

ATTACHMENTS

**Under Separate Cover
Ordinary Council Meeting**

6.00pm Tuesday 24 September 2019

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Transport
Strategy
Report
02/09/2019

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Bannockburn Traffic Management, Sustainable Transport & Car Parking Strategy



Bannockburn Traffic Management, Sustainable Transport & Car Parking Strategy*Prepared for Golden Plains Shire Council***Cardno Victoria Pty Ltd**Trading as Cardno
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1 Introduction

Cardno Victoria Pty Ltd (Cardno) has been engaged by Golden Plains Shire Council to provide Transport Strategies for Traffic Management, Sustainable Transport and Car Parking within the Bannockburn Growth Area.

Previous reports prepared by Cardno form the background context to this document include the 'Existing Conditions & Issues and Opportunities Assessment Report (January 2019)' and 'Traffic Modelling Report (March 2019)'. These documents are included as Appendix A & B respectively.

Subsequent to the abovementioned reports, this transport strategy document has been prepared to provide a summary of the work undertaken to date, along with the development and presentation of the recommendations identified to support the expected development within and around Bannockburn. An implementation plan including high level construction cost estimates is also provided.



2 Strategy Context

2.1 The Study Area

The Bannockburn study area encompasses that identified in the 2011 Urban Design Framework, being land generally bound by the Midland Highway to the north, Bannockburn Bush and Old Base Road to the west, and the extent of the rural residential development boundary to the south and east. The study area is illustrated in Figure 2-1

2.2 Strategy Purpose

The purpose of the Bannockburn Transport Strategy (BTS) is to address current and future road network and traffic management issues to support the expected residential development and commercial growth within the study area. This will be achieved by ensuring the street network caters for demand whilst ensuring the environment around the central retail and activity area is safe and vibrant.

The BTS will ensure car parking around the town centre is managed appropriately to support the retail and commercial areas, and that demand can continue to be met into the future by addressing the existing and future sustainable transport demands, including public transport and integrated walking and cycling networks throughout the study area.

2.3 Reference Documents

A number of background documents and studies have been considered in preparing the BTS, in addition to relevant local and strategic planning documentation. These include:

- Golden Plains Shire Planning Scheme;
- Bannockburn Urban Design Framework (2011);
- Bannockburn Town Centre Investment Strategy (BTCIS);
- Bannockburn Civic Heart Project (2014);
- Bannockburn Heavy Vehicle Alternative Route Study;
- Golden Plains Shire Recreation Strategy Plan (2015 – 2019);
- Bruce's Creek Masterplan, Bannockburn (2009);
- Golden Plains Shire Paths and Trails Strategy (2013 – 2017);

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- Golden Plains Shire Community Engagement Strategy (2016 – 2020);
- G21 Road Transport Plan (2017 – 2027)
- G21 Public Transport Strategy (2014); and
- G21 Physical Activity Strategy (2014 – 2017)

The literature review undertaken is summarised in the background report provided in Appendix A.



2.4 Strategy Consultation

Various stages of consultation have been undertaken throughout the development of the BTS to assist in identifying the issues and opportunities and the strategy recommendations from the community and various stakeholders. The consultation process is further detailed in Section 5 of this report.

2.5 Acknowledgement of Limitations

It is acknowledged that the development of this transport strategy commenced in late 2017 and a number of growth planning frameworks that may impact transport conditions around Bannockburn have been or are in the process of being developed more recently.

In the broader context, the Northern and Western Geelong Growth Area (NWGA) Framework Plan has been developed, in particular the Western Growth Area will extend along the Midland Highway toward Bannockburn and Hamilton Highway to the south. Whilst the Bannockburn Transport Strategy does not specifically consider this framework plan, it is considered that the recommendations identified in this strategy will assist in accommodating the impacts of the significant growth along the Midland and Hamilton Highway corridors.

At a local level, it is understood the Golden Plains Shire Council has since started working in partnership with Victorian Planning Authority (VPA) to undertake more detailed growth planning for the Bannockburn area. It is expected that the recommendations in this strategy will both inform this more detailed planning and ultimately be further refined to account for this planning.

The Department of Transport (DoT) in partnership with VicRoads has also since developed the Movement and Place (M&P) Framework. This framework helps identify the function of the various 'movement' corridors considering the interface with the surrounding roadside 'place' function with the aim of developing appropriate road network recommendations.

A formal M&P assessment was not in the scope of this study and hence not undertaken, however the broad M&P principles have been considered albeit in a less formal manner. With High Street being the only route across the rail line, it has to remain as a movement corridor. By maintaining the service roads, we have facilitated to retain or promote an element of place. Detailed measures to enhance this would be subject to future studies.

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3 Issues and Opportunities

This section presents the range of traffic and transport issues and opportunities that have been identified through the various mediums in the development of the strategy. These include:

- Stakeholder consultation including Golden Plains Shire Council, transport and other authorities;
- Documentation review, including current and previous regional and local strategies and plans;
- Site visits and extensive traffic and parking data collection; and
- Public consultation including on-line surveys and public drop in events.

Whilst there is some overlap, the issues and opportunities have been categorised under each transport mode and assigned a reference, which allows each to be considered in the identified recommendations. These have been drawn from the Existing Conditions and Issues and Opportunities Assessment Report provided in Appendix A.

3.1 Traffic Management

Based on a review of available information, site observations and early consultation, the following traffic and road network issues have been identified for the area, including:

- TMI-1. Being the only rail crossing in the area, there is a high volume of heavy vehicles including B-Double trucks utilising Shelford-Bannockburn Road and travelling through Bannockburn town centre to access the Midland Highway.
- TMI-2. There is a high number of service road entry and exit points along High Street between McPhillips Road and Pope Street with poor sight lines for drivers exiting the service roads, creating conflict points.
- TMI-3. The Geelong Road / Clyde Road / Kelly Road intersection immediately north of the rail crossing is currently in poor condition (ref Figure 3-1), with a number of issues observed, including:
 - Sight line issues, particularly the unsafe alignment of the Kelly Road approach, forcing drivers to look over their shoulder at an acute angle to check for oncoming traffic;
 - Confusing priority, particularly between Kelly Road and Clyde Road; and

- The location of an additional informal access to the rail station.

Figure 3-1 Geelong Road / Clyde Road / Kelly Road Intersection



- TMI-4. The high volumes of vehicles travelling on Geelong Road make it difficult for vehicles to egress from side roads onto Geelong Road during morning and afternoon peak hours.
- TMI-5. Speeding vehicles not adhering to the posted speed limit reducing safety of motorists and pedestrians on a number of streets in the study area.
- TMI-6. The limited public transport opportunities encourage car usage within the area.

Based on a review of existing conditions and identified issues, and considering recommendations made in previous strategy documents, the following opportunities have been identified to both improve the existing traffic and road network and to cater for expanding development within the Bannockburn Growth Area, including:

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- TMO-1. Upgrading the existing local and connector road network to ensure future traffic volumes due to development are catered for and do not have an adverse effect on local streets.
- TMO-2. Considering an upgrade of key intersections within the growth area for safety reasons and to adequately handle increased traffic volumes as growth continues, including:
- Geelong Road / Clyde Road / Kelly Road;
 - Midland Highway / Clyde Road;
 - Shelford-Bannockburn Road / Burnside Road;
 - Shelford-Bannockburn Road / Moreillon Boulevard; and
 - Milton Street / Burns Street.
- TMO-3. There is an opportunity to improve the Charlton Road / Levy Road intersection including the southern extension of Levy Road as development south of Charlton Road progresses.
- TMO-4. There is an opportunity to review the road hierarchy within the Bannockburn Growth Area so that it remains appropriate for the nature of traffic characteristics as residential and commercial development increases.
- TMO-5. Considering speed reduction measures to improve safety on certain links within the growth area.
- TMO-6. Considering a review of the service road access points to Shelford-Bannockburn Road (High Street) within the town centre.
- TMO-7. Reviewing the proposed road network outlined in the Bruce's Creek Masterplan, Somerset Estate Development Plan, and the Growth Area Urban Design Framework Plan, to ensure that it remains appropriate for the location and nature of future development, including links over Bruce's Creek.
- TMO-8. Considering the extension of the service road south of Pope Street along the west side of High Street, to reduce the number of direct property access points to the main road.
- TMO-9. Considering the provision of a heavy vehicle bypass to detour freight vehicles around Bannockburn Town Centre onto the Midland Hwy.

3.2 Sustainable Transport

3.2.1 Public Transport

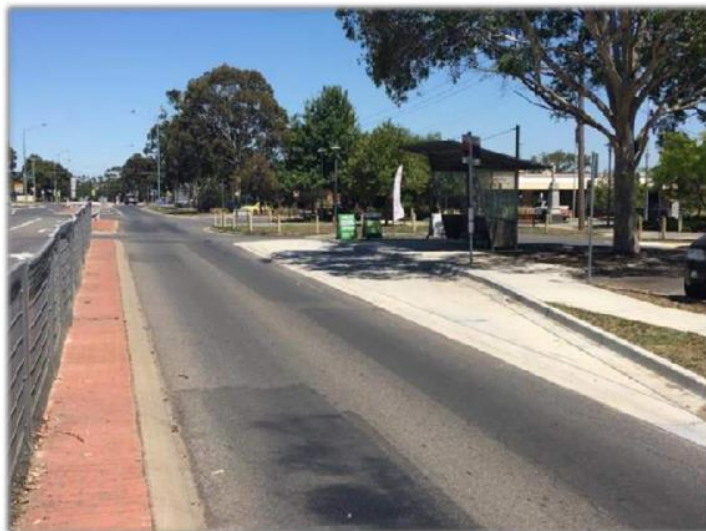
Based on a review of available information and site observations the following public transport issues have been identified for the area, including:

- PTI-1. Bannockburn has very limited bus services with existing services comprising of a single local service to and from Geelong in the afternoon, and 3 V/Line services in each direction between Geelong and Ballarat/Bendigo – two in the morning and one in the evening.
- PTI-2. There is one existing bus stop within the Bannockburn town centre located on the corner of McPhillips Road and Shelford-Bannockburn Road (ref Figure 3-2), with a single additional stop on the Midland Highway east of the Geelong Road intersection used by the local service only.
- PTI-3. Existing bus timetables do not make it feasible for Bannockburn residents to commute to Melbourne CBD or even Geelong via public transport without the use of a motor vehicle.
- PTI-4. The majority of existing residential dwellings within the growth area are not within an acceptable walking distance to the nearest bus stop.
- PTI-5. Bannockburn railway station is currently not in operation limiting the area's connectivity to other parts of Melbourne via passenger heavy rail and reducing travel options for local residents, businesses and employment in Bannockburn Growth Area.

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Figure 3-2 Shelford-Bannockburn Road Bus Stop, South of McPhillips Road



With a review of existing conditions and identified issues and early consultation with PTV, V/Line, and TfV, a number of potential opportunities have been identified to improve public transport providing access to and within Bannockburn Growth Area that include:

- PTO-1. Considering the advantages and disadvantages of extending the PTV local bus service to include a wider catchment throughout the Bannockburn Growth Area as residential development increases, and advocating to State Government to provide future services.
- PTO-2. Advocating to PTV and V/Line for additional bus services to and from Bannockburn as development within the town and the Western Growth Area increases with new services making it viable for residents to commute for work to and from Geelong, and potentially connecting to trains from Geelong to Melbourne.

- PTO-3. Considering a Council or community funded shuttle bus for residents within the growth area to the McPhillips Road/High Street bus interchange.
- PTO-4. Liaising with local schools and PTV to ensure that future school bus services meet expanding demand.
- PTO-5. Continuing to consider the long term option of reopening the passenger heavy rail service from Geelong at Bannockburn.

Ongoing consultation with schools, PTV and Department of Transport (DoT) beyond the delivery of this strategy will continue to identify opportunities for improvements to future public transport access to and within Bannockburn as demand will determine.

3.2.2 Walking and Cycling

Based on a review of available information, site observations and early consultation, a number of key pedestrian and cycling issues have been identified throughout Bannockburn, including:

- WCI-1. There is a lack of safe pedestrian crossings on High Street between Burnside Road and McPhillips Road, and a high volume of vehicles travelling through the town centre reduces the ability for pedestrians to safely cross the road (ref Figure 3-3).
- WCI-2. There is no safe pedestrian crossing on the western section of Geelong Road near the Clyde Road / Kelly Road intersection. Similarly, there is a lack of formal warning signage and pavement markings at pedestrian crossings on the Clyde Road and Kelly Road arms of the intersection near the rail crossing.
- WCI-3. Pedestrian links along Clyde Road and Kelly Road are inconsistent between Geelong Road and the Midland Highway.
- WCI-4. Missing pedestrian links on Burnside Road between Glen Avon Drive and Yverdon Drive.
- WCI-5. Missing pedestrian links on Charlton Road between Burnside Road and Willowbrae Way including a crossing at Bruce's Creek.
- WCI-6. No safe pedestrian crossing across Burnside Road to connect with the existing pedestrian path on the northern side of Burnside Road west of Dalcruin Drive.

