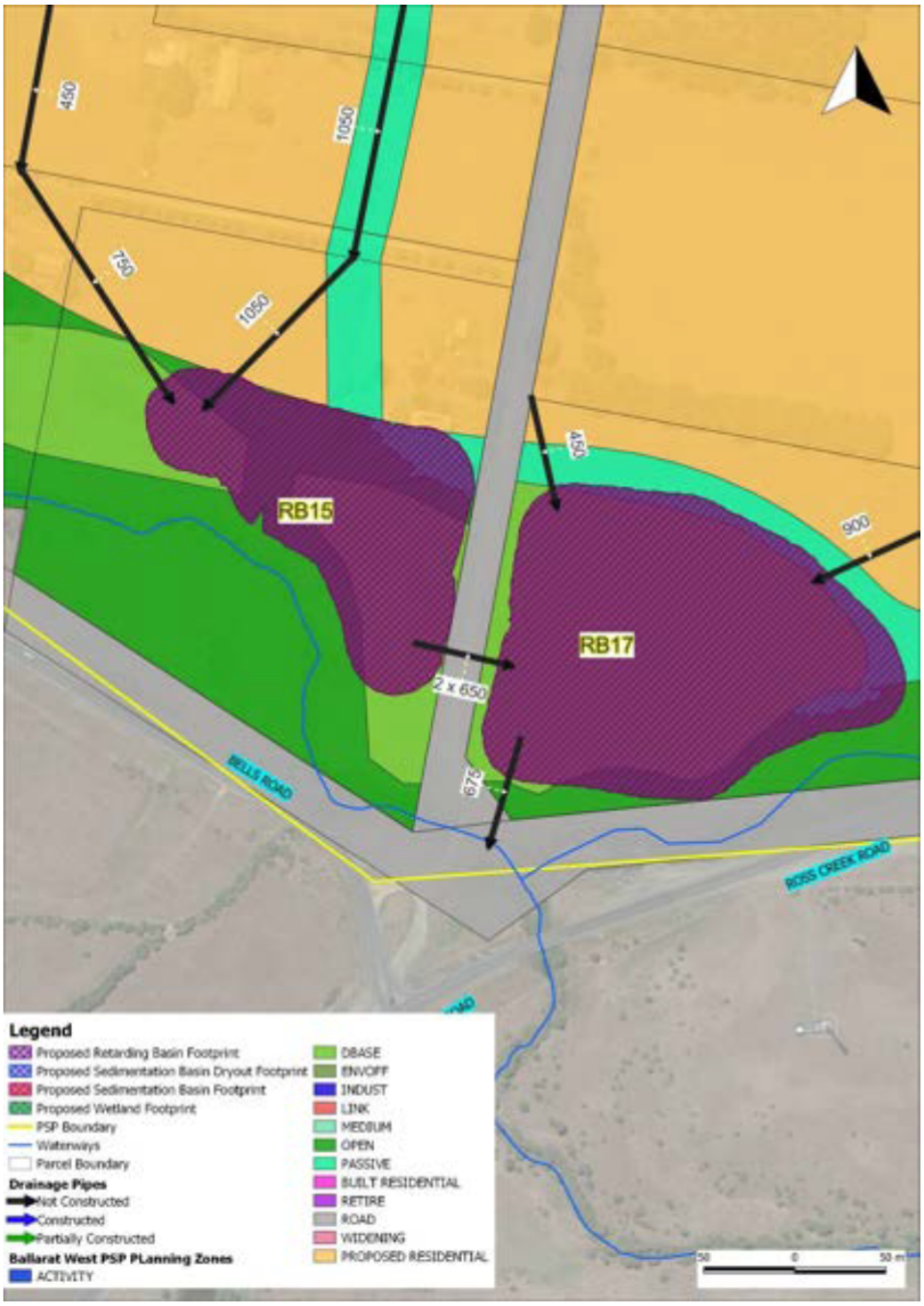


FIGURE 3.17: RETARDING BASIN 17 CONCEPT LAYOUT

ENGENY

3.4.12 RB18

Retarding basin 18 has been moved closer to Bonshaw Creek, enlarged and extended over two parcels. RB18 was moved to increase the catchment which can drain to it, allowing for better flow control and stormwater quality treatment. It's updated location also provides better connectivity between the wetland habitat and the creek habitat and corridor. It also helps to limit the number of drainage outfalls required into Bonshaw Creek and reduces the velocity of the flows discharging to Bonshaw Creek. The asset is currently partially constructed, with the northern section already built. The southern section will be built when the parcel on which it sits is developed. Figure 3.18 shows the layout of the retarding basin.

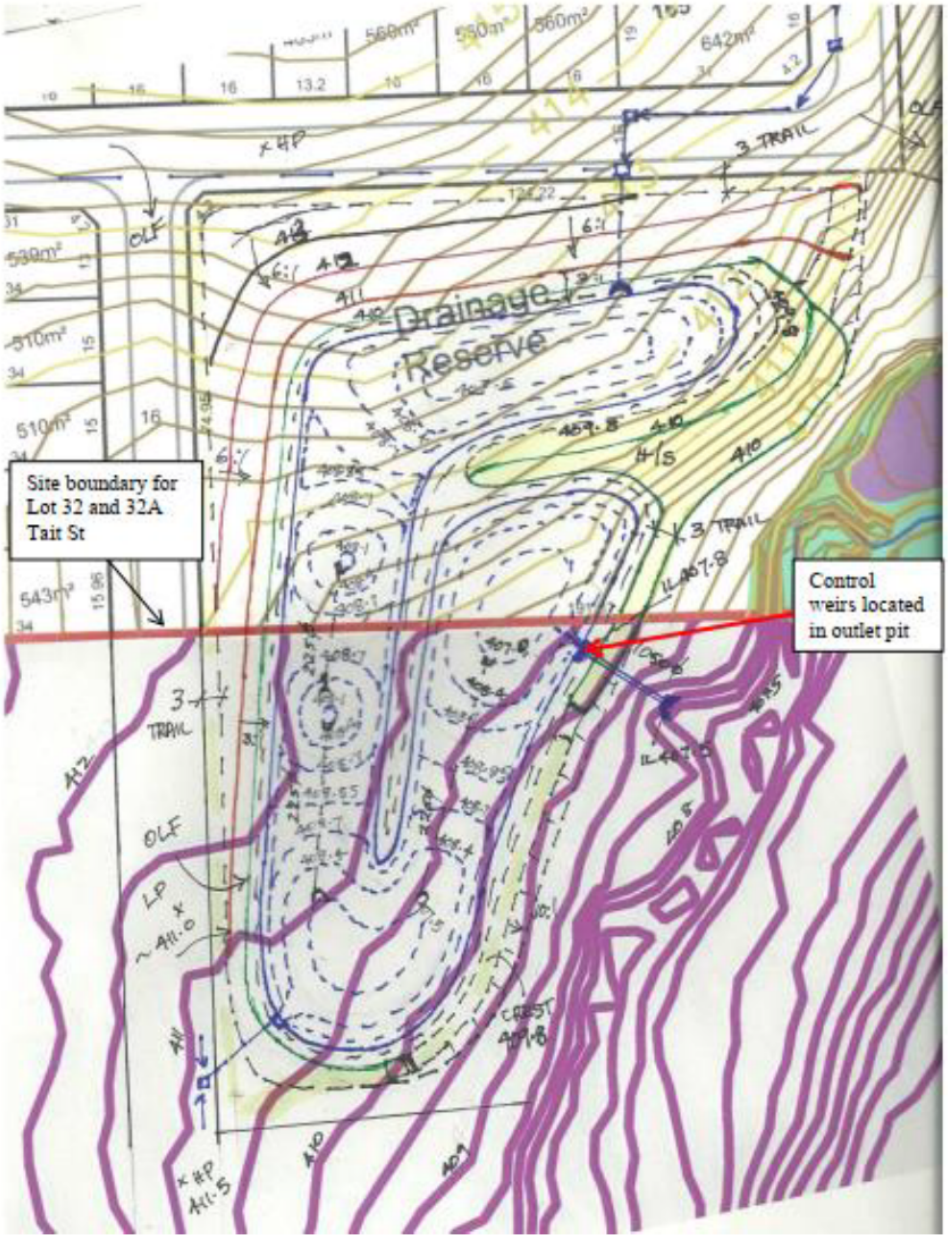


FIGURE 3.18: RETARDING BASIN 18 LAYOUT

Source: Lot 32 and 32A Tait Street, Bonshaw IWMS, Niel Craigie, 29/09/2015

3.4.13 RB24

Figure 3.19 shows the updated layout of RB24. The proposed location and size of RB 24 is very similar to the previous drainage strategy. The main change is that the footprint has been enlarged to respond to the updated design criteria with the key point being the lower extended detention depth in the wetland. Table 3.9 and Table 4.1 contain the key design criteria for the basin and wetland.