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- WCI-7. Missing shared path links on Shelford-Bannockburn Road between Bruce Street and the western boundary of the growth area.
- WCI-8. There is currently only the single formal pedestrian crossing over the rail line.
- WCI-9. Lack of on-road bicycle lanes on key arterial links connecting to or through Bannockburn Town Centre; and
- WCI-10. Missing formal on-road or off-road bicycle path along Burnside Road between Shelford-Bannockburn Road and the existing shared path on the north side of Burnside Road east of Pope Street.

Figure 3-3 Existing Pedestrian Facility on High Street



Based on a review of existing conditions and identified issues, and a review of the Paths and Trails Strategy, a number of opportunities have been identified to improve the access and

mobility for active transport modes in Bannockburn Growth Area and encourage walking and cycling including:

- WCO-1. Strengthening pedestrian and cyclist connections through Bannockburn Growth Area, linking the north/south and east/west growth area boundaries.
- WCO-2. Providing off-road shared paths on key links identified within the growth area, as identified in the Bannockburn Paths and Trails Strategy.
- WCO-3. Providing new or improved pedestrian footpaths on key existing and future links within residential areas accessing main roads within the growth area including:
 - Clyde Road and Kelly Road to Midland Highway;
 - Shelford-Bannockburn Road west of Moreillon Boulevard;
 - Moore Street and Byron Street; and
 - Burnside Road and Charlton Road.
- WCO-4. Improving active travel connectivity across Bruce's Creek as development within the growth area continues.
- WCO-5. Improving pedestrian and cyclist crossing locations along key roads within the growth area including Geelong Road and Shelford-Bannockburn Road.
- WCO-6. Investigating the potential for a shared path along the Midland Highway to Lethbridge and Batesford.
- WCO-7. Investigating the need for and a suitable location to provide a second pedestrian crossing over the rail line to provide safe pedestrian access at desire lines.

Bannockburn Traffic Management, Sustainable Transport & Car Parking Strategy*Prepared for Golden Plains Shire Council***3.3 Car Parking**

Based on a review of available information, parking surveys, and site observations, a number of key parking issues have been identified within the growth area, and in particular the town centre area, including:

- CPI-1. No undercover parking present within the town centre.
- CPI-2. 10% of parking within the vicinity to the commercial area is timed with the remaining unrestricted, reducing turnover parking for visitors to the town centre during busy periods.
- CPI-3. Unrestricted parking proximate to key generators including Bannockburn Primary School, Bannockburn Library and Bannockburn Recreational Reserve.
- CPI-4. Cars parked on both sides of the narrow residential streets can impact two-way traffic flow.
- CPI-5. Car parking issues identified during specific events in the town centre such as Market days and events at Victoria Park and Bannockburn Recreation Reserve.

Based on a review of existing conditions and identified issues, a number of opportunities have been identified to improve the parking within Bannockburn Town Centre including:

- CPO-1. Reviewing on-street and off-street parking within the Bannockburn Town Centre to allow a mixture of timed and unrestricted parking to cater for all users' needs, considering the additional parking provision within the redeveloped Bannockburn Plaza.
- CPO-2. Ensuring future development proposals provide parking in accordance with the Golden Plains Shire Planning Scheme.
- CPO-3. Investigating and identifying areas within the town centre to supply additional off-street parking, catering to specific development needs as they arise.

Figure 3-4 Informal Car Parking on McPhillips Road



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4 Development of Recommendations

This section provides an overview of the methodology used to identify and development the transport recommendations which are presented in Section 6 of this report.

4.1 Key Tasks

The following tasks have generally informed the development of the strategy recommendations. These tasks, and the resulting outcomes informing the recommendations have been detailed in the background reports provided as appendices to this strategy report. The tasks generally being:

- Early stakeholder consultation;
- Data collection and existing conditions review;
- Future development analysis and traffic assessment;
- Issues and opportunities assessment;
- Provision of draft strategy options plans for consultation;
- Community and stakeholder consultation; and
- Provision of draft strategy recommendations and documentation for review.

4.2 Development of Recommendations

The following is a summary of steps taken in developing the draft recommendations for each element of the Bannockburn Transport Strategy.

4.2.1 Roads and Traffic Strategy Recommendations

- Reviewing measures identified in the Growth Area Plan as appropriate;
- Reviewing speed limits in the study area for appropriateness given potential changes in road network conditions;
- Developing a spreadsheet traffic model to provide an indication of future traffic volumes on key roads and intersections within the study area;
- Reviewing intersection treatments and layouts and recommending changes to improve safety and efficiency on the road network;
- Determining the need for additional traffic management measures throughout the study area;

- Reviewing and making recommendations regarding the service road arrangements along High Street;
- Reviewing safety at the rail crossing on Bannockburn – Shelford Road;
- Reviewing the freight network and requirements for freight vehicles in the local area;
- Identifying future access requirements within the existing town centre and for new development areas;
- Identifying road safety issues within the study area and measures to improve road safety; and
- Recommending a road hierarchy for proposed development lots within the study area.

4.2.2 Sustainable Transport Strategy Recommendations

- Identifying current and future desirable connections for pedestrians and cyclists;
- Identifying potential road user conflict points or related safety issues and determining improvement measures in order to reduce the risk and severity of incidents at these locations;
- Identifying opportunities to improve off-road connectivity through the existing township and to facilitate through future development; and
- Identifying opportunities to improve public transport facilities and services where possible, including taxi services, community transport, on-demand services and local and regional bus services.

4.2.3 Car Parking Strategy Recommendations

- Undertaking an existing car parking demand assessment and identifying any deficiencies in on-street and off-street car parking, considering commercial development proposals within the town centre;
- Identifying locations for additional formalised on-street car parking to manage current and future car parking demand in the town centre; and
- Proposing car parking solutions for identified developments such as the Bannockburn Heart precinct, the Bannockburn Community and Civic Centre redevelopment, new schools, and the proposed Bannockburn Plaza development’.

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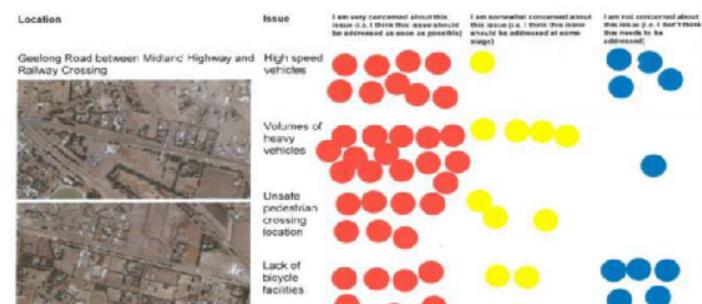
5 Summary of Consultation

Cardno and Golden Plains Shire Council has undertaken a series of community and stakeholder consultation exercises throughout the development of the strategy to understand the issues and opportunities within the local transport network from the public's perspective, and again to gain feedback on the draft strategy recommendations. The following presents a summary of the consultation works undertaken to date.

5.1 Community Consultation and Feedback Events

The first stage of community consultation was undertaken to collect feedback from the community regarding the existing transport network issues within Bannockburn. A letter and survey were sent via post to all residents and businesses within the study area in April 2018, and an online version of the survey was made available from 30th April 2018 until 2nd June 2018. The survey asked community members to nominate locations where they have noted issues and advise whether it was not an issue, a minor issue or a major issue, and provide any suggestions to overcome the issues they have noted.

Following the collection of the survey data, the second stage of community consultation was undertaken to understand the community's prioritisation of the major issues noted in the first stage of consultation. A 'Community Day' public drop-in session was undertaken on Wednesday 11th July 2018 from 10:00am to 4:00pm, where Council and Cardno staff were available to discuss and explain the project scope and invite community members to partake in an interactive feedback activity.



A second community drop in session was held to gain feedback on the draft strategy recommendations. This was facilitated by Golden Plains Shire Council and was held on Wednesday 19th June 2019, where Council staff were available to answer questions and provide additional information regarding the strategy recommendations. Feedback from this session has been incorporated into the strategy documentation.

5.2 Stakeholder Consultation

Key stakeholders have also been consulted in the various stages of the development of the Bannockburn Transport Strategy. The first stage of stakeholder consultation was undertaken to collect knowledge and understand the key issues and opportunities from the perspective of the stakeholders. An inception meeting was held at Golden Plains Shire Council with a range of Council departments to collect information and understand who the key stakeholders are. Stakeholders included:

- Golden Plains Shire Council – Officers from various departments;
- VicRoads (South West Region) – Now Regional Roads Victoria;
- Public Transport Victoria – now Department of Transport;
- Transport for Victoria – now Department of Transport;
- VicTrack; and
- V/Line.

Stakeholders were contacted in the early stages in the development of the strategy including a meeting with VicRoads, also attended by Council officers to gain their insight into existing issues and current and future proposals on their network. VicRoads also attended a second meeting with Council officers to discuss and provide feedback on the draft recommendations, including the background to identifying the various recommendations.

A summary of the feedback from the community and stakeholders is provided as Appendix C.

The draft recommendations were also presented to Golden Plains Shire Councillors at a Council Briefing on Tuesday 21st May 2019.

More detailed feedback has also been provided by Regional Roads Victoria and Department of Transport, which has been considered in the final draft of this strategy as appropriate.

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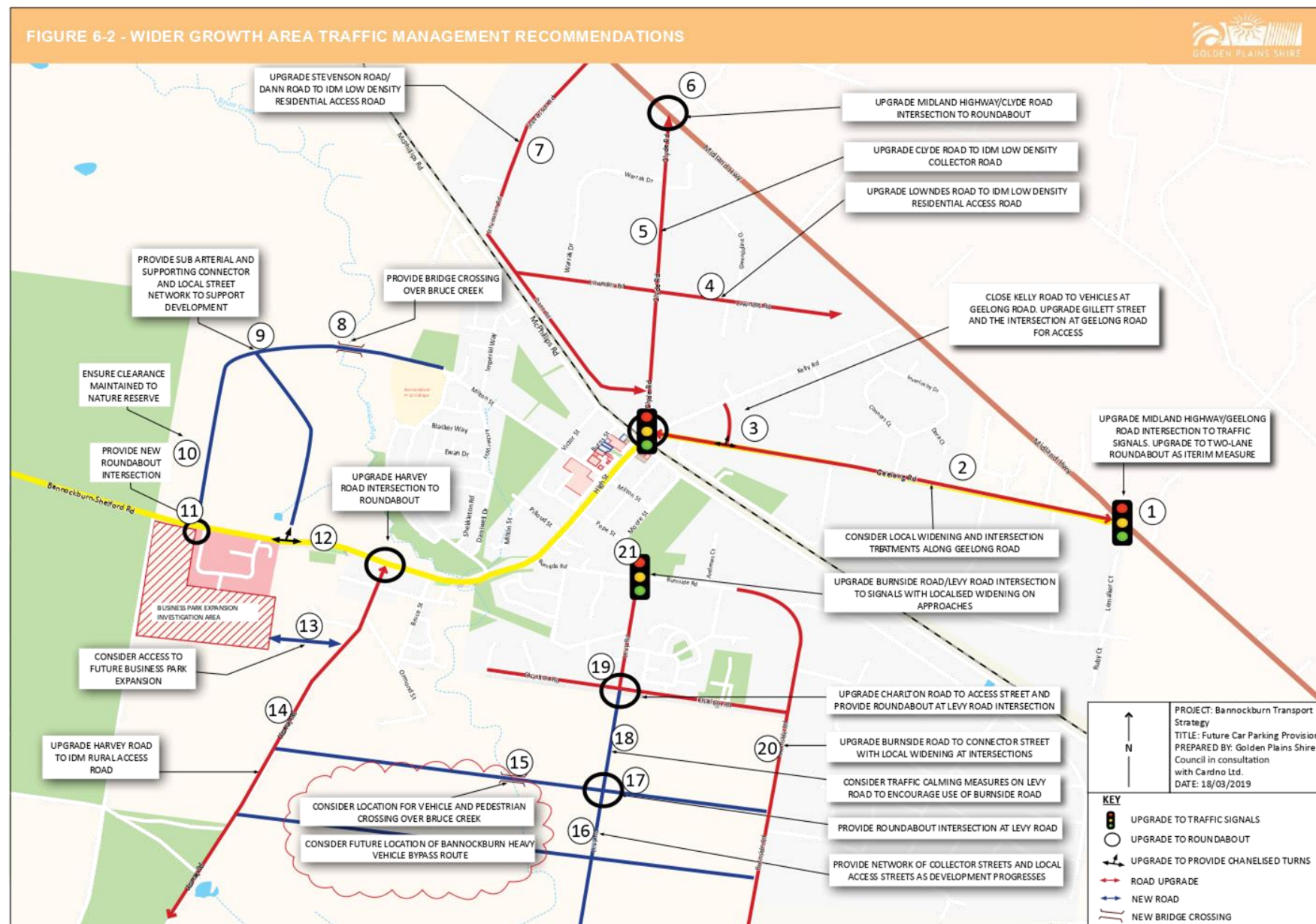
6 Integrated Strategy Recommendations

The following sections detail the recommendations for each of the strategies, drawn from the outcomes of the previous stages in the strategy development. They are generally split into strategies concerning the town centre area and then the wider Bannockburn Growth Area.

6.1 Traffic Management Strategy Recommendations

The following traffic recommendations have been developed in response to the issues and opportunities that have been identified in both the Bannockburn town centre and the wider growth area. Each recommendation is linked to relevant issues and opportunities, as identified within Section 3. The locations for each of the town centre and wider growth area traffic recommendations are also illustrated in Figure 6-1 and Figure 6-2 respectively.





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6.1.1 Town Centre Traffic Management Recommendations

The following traffic management recommendations have been identified for Bannockburn Town Centre, and are illustrated on Figure 6-1. The various issues and opportunities addressed for each have also been identified.

1. Remove the Kelly Road arm and upgrade Geelong Road / Clyde Road intersection to a roundabout with a pedestrian crossing in the interim and ultimately upgrade to a fully signalised intersection including pedestrian access and integration with rail level crossing, as demand dictates (TMI-2, TMO-2)
2. Continue to upgrade McPhillips Road between High Street and Victor Street (TMO-1)
3. Close the northern section of Burns Street to accommodate and provide access to the proposed Bannockburn Plaza as identified in the Town Centre Land Use Strategy and plans for the plaza development (TMO-1)
4. Upgrade Victor Street and Burns Street intersections to provide channelised left and right turns off Milton Street, including localised widening of Milton Street (TMO-2)
5. Upgrade Burns Street to a local access street (TMO-1)
6. Upgrade the High Street / Pope Street intersection to a roundabout (TMO-2)
7. Upgrade Bannockburn-Shelford Road to provide channelised left and right turns into Burnside Road (TMO-2)
8. Ultimately upgrade High Street / Milton Street to a signalised intersection with full pedestrian access to increase vehicle capacity and vehicle and pedestrian safety (TMO-2)
9. Streamline access to service roads by removing mid-block access, including the addition of an entry point south of McPhillips Road (TMI-2, TMO-6, TMO-9)
10. Upgrade High Street to a dual carriageway with two lanes in each direction, with 2 x 7m wide carriageways and central median as per IDM standards whilst considering local constraints (TMI-11)

11. Upgrade Milton Street east of High Street to formalise existing parking and accommodate a shared path. Maintain existing character and provide an attractive pedestrian link between High Street and Victoria Park (TMO-1)
12. Upgrade Moore Street and McPhillips Road to Infrastructure Design Manual (IDM) collector street level 1, incorporating shared paths and parking. Incorporate appropriate traffic management measures to prevent rat-running for vehicles trying to avoid High Street (TMO-1)
13. Upgrade the Pope Street / Moore Street intersection to provide channelised left and right turns off Pope Street (TMO-1, TMO-2)

6.1.2 Wider Growth Area Traffic Management Recommendations

The following traffic management recommendations have been identified for the wider Bannockburn Growth Area, and are illustrated on Figure 6-2. The various issues and opportunities addressed for each have also been identified.

1. Advocate for an interim upgrade of the Midland Highway / Geelong Road intersection roundabout to two lanes and ultimate upgrade of the intersection to traffic signals (TMO-2)
2. Consider local widening and intersection treatments to improve safety and increase capacity along Geelong Road (TMI-14)
3. Close Kelly Road to vehicles at Geelong Road to simplify the intersection and upgrade Gillett Street and the intersection at Geelong Road for access (TMI-13, TMO-1, TMO-2)
4. Upgrade Lowndes Road to IDM low density residential access road (TMO-4)
5. Upgrade Clyde Road to IDM low density collector road (TMO-4)
6. Advocate to VicRoads for an upgrade of Midland Highway / Clyde Road intersection to roundabout (TMO-2)
7. Upgrade Stevenson Road / Dann Road to IDM low density residential access road (TMO-4)

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8. Provide a bridge crossing over Bruce Creek, extending Milton Street into the proposed development west of the creek (TMO-7)
9. Provide sub arterial and supporting connector and local street network to support development west of Bruce Creek (TMO-4)
10. Ensure clearance between the proposed connector road and the nature reserve along the western boundary of the growth area (TMO-7)
11. Provide a new roundabout at the new connector road intersection with Bannockburn-Shelford Road at the western side of the growth area (TMI-5, TMO-5)
12. Upgrade the Harvey Road / Bannockburn-Shelford Road intersection to a roundabout as traffic volumes increase (TMI-1, TMO-2, TMO-8)
13. Consider access to future expansion of business park from Harvey Road pending the size and nature of the expansion (TMO-1, TMO-7)
14. Upgrade Harvey Road to IDM rural access road (TMO-4)
15. Investigate potential additional vehicle and pedestrian crossing over Bruce Creek to the south as a long term option if demand exists and/or as part of a heavy vehicle bypass option (TMI-1, TMO-7, TMO-8)
16. Provide a network of collector streets and local access streets as development progresses south of Charlton Road (TMO-1, TMO-4)
17. Provide a roundabout intersection with proposed connector street at Levy Road (TMI-5, TMO-3)
18. Consider traffic calming measures on Levy Road to encourage use of Burnside Road for through traffic (TMO-1, TMO-5)
19. Upgrade Charlton Road to an access street and provide a roundabout at the Levy Road intersection (TMO-1, TMO-3, TMO-4)
20. Upgrade Burnside Road to a connector street with local widening to allow channelised right and left turns at intersections to increase capacity (TMO1, TMO4)

21. Upgrade the Burnside Road / Levy Road intersection to signals with localised widening on approaches. (TMO-2)
22. Integrate speed management measures into street network and intersection improvements to encourage through traffic on connector and arterial roads and local traffic only on local and active streets.

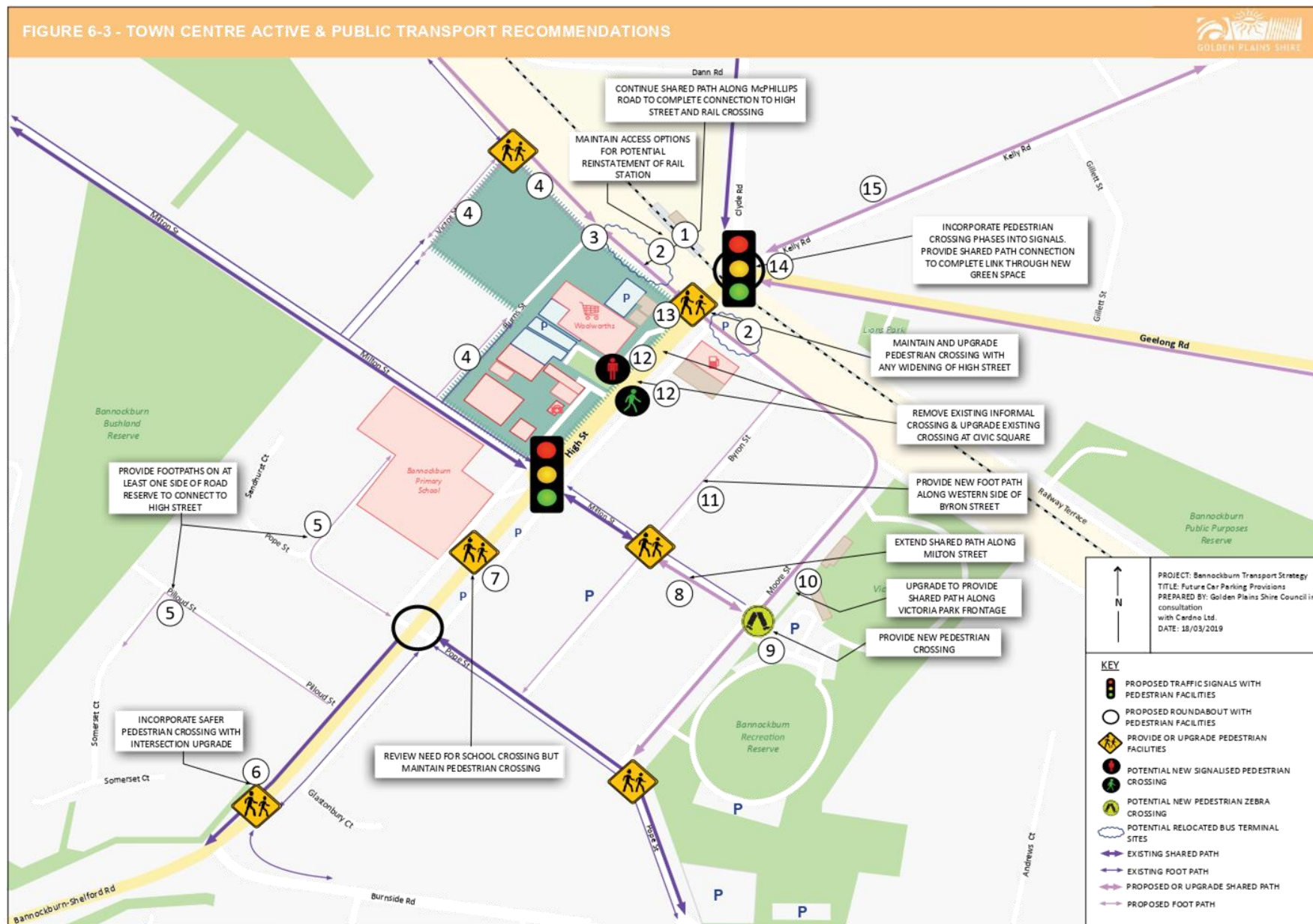
The following general comments are made in relation to the wider Bannockburn traffic network recommendations:

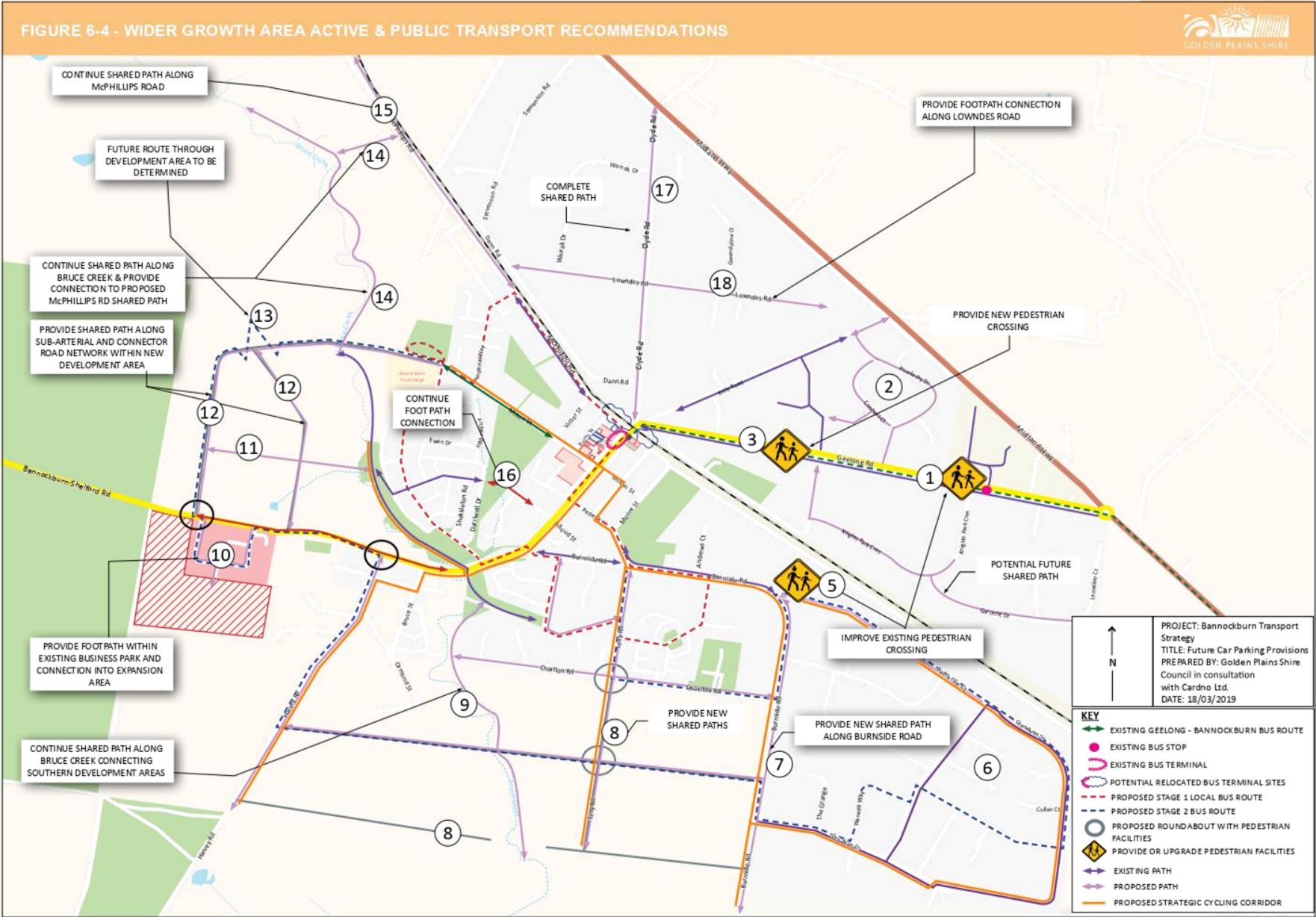
- Intersection arrangements south of Charlton Road are indicative only. When new development distribution is known in this area, local traffic modelling can determine the most appropriate intersection control (TMO-7)
- It is suggested to advocate for a future town bypass to reduce through traffic on High Street including heavy vehicles, providing any additional road network and intersection upgrades as appropriate to cater for additional traffic, including heavy vehicles. (TMI-1, TMO-8)



6.2 Active & Public Transport Strategy Recommendations

The following sustainable transport recommendations have been developed in response to the issues and opportunities that have been identified in both the Bannockburn town centre and the wider growth area. Each recommendation is linked to relevant issues and opportunities, as identified within Section 3. The locations for each of the town centre and wider growth area sustainable transport recommendations are also illustrated in Figure 6-3 and Figure 6-4 respectively.