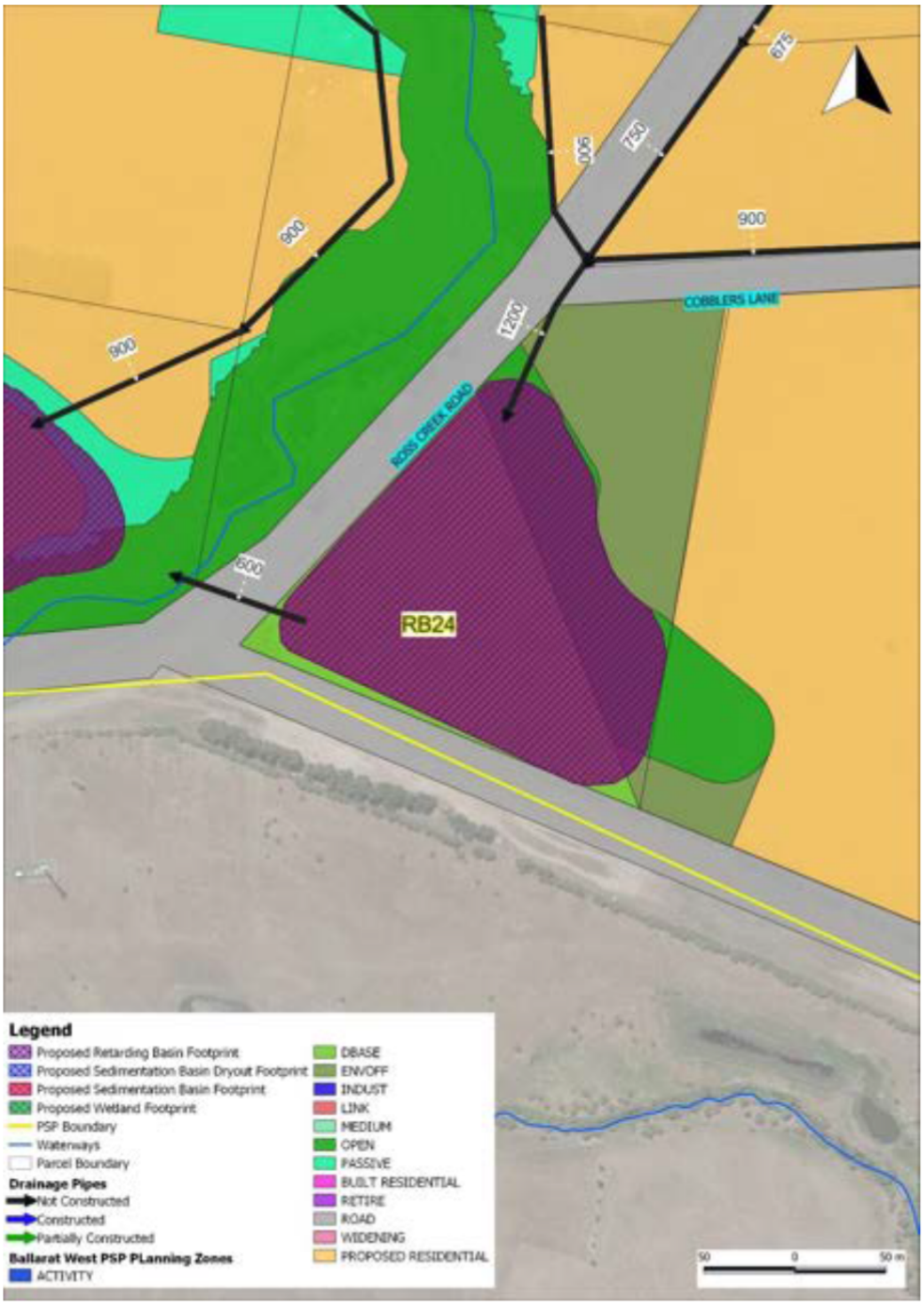


FIGURE 3.19: RETARDING BASIN 24 CONCEPT LAYOUT