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6.2.1 Town Centre Active and Public Transport Recommendations

The following active and public transport recommendations have been identified for Bannockburn Town Centre, and are illustrated on Figure 6-3. The various issues and opportunities addressed for each have also been identified.

1. Maintain access options for the potential reinstatement of the rail station (PTI-1, PTI-5, PTO-2, PTO-5)
2. Consider the relocation of the bus terminal as High Street is widened with potential cross section implications (PTI2)
3. Continue shared path along McPhillips Road to complete the connection between Burns Street and High Street and rail crossing (WCI-8)
4. Provide shared path connection to complete link through new green space between Kelly Road closure and Geelong Road intersection pedestrian facilities. (WCI-3, WCO-1, WCO-2, WCO-3)
5. Provide footpaths on at least one side of the road reserve on Pope Street and Pilloud Street from the west to connect residential streets to High Street (WCI-1, WCO-2)
6. Incorporate a safer pedestrian crossing on Bannockburn-Shelford Road with intersection upgrade at Burnside Road (WCI-1, WCO-5)
7. With the ultimate provision of traffic signals at the High Street / Milton Street intersection, review the need for and / or the location of the school crossing on High Street (WCI-1, WCO-5)
8. Extend the shared path along Milton Street to provide an attractive pedestrian/cycle corridor between High Street and Victoria Park (WCO-2)
9. Provide a new pedestrian crossing linking Milton Street shared path to Victoria Park and Moore Street shared path (WCO-2)
10. Upgrade to provide shared path along Moore Street on the Victoria Park / Recreation Reserve frontage (WCO-2)
11. Provide new footpath along western side of Byron Street (WCO-2)

12. Streamline mid-block pedestrian facilities on High Street to improve safety and remove existing informal pedestrian crossing outside service station and upgrade existing crossing at civic square to signalised crossing considering proximity to bus stops (WCI-1, WCO-5)
13. Maintain and upgrade the pedestrian crossing at McPhillips Road with any widening of High Street (WCI-1, WCO-5)
14. Incorporate pedestrian crossing on interim roundabout arms as appropriate. Incorporate pedestrian crossing phases into ultimate signals (WCI-2, WCO-3)

The following general comments are made in relation to sustainable transport recommendations within the town centre:

- Ensure shared path network links existing and proposed residential areas, schools and recreational facilities to the town centre (WCI-7, WCI-10, WCI-11, WCO-1, WCO-2, WCO-4, WCO-5)
- Ensure that provisions are made for high quality cycling infrastructure along the proposed Strategic Cycling Corridors (SCC) for Bannockburn as identified on Figure 6-3, and ensure that connecting shared path and on road cycle provisions complement the Bannockburn SCC.
- Integrate bicycle lanes to High Street with road improvements including priority measures at intersections. (WCI-9)

6.2.2 Wider Growth Area Active & Public Transport Recommendations

The following active and public transport recommendations have been identified for the wider Bannockburn Growth Area, and are illustrated on Figure 6-4. The various issues and opportunities addressed for each have also been identified.

1. Upgrade the existing pedestrian crossing on Geelong Road at Giles Drive to match Geelong Road improvements if required (WCO-5)
2. Complete the footpath network connecting to Geelong Road and shared path off Scotland Court (WCO-3)
3. Provide a new pedestrian crossing on Geelong Road connecting shared paths at Range Road (WCO-5)

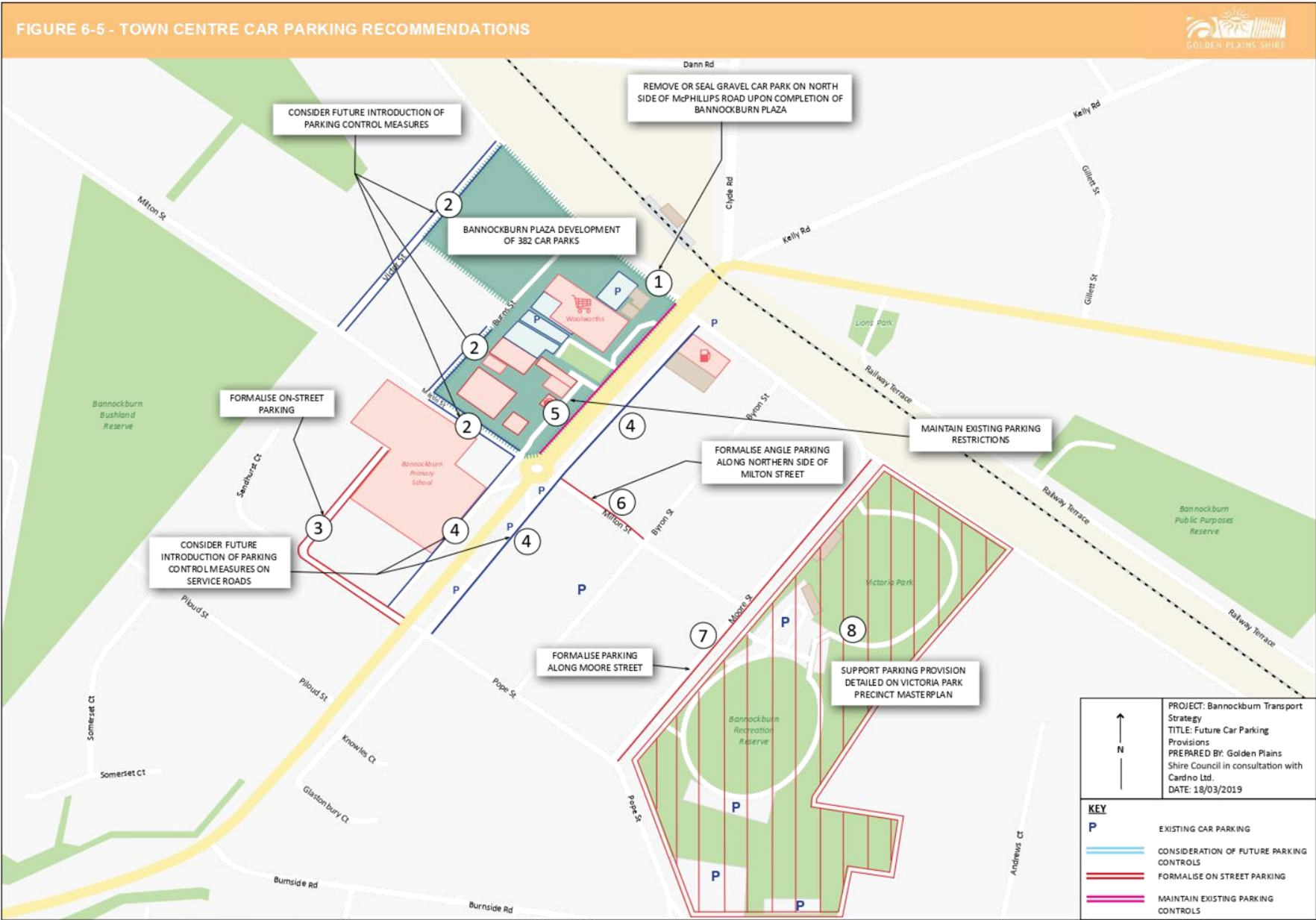
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4. Potential future shared path along Garonne Drive and Knights Park Cres, connecting new development between the rail line and the shared path along Geelong Road (WCO-1)
 5. Improve the existing pedestrian crossing on Yverdon Drive near Burnside Road (WCO-5)
 6. Complete footpath connections along the existing street network east of Burnside Road (WCO-1, WCO-3)
 7. Upgrade existing footpaths and provide a new shared path along Burnside Road serving existing and new development in southeast area within the development framework (WCI-4, WCO-1, WCO-2)
 8. Provide shared paths with appropriate crossings at intersections within new development south of Charlton Road (WCO-1)
 9. Extend the shared path along Bruce's Creek corridor south of existing section to access new development within the southern areas of the development framework (WCO-1, WCO-4)
 10. Provide footpaths within existing business park connecting to Shelford-Bannockburn Road and provide connection into expansion area (WCI-7, WCO-1)
 11. Provide a footpath connection along Lowndes Road (WCO-3)
 12. Provide shared paths along the sub-arterial and connector road network within Somerset Estate development area west of Bruce Creek, including a connection to the existing pedestrian crossing at Sunset Way (WCO-1, WCO-4)
 13. Facilitate future bus routes through development area ensuring road network designs are bus capable (PTI-1, PTI-3, PTI-4, PTO-1, PTO-2, PTO-3, PTO-4)
 14. Extend the shared path along Bruce's Creek corridor north of the existing section to access new development within the northwest area of the development framework, including connection to the proposed McPhillips Road shared path (WCO4)
 15. Continue the shared path along McPhillips Road towards Lethbridge (WCO6)
 16. Continue the footpath connection from the existing creek crossing opposite Sunset Way through residential development into town centre and provide connections to Bannockburn bushland reserve (WCO-1, WCO-4)
 17. Complete the shared path along Clyde Road to Midland Highway and upgrade to concrete paving (WCI-3, WCO-1, WCO-2, WCO-3)
 18. Complete footpath connections throughout the wider growth area (WCI-3, WCI-4, WCI-5, WCI-7, WCO-1, WCO-3, WCO-7)
- The following general comments are made in relation to the wider Bannockburn sustainable transport recommendations:
- Advocate for increased service frequency for Bannockburn – Geelong bus service (PTI-1, PTI-3, PTO-2)
 - Upgrade all modified intersections to be bus capable to facilitate future services (PTI-1, PTI-3, PTI-4, PTO-1)
 - Advocate for a local bus service in staged expansion as future development progresses with bus stops located to maximise catchment (PTI-1, PTI-4, PTO-1, PTO-3)
 - Ensure school bus routes continue to service expanding development (PTO-4)
 - Advocate for future reinstatement of train service on the Ballarat – Geelong rail line as growth extends west of Geelong (PTI-5, PTO-5)
 - Provide on-road cycle lanes along Bannockburn-Shelford Road, Harvey Road, Geelong Road, Clyde Road, Levy Road, Burnside Road, and new sub-arterial road within Somerset Estate. (WCI-9)
 - Contributions to or full construction of active transport recommendations will be sought through the consideration and approval of development proposals.

6.3 Car Parking Strategy Recommendations

The following recommendations have been developed in response to the issues and opportunities that have been identified regarding car parking in Bannockburn. Each recommendation is linked to relevant issues and opportunities, as identified within Section 3. Strategies are illustrated in Figure 6-5.



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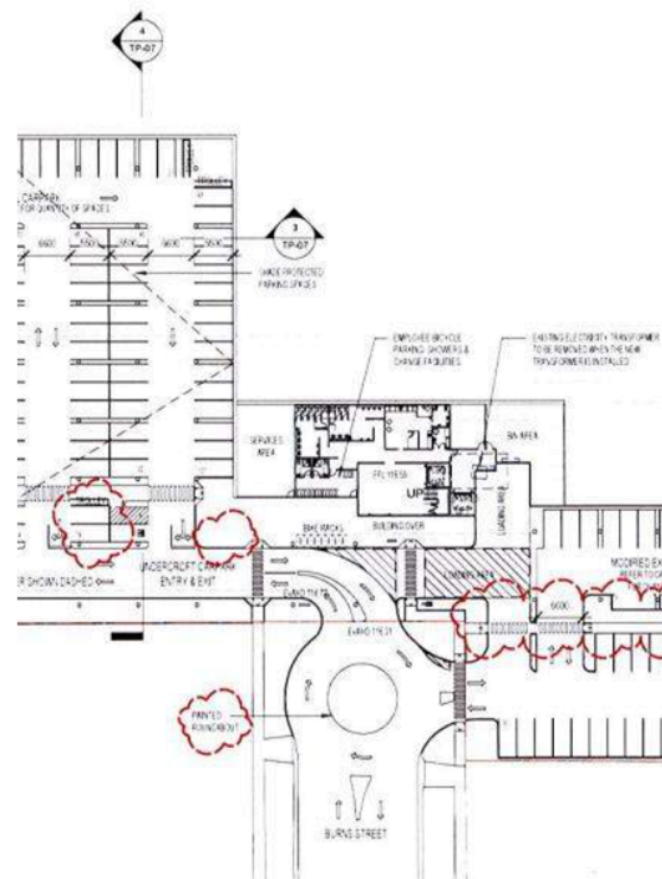
6.3.1 Town Centre Car Parking Recommendations

The following car parking recommendations have been identified for Bannockburn Town Centre, and are illustrated on Figure 6-5. The various issues and opportunities addressed for each have also been identified.

1. Either remove or seal the gravel car park on north side of McPhillips Road upon completion of Bannockburn Plaza (CPI-2, CPO-1, CPO-3)
2. Consider the future introduction of on-street parking controls around Bannockburn Plaza development on Victor Street, Burns Street and Milton Street. Such controls would be subject to separate car parking assessments (CPI-2, CPO-1)
3. Formalise on-street parking along Burns Street and Pope Street, south of Milton Street and west of High Street (CPO-1, CPO-3)
4. Consider the future introduction of parking control measures along the High Street service roads (CPI-2, CPI-3, CPO-1)
5. Maintain existing parking restrictions within the High Street service road, between McPhillips Road and Milton Street (CPI-2, CPO-1)
6. Formalise angle parking along the northern side of Milton Street east of High Street (CPO-1, CPO-3)
7. Formalise parking along Moore Street for events at Victoria Park and civic heart activities including the market (CPI-5)
8. Support parking provision detailed on Victoria Park Precinct Masterplan. (CPO-2, CPO-3)

The following general comments are made in relation to the car parking recommendations:

- Provision of parking associated with Bannockburn Plaza (which is subject to future planning approval) will maintain over-supply under current conditions and will continue to meet demand as development progresses and other parking provision and management measures are considered. Car parking associated with the future development is to be assessed in accordance with Planning Scheme requirements, whilst considering nearby on and off street parking conditions in relation to supply and demand. (CPO-1, CPO-2).



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7 Implementation Plan

The below tables summarise the recommendations, the responsible authority/s for the delivery of each recommendation, an estimated timeframe for implementation along with a high level cost estimate. Cost estimates are indicative only and would be subject to more detailed estimates closer to the time of implementation. Timeframes are categorised as follows: short term 0-5 years, medium term 5-10 years, long term 10+ years.

Table 7-1 Town Centre Traffic Recommendations

| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost Estimate | Comments |
|-------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------|-----------------|---------------|-----------------------------------------------------------------------------------------------|
| 1 | Geelong Road / Clyde Road | Interim intersection upgrade to roundabout | VicRoads / Council | Short | \$1 million | |
| 1 | Geelong Road / Clyde Road | Ultimate intersection upgrade to traffic signals | VicRoads / Council | Long | \$3.9 million | If ultimate traffic conditions require |
| 2 | McPhillips Road | Continued road upgrade between High Street and Victor Street & north of imperial Way | Council | Short to Medium | \$370,000 | |
| 3 | Burns Street | Close northern section of road at proposed plaza access | Council | Short to Medium | \$25,000 | Timing dependent on development of the proposed plaza |
| 4 | Victor Street and Burns Street intersections with Milton Street | Provide channelised left and right turns | Council | Short | \$1.5 million | Timing dependent on development of the proposed plaza |
| 5 | Burns Street | Upgrade to a local access street | Council | Medium | \$740,000 | Timing as development occurs / dictates. Cost includes parking pavement and kerb on one side. |
| 6 | High Street / Pope Street | Upgrade intersection to roundabout | VicRoads / Council | Medium | \$1.7 million | |
| 7 | Bannockburn-Shelford Road into Burnside Road | Provide channelised left and right turns | VicRoads / Council | Short | \$1.5 million | |
| 8 | High Street / Milton Street | Ultimate intersection upgrade to traffic signals | VicRoads / Council | Medium to Long | \$1 million | |

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| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost Estimate | Comments |
|-------------------|---------------------------------------|--------------------------------------------------------------------------------|-----------|-----------|---------------|----------------------------------------------|
| 9 | High Street, south of McPhillips Road | Remove mid-block service road access, including the addition of an entry point | VicRoads | Long | \$165,000 | Timing in conjunction with item no. 10 below |
| 10 | High Street | Upgrade to dual carriageway | VicRoads | Long | \$1.5 million | Timing as traffic volumes determine |
| 11 | Milton Street east of High Street | Formalise existing parking | Council | Short | \$100,000 | |
| 12 | Moore Street and McPhillips Road | Upgrade to IDM collector street level 1 | Council | Medium | \$1.8 million | |
| 13 | Pope Street into Moore Street | Provide channelised left and right turns | Council | Medium | \$1.5 million | Timing in conjunction with item no. 12 above |

Table 7-2 Wider Network Traffic Recommendations

| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost estimate | Comments |
|-------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------|-----------------|---------------|---------------------------------------------------|
| 1 | Midland Highway / Geelong Road | Interim roundabout with two-lanes | VicRoads | Medium | \$1.6 million | |
| 1 | Midland Highway / Geelong Road | Ultimate traffic signals | VicRoads | Long | \$2.3 million | Timing as traffic volumes determine |
| 2 | Geelong Road | Local road widening and intersection treatments | VicRoads | Short to Medium | \$4.5 million | 3 intersections |
| 3 | Kelly Road / Geelong Road / Clyde Road & Gillett Street / Geelong Road | Close Kelly Road at Geelong Road intersection. Upgrade intersection with turning lanes. | VicRoads / Council | Short to Medium | \$1.6 million | As Geelong Rd / Kelly Rd intersection is upgraded |
| 4 | Lowndes Road | Upgrade to IDM residential access road | Council | Medium | \$3.3 million | |
| 5 | Clyde Road | Upgrade to IDM low density collector road | Council | Medium | \$3.8 million | |
| 6 | Midland Highway / Clyde Road | Upgrade intersection to roundabout | VicRoads / Council | Short to Medium | \$2 million | |
| 7 | Stevenson Road / Dann Road | Upgrade to IDM residential access road | Council | Medium | \$4.9 million | |
| 8 | Milton Street, over Bruce Creek | Provide bridge crossing | Council | Medium to Long | \$4 million | As development west of Bruce Creek progresses |

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| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost estimate | Comments |
|-------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------|--------------------|----------------|---------------|-----------------------------------------------------------------------|
| 9 | Future development west of Bruce Creek | Provide sub arterial and supporting connector and local street network | Council | Medium to Long | \$6.5 million | As development west of Bruce Creek progresses |
| 11 | New connector road intersection with Bannockburn-Shelford Road at western UDF boundary | Provide roundabout intersection | VicRoads / Council | Medium to Long | \$1.1 million | As development west of Bruce Creek progresses |
| 12 | Harvey Road / Bannockburn-Shelford Road | Upgrade intersection to roundabout | VicRoads / Council | Medium to Long | \$1.1 million | As traffic volumes increase and heavy vehicle bypass route considered |
| 13 | Harvey Road | Provide new road link from Harvey Road into Business Park | Council | Medium to Long | \$1.3 million | |
| 14 | Harvey Road | Upgrade to IDM rural access road | Council | Medium to Long | \$3.9 million | As traffic volumes increase and heavy vehicle bypass route considered |
| 15 | Bruce Creek (South) | New vehicle and pedestrian crossing connecting southern growth areas | Council | Long | \$4 million | |
| 17 | proposed connector street / Levy Road | Provide roundabout intersection | Council | Long | \$1.6 million | |
| 18 | Levy Road | Traffic calming measures | Council | Long | \$150,000 | As development to the south progresses |
| 19 | Charlton Road | Upgrade to an access street | Council | Long | \$3 million | As development to the south progresses |
| 19 | Charlton Road / Levy Road | Upgrade to a roundabout intersection | Council | Long | \$1.6 million | As development to the south progresses |
| 20 | Burnside Road | Upgrade to a connector street with local widening | Council | Medium to Long | \$4.3 million | As development to the south progresses |
| 21 | Burnside Road / Levy Road | Provide traffic signals with localised widening | Council | Long | \$2.7 million | |

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Table 7-3 Town Centre Active and Public Transport Recommendations

| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost estimate | Comments |
|-------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------|-----------------|------------------------|----------------------------------------------------|
| 2 | Town Centre | Relocation of the bus terminal | DoT / PTV | Medium to Long | - | Check this one with Viraj |
| 3 | McPhillips Road | Continue shared path between Burns Street and High Street and rail crossing | Council | Short | \$45,000 | 120m |
| 4 | Kelly Road | Provide shared path connection between Kelly Road closure and Geelong Road | VicRoads / Council | Short to Medium | \$375 per linear metre | Length to be confirmed |
| 5 | Pope Street and Pilloud Street | Provide footpaths on at least one side of road | Council | Short | \$190,000 | 300m and 440m |
| 6 | Bannockburn-Shelford Road / Burnside Road | Incorporate a safer pedestrian crossing at or near intersection | VicRoads | Short | \$8,000 | |
| 8 | Milton Street | Extend shared path between High Street and Victoria Park | Council | Short | \$45,000 | 120m |
| 9 | Milton Street | Provide a new pedestrian crossing at Moore Street to access Victoria Park | Council | Short | \$9,000 | |
| 10 | Moore Street | Provide shared path between McPhillips Road and Pope Street | Council | Short | \$170,000 | 450m |
| 11 | Byron Street | Provide new footpath between McPhillips Road and Pope Street | Council | Short | \$115,000 | 450m |
| 12 | High Street (civic square) | Streamline pedestrian access including upgrade existing crossing at Civil Square to signalised crossing | VicRoads | Medium | \$5,000 | |
| 13 | McPhillips Road | Upgrade pedestrian crossing west of High Street | Council | Medium | \$8,000 | As High Street is duplicated |
| 14 | Geelong Road / High Street | Incorporate pedestrian crossing with interim roundabout and ultimate traffic signals | VicRoads / Council | Short to Long | - | Included as part of overall intersection upgrades. |

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Table 7-4 Wider Network Active and Public Transport Recommendations

| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost estimate | Comments |
|-------------------|-------------------------------------|-------------------------------------------------------------------------|--------------------|--------------|------------------------|---------------------------------------------------------|
| 1 | Geelong Road | Upgrade the existing pedestrian crossing at Giles Drive | VicRoads | Short | - | Already in place. |
| 2 | Geelong Road | Complete the footpath network to Scotland Court | VicRoads / Council | n/a | n/a | Already implemented. Strategy ref. no. 3 more relevant. |
| 3 | Geelong Road | Provide a new pedestrian crossing connecting shared paths at Range Road | VicRoads / Council | Short | \$20,000 | 40m footpath + crossing |
| 4 | Garonne Drive and Knights Park Cres | Potential future shared path | Council | Medium | \$265,000 | 700m |
| 5 | Yverdon Drive | Improve the existing pedestrian crossing at Burnside Road | Council | Short | \$8,000 | |
| 6 | Burnside Road | Complete footpath connections | Council | Short-Medium | \$250 per linear metre | Length to be confirmed |
| 7 | Burnside Road | Provide a new shared path south of Yverdon Drive | Council | Medium | \$340,000 | 700m |
| 8 | Development south of Charlton Road | Provide shared paths | Council | Long | \$375 per linear metre | Length to be confirmed |
| 9 | Bruce's Creek corridor south | Extend the shared path | Council | Long | \$375 per linear metre | Length to be confirmed |
| 10 | Within existing business park | Provide footpaths along street network | Council | Short | \$250 per linear metre | Length to be confirmed |
| 11 | Lowndes Road | Provide a footpath connection | Council | Short | \$250 per linear metre | Length to be confirmed |
| 12 | Somerset Estate | Provide shared paths | Council | Long | \$375 per linear metre | Length to be confirmed |
| 14 | Bruce's Creek (North) | Extend the shared path north along corridor | Council | Medium | \$375 per | Length to be confirmed |

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| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost estimate | Comments |
|-------------------|------------------------------------------------------------------|---------------------------------------------------------|-----------|-----------|------------------------|----------------------------------------------------------|
| | | and to McPhillips Road | | | linear metre | |
| 15 | McPhillips Road | Continue the shared path towards Lethbridge | Council | Medium | \$375 per linear metre | Length to be confirmed |
| 16 | From the existing creek crossing to Bannockburn bushland reserve | Continue the footpath connection | Council | Short | \$250 per linear metre | Length to be confirmed |
| 17 | Clyde Road | Complete the shared path | Council | Short | \$375 per linear metre | Length to be confirmed |
| 18 | Throughout the wider growth area | Complete footpath connections as development progresses | Council | Long | \$250 per linear metre | Timing as development progresses. Length to be confirmed |

Table 7-5 Car Parking Recommendations

| Strategy ref. no. | Location | Proposal | Authority | Timeframe | Cost estimate | Comments |
|-------------------|-----------------------------------------------|----------------------------------------------------|-----------|-----------|---------------|---------------------------------------------------|
| 1 | North side of McPhillips Road | Seal the gravel car park opposite the rail station | Council | Medium | \$300,000 | If required, upon completion of Bannockburn Plaza |
| 2 | Victor Street, Burns Street and Milton Street | Consider on-street parking controls | Council | Short | \$12,000 | 600m length of road |
| 3 | Burns Street and Pope Street | Formalise on-street parking | Council | Short | \$10,000 | 300m length of road |
| 4 | High Street service roads | Consider parking control measures | VicRoads | Short | \$12,000 | 600m length of road |
| 6 | Milton Street and High Street | Formalise angle parking | Council | Short | \$250,000 | 100m length of road. Includes road upgrade. |
| 7 | Moore Street | Formalise parking | Council | Short | \$12,000 | 450m length of road |

Bannockburn Car Parking, Traffic Management & Pedestrian Movement Strategy

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Appendix A Existing Conditions & Issues and Opportunities Assessment Report (January 2019)

Appendix B Traffic Modelling Report (March 2019)

Appendix C Community & Stakeholder Consultation Memo (September 2018)



Report
Appendices

02/09/2019

V171834

Bannockburn Car Parking, Traffic Management & Pedestrian Movement Strategies



Bannockburn Car Parking, Traffic Management & Pedestrian Movement Strategy

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Appendix A Existing Conditions & Issues and Opportunities Assessment Report

Appendix B Traffic Modelling Report

Appendix C Community & Stakeholder Consultation Memo

Bannockburn Transport Strategy

Existing Conditions & Issues and Opportunities Assessment Report

V171834

Prepared for
Golden Plains Shire

9 September 2019



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1 Introduction

1.1 Background

Cardno Victoria Pty Ltd (Cardno) has been engaged by Golden Plains Shire Council to provide Transport Strategies for Traffic Management, Car Parking, and Sustainable Transport within Bannockburn Growth Area.

This Existing Conditions and Issues and Opportunities Report provides an overview of the current transport conditions within Bannockburn and will inform the development of the three strategies, and be referenced in subsequent strategy documentation.

Bannockburn is located on the Midland Highway within Golden Plains Shire approximately 17 kilometres north west of Geelong. The town is the primary rural service centre for the south eastern section of Golden Plains and other surrounding rural areas.

The study area encompasses that identified in the 2011 Urban Design Framework, and is generally bound by the Midland Highway to the north, Bannockburn Bush and Old Base Road to the west, and the extent of the rural residential development to the south and east as shown in Figure 1-1.

Figure 1-1 Bannockburn Study Area



The population within Bannockburn and surrounding districts increased by 39.3% between 2001 and 2006 to 8,140 and is forecasted to grow to 12,260 by 2021. This strategy provides a detailed analysis of existing and future traffic, parking and public and active transport infrastructure and services required to support the increasing population base.

1.2 Purpose of the Bannockburn Transport Strategies

The purpose of the Bannockburn Transport Strategy (BTS) is to address current and future road network and traffic management issues within the study area. This will be achieved by ensuring the street network caters for demand whilst ensuring the environment around the central retail and activity area is safe and vibrant. The BTS will ensure car parking around the town centre is managed appropriately to support the retail and

commercial areas, and that demand can continue to be met into the future by addressing the existing and future sustainable transport demands, including integrated walking and cycling networks throughout the study area.

The development of this strategy considers all appropriate State, regional and local transport and planning policy, with a particular emphasis on the Bannockburn Urban Design Framework (BUDF) and Bannockburn Town Centre Investment Strategy (BTCIS).

The development of the BTS is to identify a set of specific measures that consider:

- > Issues that have been previously identified in previous strategies and measures proposed that addressed those concerns at the time;
- > Population growth in the area since then, and the additional stress on the network that has either exacerbated existing problems or posed new concerns, and proposed measures to address these;
- > Traffic, parking and active transport infrastructure and improvement measures to support future land use and development to cater for continuing population growth within the study area; and
- > Community and stakeholder consultation.

1.3 Referenced Documents

A number of background documents and studies have been considered in preparing this BTS, including:

- > Bannockburn Urban Design Framework (2011);
- > Bannockburn Town Centre Investment Strategy (BTCIS);
- > Bannockburn Civic Heart Project (2014);
- > Bannockburn Heavy Vehicle Alternative Route Study;
- > Golden Plains Shire Recreation Strategy Plan (2015 – 2019);
- > Bruce's Creek Masterplan, Bannockburn (2009);
- > Paths and Trails Strategy (2013 – 2017);
- > Community Engagement Strategy (2016 – 2020);
- > G21 Public Transport Strategy (2014);
- > G21 Physical Activity Strategy (2014 – 2017); and
- > Other documents as identified throughout this report.

Key Strategies are summarised in Chapter 2 and discussed further with other background documents in Appendix A.

1.4 Consultation

In order to prepare the BTS, the following consultation has been undertaken to gather an insight into existing and future traffic, parking and public and active transport issues within the Bannockburn Growth Area (BGA):

- > Golden Plains Shire Council;
- > Golden Plains Shire community and stakeholders;
- > VicRoads;
- > Transport For Victoria;
- > Public Transport Victoria;
- > V/Line; and
- > VicTrack.

A summary of the consultation undertaken to date is included within Appendix G.

2 Bannockburn Literature Review

Golden Plains Shire Council provided Cardno with considerable local and strategic planning documentation for consideration, broadly grouped within the following categories:

- > Economic Development;
- > Community Development;
- > Recreation;
- > Asset Management; and
- > Roads and Transport.

Considerable analysis of this documentation has been undertaken and is included in Appendix A of this report, however there are some key strategies that will be vital to informing the development of these new transport strategies, which are summarised in this section.

2.1 Bannockburn Urban Design Framework (UDF) (2011)

Bannockburn Urban Design Framework (BUDF) addresses issues arising from strong growth and resulting development within Bannockburn. The BUDF reflects the current needs, values and aspirations of the Bannockburn community.

The land use and activity precincts within the growth area that are to serve the proposed population growth at the present time do not have the infrastructure to cater for the increase in traffic, car parking, transport, pedestrian and vehicle access. To alleviate the movement issues within the Bannockburn growth area the BUDF recommends actions which include the following:

- > Priority to be given to Shelford-Bannockburn Road traffic at the High Street entry, with consideration given to closing or truncating Kelly Road at the southern end and rerouting along a newly opened road section of Gillett Street;
- > Use the rail corridor and the wide road reserves as multi use (bicycle, pedestrian) trail links to open space, education and recreation zones;
- > Determine main road avenues and connections through the town, for the future planning of the road network, infrastructure and services, trail system, and drainage (particularly WSUD treatments incorporated into the road system); and
- > Investigate opportunities for providing alternative routes and rail crossings as part of the access opportunities to both Geelong and the Geelong Bypass.

2.2 Bannockburn Town Centre Investment Strategy (2008)

The Town Centre Investment Strategy plans for the future growth of Bannockburn's commercial centre by providing a planned land use plan to guide commercial growth and builds on the direction of the BUDF. As part of the strategy additional traffic management and service provision within the town will need to be upgraded to accommodate the anticipated growth. Key findings of the strategy include:

- > The lack of traffic management in the Town Centre is becoming an issue given the continual population growth in Bannockburn;
- > The road network that exists around Bannockburn is adequate and allows easy access to and from the town;
- > The frequency of bus services in Bannockburn is poor, leaving public transport nearly non-existent;
- > Walking paths that exist in and around Bannockburn do not necessarily link to places of interest or gathering; and
- > Parking within the Town Centre is becoming inadequate to meet demand during daily peak periods.

2.3 Bannockburn Heavy Vehicle Alternative Route Study (2013)

The Heavy Vehicle Alternate Route Study identifies suitable heavy vehicle alternative routes which consider not only the technical, land use and environmental issues, but also has been considered by the local community and key stakeholders. The study developed a range of high-level options for an alternative

heavy vehicle route around Bannockburn, providing connectivity between Shelford-Bannockburn Road and Midland Highway. The study will provide useful information regarding heavy vehicle movements within Bannockburn, which will inform the Bannockburn Transport Study.

2.4 Bannockburn Civic Heart Project (2014)

The Civic Heart Project is a visionary project that will create a vibrant community space in the centre of Bannockburn, Golden Plains Shire's largest township.

Extensive community consultation was undertaken to determine the best use for the site and to reflect the guiding principles developed through initial community and stakeholder consultation. Key principles and objectives of the BCHP include:

- > The Civic Heart and its surrounds should be considered in an integrated way by providing safe connections between the Civic Heart and the school; and
- > Vehicle access and parking should be flexible and convenient but not dominate the core of the precinct by ensuring car parking and vehicle access areas are designed to provide safe and legible movements for pedestrians.

A detailed summary of the literature assisting with the Bannockburn Transport Strategy is contained in Appendix A.

3 Existing Conditions

3.1 Location and Access

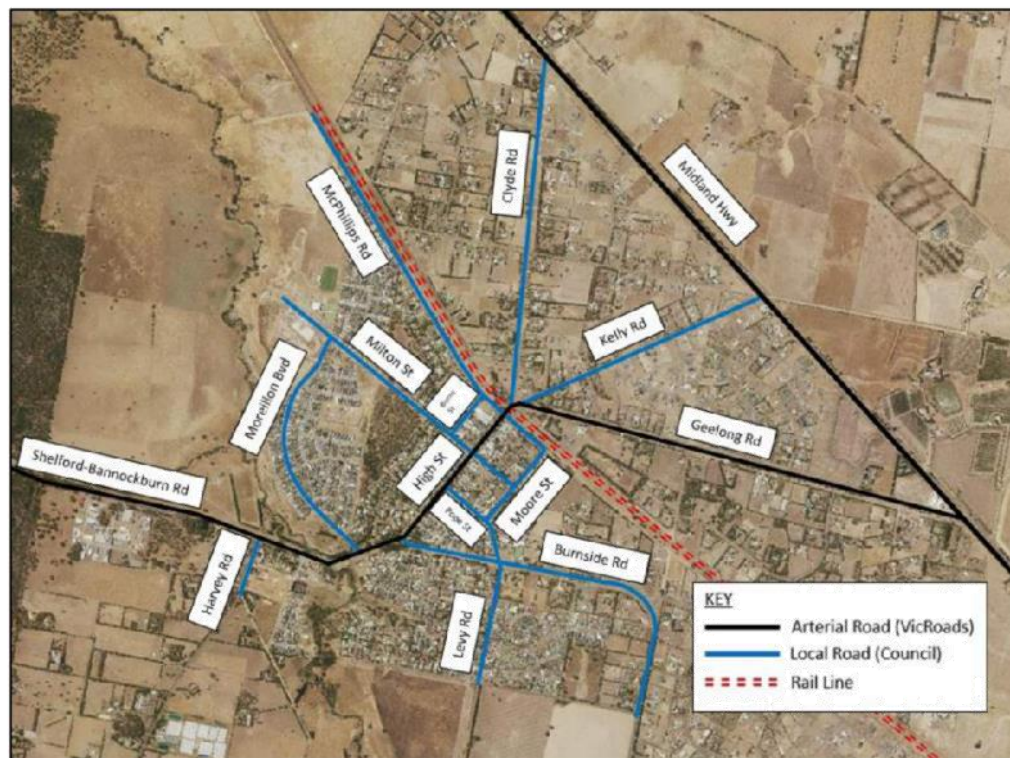
Bannockburn Growth Area is Golden Plains Shire's largest and fastest growing population centre and encompasses an area of approximately 1,790 hectares. The growth area incorporates Bannockburn Town Centre, rural farm land, low density residential housing, recreation and educational precincts, and Bruce's Creek.

BGA has major access points to the Midland Highway via Geelong Road, Clyde Road and Kelly Road to the north and east. Bannockburn-Shelford Road extends west towards Teesdale and Shelford, whilst Harvey Road and Burnside Road extend to the south.

Bannockburn lies on the Geelong Ballarat Railway Line, however there is currently no passenger rail service, but is currently a key strategic freight rail line.

Figure 3-1 illustrates key transport links providing access into the Bannockburn Growth Area.

Figure 3-1 Bannockburn Transport Access Links



3.2 Existing Road Network

The existing Bannockburn Growth Area road network consists of strategic, local and service roads. The following section provides a brief description of the key road links that will continue to support the growth in Bannockburn, or be improved or upgraded as growth increases.

3.2.1 Strategic Road Network

3.2.1.1 Midland Highway

The Midland Highway is a VicRoads controlled Arterial Road that extends along the growth area boundary from the east to the north of the growth area. The Midland Highway connects Geelong from the south east to Ballarat to the north west.

The Midland Highway has a 100km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 60 metre road reserve. There are currently no pedestrian or bicycle facilities along the Midland Highway within the study area.

Figure 3-2 Midland Hwy Eastbound and at Kelly Rd Intersection



3.2.1.2 Geelong Road

Geelong Road is a VicRoads controlled Arterial Road that extends between the Midland Highway and Shelford-Bannockburn Road. Geelong Road is the main Arterial Road access to the BGA from the east.

Geelong Road has an 80km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 60 metre road reserve reducing to 60km/hr approximately 400m east of the rail crossing. There is currently an existing off-road pedestrian path on the south side of Geelong Road between the Midland Highway and Shelford-Bannockburn Road.

Figure 3-3 Geelong Road Westbound, at Knights Park Cres and 60kph Speed Zone



3.2.1.3 Shelford-Bannockburn Road (High Street)

Shelford-Bannockburn Road is a VicRoads controlled Arterial Road that extends between Geelong Road at the rail crossing and the boundary of the BGA in the west. Shelford-Bannockburn Road is the main road through the BGA and runs through the heart of the Bannockburn Town Centre.

Shelford-Bannockburn Road has a 60km/hr posted speed limit between McPhillips Road and Pope Street with a divided carriageway with one lane in each direction. Off-road pedestrian paths are located on the north and south sides of Shelford-Bannockburn Road between McPhillips Street and Pope Street.

Between McPhillips Road and Pope Street, Shelford-Bannockburn Road has one-way service roads on the north and south sides with a mixture of angled and parallel parking and is divided by a grass median.

West of Pope Street, Shelford-Bannockburn Rd has an 80km/hr speed limit with a single carriageway and one traffic lane in each direction within a 60 metre road reserve. Shelford-Bannockburn Road has an off-road pedestrian path between Pope Street and Bruce Street.

Figure 3-4 Shelford-Bannockburn Road (High Street)



3.2.2 Local Roads

3.2.2.1 Clyde Road

Clyde Road is a Council controlled local access street that extends north between the Midland Highway and Shelford-Bannockburn Road.

Clyde Road has an 80km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 60 metre road reserve. There is currently an existing semi-formal gravel pedestrian path which extends along the west side of the road from Shelford-Bannockburn Road to Lowndes Road, with sections of formal footpath access further north along the east side of the road to Midland Highway.

Figure 3-5 Clyde Road, Northbound at Lowndes Rd and Southbound from Midland Hwy



3.2.2.2 Kelly Road

Kelly Road is a Council controlled local access street that also extends between the Midland Highway and Shelford-Bannockburn Road.

Kelly Road has a 60km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve. There is currently an existing off-road pedestrian path on the south side of Kelly Road which extends between Inverloch Drive and Gillett Street.

Figure 3-6 Kelly Road, Southbound at Inverloch Drive and at Gillett Street



3.2.2.3 Burnside Road

Burnside Road is a Council controlled local access street that extends between Shelford-Bannockburn Road and the southern boundary of the BGA.

Between the southern boundary of the BGA and Charlton Road, Burnside Road has an 80km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 20 metre road reserve.

Between Charlton Road and Yverdon Drive the posted speed limit reduces to 60km/hr with a single carriageway and one traffic lane in each direction within a 20 metre road reserve.

West of Yverdon Drive to Shelford-Bannockburn Road, Burnside Road maintains a 60km/hr speed limit with a single carriageway and one traffic lane in each direction within a 60 metre road reserve. An off-road shared path is located on the north side of Burnside Road between Yverdon Drive and Shelford-Bannockburn Road.

Figure 3-7 Burnside Road, Westbound at Dalcrin Drive and Northbound south of Charlton Road



3.2.2.4 Levy Road

Levy Road is a Council controlled local access street that extends between Burnside Road and the southern boundary of the BGA.

Between the southern boundary of the BGA and Charlton Road, Levy Road has a 50km/hr posted speed limit with a single informal carriageway and one traffic lane within a 20 metre road reserve.

Between Charlton Road and Burnside Road, Levy Road maintains a 50km/hr speed limit with a single carriageway and one traffic lane in each direction within a 20 metre road reserve. An off-road pedestrian path is located on the west side of Levy Road between Charlton Road and Dalcrui Drive and an off-road shared path on the east side between Dalcrui Drive and Burnside Road.

Figure 3-8 Levy Road, Southbound south of Burnside Road and at Charlton Road



3.2.2.5 Moreillon Boulevard

Moreillon Boulevard is a Council controlled local access street that extends between Shelford-Bannockburn Road and Milton Street, and provides the primary access to the more recent residential development west of the town centre.

Moreillon Boulevard has a 50km/hr speed limit with a single carriageway and one traffic lane in each direction within a 20 metre road reserve. There are currently existing off-road pedestrian paths on both sides of Moreillon Boulevard which extend for the entire length.

Figure 3-9 Moreillon Blvd, Southbound from Milton Street and near Rosemond Way



3.2.2.6 Milton Street

Milton Street is a Council controlled local access street that extends between Shelford-Bannockburn Road and Moreillon Boulevard north of Shelford-Bannockburn Road and between Shelford-Bannockburn Road and Moore Street and the recreation reserve south of Shelford-Bannockburn Road.

North of Shelford-Bannockburn Road, Milton Street has a 50km/hr speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve. There are currently existing off-road pedestrian paths on both sides of Milton Street which extend for the entire length. Milton Street provides access to significant residential development to the west of High Street and the P12 school and sports facilities west of the Moreillon Boulevard intersection.

South of Shelford-Bannockburn Road, Milton Street has a 50km/hr speed limit with a single carriageway and one traffic lane in each direction within a 20 metre road reserve. There is currently an existing off-road

pedestrian path on the east side of Milton Street which extends for the entire length. Established street trees line both sides of the road reserve, between the carriageway and footpaths. There is no subsurface drainage along this section of Milton Street.

Figure 3-10 Milton Street, north and south of Shelford-Bannockburn Road



3.2.2.7 McPhillips Road

McPhillips Road is a Council controlled local access street that runs adjacent to the rail line between Shelford-Bannockburn Road and Scanlon Road north of Shelford-Bannockburn Road and between Shelford-Bannockburn Road and Moore Street south of Shelford-Bannockburn Road.

North of Shelford-Bannockburn Road, McPhillips Road has a 60km/hr speed limit with a single carriageway and one traffic lane in each direction within a 40 metre road reserve. There is currently an existing off-road pedestrian path on the west side of McPhillips Road between Shelford-Bannockburn Road and Burns Street and on the east side of McPhillips Road between Burns Street and Mowbray Way.

South of Shelford-Bannockburn Road, McPhillips Road has a 50km/hr speed limit with a single carriageway and one traffic lane in each direction within a 40 metre road reserve. There is currently an existing off-road pedestrian path on the east side of McPhillips Road which extends for the entire length.

McPhillips Road provides access to the Health Centre and residential development at Imperial Way. Extending further north, McPhillips Road becomes a gravel road to Scanlon Road and the rail level crossing accessing Midland Highway.

Figure 3-11 McPhillips Road, north and south of High Street



3.2.2.8 Pope Street

Pope Street is a Council controlled local access street that extends between Shelford-Bannockburn Road and Burns Street north of Shelford-Bannockburn Road and between Shelford-Bannockburn Road and Burnside Road south of Shelford-Bannockburn Road.

North of Shelford-Bannockburn Road, Pope Street has a 50km/hr speed limit with a single carriageway and one traffic lane in each direction within a 40 metre road reserve. There are currently no existing off-road pedestrian paths or formal on street parking within this section of Pope Street.

South of Shelford-Bannockburn Road, Pope Street has a 50km/hr speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve. There is currently existing off-road pedestrian paths on both sides of Pope Street which extend for the entire length. Pope Street provides access to Golden Plains Shire Council offices.

Figure 3-12 Pope Street, Northbound north of High Street and Southbound south of High Street



3.2.2.9 Byron Street

Byron Street is a Council controlled local access street that extends between Pope Street and McPhillips Road.

Byron Street has a 50km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve. There are currently no existing off-road pedestrian paths in Byron Street.

Figure 3-13 Byron Street, Southbound from McPhillips Road and from Milton Street



3.2.2.10 Burns Street

Burns Street is a Council controlled local access street that extends between Milton Street and McPhillips Road, and provides access to the Woolworths off-street car park.

Burns Street has a 50km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve with a mixture of angled and parallel on-street parking. There are currently off-road pedestrian paths on both sides of Burns Street for the entire length.

The Woolworths loading area is access directly off Burns Street, with loading activity observed on Burns Street.

3.2.2.11 Victor Street

Victor Street is a Council controlled local access street that extends between the Milton Street and McPhillips Road.

Victor Street has a 50km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve. There is currently a short section of foot path on the eastern side of the road reserve approaching Milton Street, otherwise there are no other pedestrian paths along Victor Street.

3.2.2.12 Moore Street

Moore Street is a Council controlled local access street that extends between Pope Street and McPhillips Road.

Moore Street has a 50km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve. There is currently existing off-road pedestrian paths on the south side of Moore Street between McPhillips Road and Milton Street and on the north side between Milton Street and Pope Street.

Moore Street provides access to Victoria Park and the recreation reserve in a number of locations along the southern boundary of the road.

3.2.2.13 Harvey Road

Harvey Road is a Council controlled local access street that extends along the west side of Bruce's Creek, between Shelford-Bannockburn Road and the south western boundary of the BGA.

Between the south western boundary of the BGA and Shelford-Bannockburn Road, Harvey Road has an 80km/hr posted speed limit with a single carriageway and one traffic lane in each direction within a 30 metre road reserve.

Figure 3-14 Burns Street, Victor Street, Moore Street and Harvey Road



3.3 Existing Traffic Conditions

In order to gain a thorough understanding of existing traffic conditions in and around Bannockburn, Cardno commissioned traffic surveys in March 2018. These included traffic volume and speed surveys, and intersection turning movement counts. The results from these surveys and an assessment of the current traffic conditions is summarised in the following sections.

3.3.1 Road Network

Cardno commissioned weekly tube count surveys within and around the Bannockburn Growth Area in March 2018 to gain an understanding of the current traffic characteristics of the road network in the area. The locations of each survey location and a more detailed summary of the traffic flows and speeds is provided in Appendix B.

A summary of the traffic characteristics of the road network is provided in Table 3-1, illustrating the theoretical capacity of each link, the weekday and Saturday traffic flows with the proportion of heavy vehicles, and the 85th percentile speed.

Additionally the future traffic volumes have been calculated on key roads to give an insight on post development traffic volumes in order to determine where road upgrades may be required.

Table 3-1 Bannockburn Traffic Characteristics

| Location | Link Capacity (vpd) (IDM Standards) | Existing Traffic Volumes (%Heavy) | | Future Traffic Volumes | | Speed Limit (km/h) | 85 th %ile Speed (km/h) |
|---------------------------------------------------------|-------------------------------------|-----------------------------------|--------------|------------------------|----------|--------------------|------------------------------------|
| | | Weekday | Saturday | Weekday | Saturday | | |
| Midland Hwy 600m SE of Kelly Rd | 18,000* | 5562 (12.3%) | 6725 (6.6%) | 8,240 | 11,187 | 100 | 102 |
| Midland Hwy 800m NW of Kelly Rd | 18,000* | 5351 (14.1%) | 6593 (8.1%) | 7,991 | 11,527 | 100 | 103 |
| Geelong Rd btw Francis Ct and Inverlochy Dr | 18,000* | 9659 (11.6%) | 7940 (7.5%) | 33,382 | 20,356 | 80 | 78 |
| Shelford-Bannockburn Rd nth of Pope St | 18,000* | 8737 (8.0%) | 8029 (4.5%) | 24,268 | 18,758 | 60 | 56 |
| Shelford-Bannockburn Rd sth of McPhillips St | 18,000* | 10365 (7.9%) | 9003 (4.5%) | 35,626 | 28,785 | 60 | 47 |
| Shelford-Bannockburn Rd btw Bruce St and Moreillon Blvd | 18,000* | 6684 (10.2%) | 5823 (5.1%) | 16,102 | 13,661 | 60 | 51 |
| Shelford-Bannockburn Rd btw Harvey Rd and Holder Rd | 18,000* | 5441 (13.2%) | 4586 (6.3%) | 9,440 | 13,741 | 80 | 69 |
| Clyde Rd btw Warrak Dr and Lowndes Rd | 2,500-6,000 | 1428 (9.5%) | 1820 (4.7%) | 3,870 | 13,821 | 80 | 78 |
| Kelly Road 300m NE of Gillett St | 1,000-2,500 | 448 (13.6%) | 418 (11.2%) | 596 | 10,891 | 80 | 82 |
| Yverdon Dr at No. 74 | 1,000-2,500 | 674 (12.2%) | 558 (11.8%) | - | - | 50 | 72 |
| Burnside Rd btw Dalcruin Dr and Yverdon Dr | 2,500-6,000 | 2430 (12.6%) | 2282 (9.1%) | 6,019 | 6,250 | 60 | 72 |
| Burnside Rd btw Earl Cr and Elrae Ct | 2,500-6,000 | 1471 (8.5%) | 1317 (3.7%) | 4,079 | 2,701 | 50 | 62 |
| Burnside Rd south of Charlton Rd | 2,500-6,000 | 1646 (17.7%) | 1728 (14.8%) | - | - | 80 | 81 |
| Burnside Rd south of Yverdon Dr | 2,500-6,000 | 1444 (11.8%) | 1409 (7.8%) | - | - | 60 | 72 |
| Charlton Rd btw Charlton Rd and Burnside Rd | 1,000-2,500 | 253 (6.2%) | 227 (2.6%) | 2,963 | - | 50 | 69 |
| Levy Rd btw Fenwick Fairway and Dalcruin Dr | 1,000-2,500 | 447 (5.7%) | 389 (2.1%) | 4,241 | 5,510 | 50 | 57 |
| Pope St btw Byron St and Moore St | 2,500-6,000 | 1474 (4.4%) | 1395 (2.1%) | 5,510 | 5,543 | 50 | 56 |
| Moore St btw Pope St and Milton St | 1,000-2,500 | 1865 (5.9%) | 1279 (4.8%) | - | - | 50 | 56 |
| McPhillips Rd at No. 63 | 1,000-2,500 | 871 (11.3%) | 872 (6.9%) | 1,412 | 2,616 | 60 | 64 |
| McPhillips Rd just east of Burns St | 2,500-6,000 | 1624 (13.1%) | 1550 (10.9%) | | | 60 | 51 |
| Imperial Way btw Merlot Ct and Milton St | 1,000-2,500 | 648 (7.4%) | 663 (8.3%) | - | - | 50 | 56 |

| Location | Link Capacity (vpd) (IDM Standards) | Existing Traffic Volumes (%Heavy) | | Future Traffic Volumes | | Speed Limit (km/h) | 85 th %ile Speed (km/h) |
|-------------------------------------------------------------|-------------------------------------|-----------------------------------|-------------|------------------------|----------|--------------------|------------------------------------|
| | | Weekday | Saturday | Weekday | Saturday | | |
| Milton St east of Archer Way | 2,500-6,000 | 3172 (8.0%) | 2059 (7.8%) | - | - | 50 | 58 |
| Moreillon Blvd btw McKenna St and Darriwell Dr | 2,500-6,000 | 534 (2.3%) | 316 (5.4%) | - | - | 50 | 57 |
| Harvey Rd 300m sth of Ormond St | 1,000-2,500 | 939 (10.6%) | 951 (6.1%) | 5,403 | 5,009 | 80 | 89 |
| Moreillon Blvd btw Shelford-Bannockburn Rd and Darriwell Dr | 2,500-6,000 | 1244 (7.4%) | 1029 (8.6%) | 4,077 | 3,276 | 50 | 51 |
| Milton St Btw Burns St and Shelford-Bannockburn Rd | 2,500-6,000 | 4910 (5.6%) | 3750 (4.1%) | 15,981 | 16,944 | 60 | 69 |

***Austroads Theoretical Capacity**

As expected, the VicRoads arterial roads carry the highest traffic volumes through Bannockburn, with around 10,000 vehicles per day (vpd) during the week on Geelong Road and High Street, reducing to 6,600 vehicles on Shelford-Bannockburn Road west of the town centre. This route also carries the highest number of heavy vehicles (approximately 1,120 vpd on Geelong Road and 820 vpd on High Street).

Milton Street also carries higher levels of traffic, particularly west of High Street, with almost 7,000 vpd during the week. This exceeds the Infrastructure Design Manual (IDM) indicative maximum traffic volumes for a street of this type.

Other observations made in analysing the traffic data include:

- > All other streets carry daily traffic flows well within the IDM guidelines;
- > A significant portion of traffic access Burnside Road via Pope Street, with traffic volumes higher east of the Pope Street roundabout;
- > Average speeds are generally within the posted limit on the arterial roads into and through the town centre;
- > Average speeds are up to 10km/h over the posted limits on most local streets close to the town centre, including Milton Street, Moreillon Boulevard, and Pope Street;
- > Vehicles drive significantly faster than the posted limit on a number of outer streets on the periphery of the residential area, including Yverdon Drive, Charlton Street, Burnside Road, with the average speeds up to over 70km/h in a 50 km/h zone;
- > Heavy vehicles are most prominent on Geelong Road, High Street and Shelford- Bannockburn Road, generally being through, strategic traffic accessing the Midland Highway.
- > Milton Street west of High Street also carries a higher number of heavy vehicles, with around 360 heavy vehicles per day near Burns Street and 250 vpd near the school at Archer Street. This would be accounted for by commercial vehicles accessing the supermarket and shops off Burns Street, and school buses accessing the school and recreation centre.

3.3.2 Intersection Turning Movement Surveys

A number of intersection turning movement surveys were also undertaken during the same period as the traffic volumes, with AM and PM peak surveys undertaken on Thursday 1st March 2018, and Saturday morning peak on 3rd March 2018, to assist in gaining an understanding of the current performance of key intersections in the town centre area.

These surveys were undertaken at the following intersections:

- > Midland Hwy and Geelong Road;
- > Midland Hwy, Kelly Road and Kelly Lane;

- > Midland Hwy, Clyde Road and Clyde Hill Road;
- > Shelford-Bannockburn Road and Kelly Road;
- > Shelford-Bannockburn Rd, Geelong Road and Clyde Road;
- > McPhillips Road and Victor Street;
- > Victor Street and Milton Street;
- > Shelford-Bannockburn Road and Milton Street;
- > Burnside Road, Pope Street and Levy Road;
- > Shelford-Bannockburn Road and Burnside Road;
- > Shelford-Bannockburn Road and Moreillon Blvd; and
- > Shelford-Bannockburn Road and Harvey Road.

The weekday peak (1 hour) turning movement volumes for these intersections are presented in Appendix C.

3.3.3 SIDRA Intersection Performance

The intersection turning movement counts allowed us to analyse the current intersection performance using the SIDRA Intersection. This computer package, originally developed by the Australian Road Research Board, provides information about the capacity of an intersection in terms of a range of parameters, as described below:

Degree of Saturation (D.O.S.) is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown in Table 3-2.

Table 3-2 Rating of Degrees of Saturation

| D.O.S. | Rating |
|------------|-----------|
| Up to 0.6 | Excellent |
| 0.6 to 0.7 | Very Good |
| 0.7 to 0.8 | Good |
| 0.8 to 0.9 | Fair |
| 0.9 to 1.0 | Poor |
| Above 1.0 | Very Poor |

It is considered acceptable for some critical movements in an intersection to operate in the range of 0.9 to 1.0 during the high peak periods, reflecting actual conditions in a significant proportion of suburban signalised intersections.

The **95th Percentile (95thile) Queue** represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour; and

Average Delay is the delay time, in seconds, which can be expected over all vehicles making a particular movement in the peak hour.

The results of the SIDRA Intersection analysis for each of the above intersections are summarised in Appendix C, with the key intersections along Geelong Road and Shelford-Bannockburn Road provided in Table 3-3.

Table 3-3 Results of the SIDRA Intersection Analysis

| Intersection | Approach | AM Peak | | | PM Peak | | | Saturday Peak | | |
|--------------------------|------------------|---------|------------|----------------------------|---------|------------|----------------------------|---------------|------------|----------------------------|
| | | DOS | Avg. Delay | 95 th ile Queue | DOS | Avg. Delay | 95 th ile Queue | DOS | Avg. Delay | 95 th ile Queue |
| Midland Hwy / Geelong Rd | Midland Hwy (SE) | 0.304 | 7 | 2.1 | 0.652 | 7 | 7.2 | 0.515 | 7.3 | 4.2 |

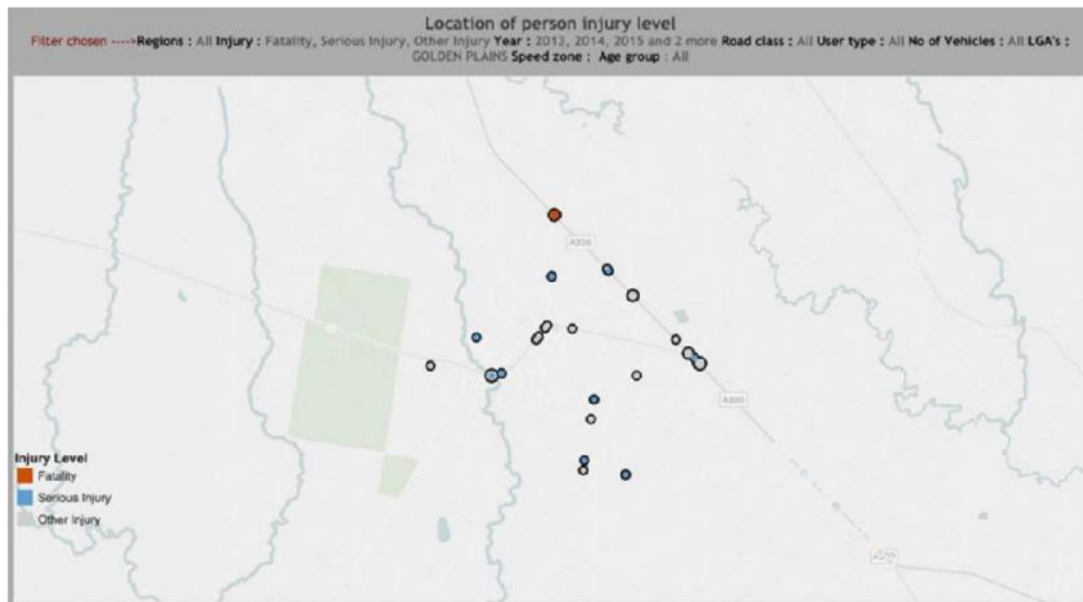
| Intersection | Approach | AM Peak | | | PM Peak | | | Saturday Peak | | |
|---------------------------------------|------------------------------|---------|------------|----------------------------|---------|------------|----------------------------|---------------|------------|----------------------------|
| | | DOS | Avg. Delay | 95 th ile Queue | DOS | Avg. Delay | 95 th ile Queue | DOS | Avg. Delay | 95 th ile Queue |
| | Midland Hwy (NW) | 0.373 | 11.6 | 2.1 | 0.28 | 9.1 | 1.3 | 0.385 | 9.8 | 1.9 |
| | Geelong Rd (W) | 0.604 | 12.2 | 4.2 | 0.336 | 12.6 | 1.7 | 0.342 | 12.6 | 1.8 |
| Geelong Rd / Clyde Rd | Clyde Rd (N) | 0.247 | 14 | 0.8 | 0.328 | 16.7 | 1.2 | 0.427 | 12.1 | 1.9 |
| | Geelong Rd (E) | 0.193 | 5.4 | 0 | 0.388 | 5.4 | 0.1 | 0.195 | 5.5 | 0.1 |
| | Geelong Rd (SW) | 0.411 | 5.1 | 2.9 | 0.273 | 5.2 | 1.6 | 0.322 | 5.2 | 1.9 |
| Bannockburn-Shelford Rd / Milton St | Milton St (SE) | 0.775 | 49.2 | 4.7 | 0.902 | 89.2 | 6.1 | 0.231 | 11.3 | 5.9 |
| | Milton St (NW) | 0.332 | 11.3 | 1.3 | 1.101 | 120.7 | 19.1 | 0.266 | 8.4 | 1 |
| | Bannockburn-Shelford Rd (NE) | 0.179 | 4.3 | 0.8 | 0.398 | 2.5 | 0.1 | 0.295 | 7 | 1.3 |
| | Bannockburn-Shelford Rd (SW) | 0.252 | 1.1 | 0.1 | 0.190 | 1 | 0.1 | 0.306 | 5 | 1.5 |
| Bannockburn-Shelford Rd / Burnside Rd | Burnside Rd (SE) | 0.127 | 7.1 | 0.5 | 0.129 | 8.6 | 0.4 | 0.098 | 8.4 | 0.3 |
| | Bannockburn-Shelford Rd (NE) | 0.076 | 0.4 | 0 | 0.221 | 0.9 | 0 | 0.214 | 0.9 | 0 |
| | Bannockburn-Shelford Rd (SW) | 0.226 | 1 | 0.5 | 0.193 | 1.5 | 0.5 | 0.146 | 1.3 | 0.3 |

It is demonstrated that all intersections generally perform within capacity to an Excellent or Very Good rating under normal weekday and Saturday peak period traffic conditions. The exception to this is the High Street / Milton Street intersection, which reaches capacity in the PM peak period, particularly the Milton Street western approach, exceeding capacity with a DoS of 1.101, and the eastern approach nearing capacity at 0.902. This coincides with a two way traffic flow of approximately 1,000 vehicles on High Street in the PM peak. This intersection operates within capacity during the AM peak, however the DoS on the south east approach does near 0.8, indicating that there are longer delays on that arm at the intersection.

3.3.4 Crash Statistics Analysis

To gain an understanding of the locations and severity of road accidents and potential problematic intersections or road links within Bannockburn, Cardno has reviewed the CrashStats data obtained from VicRoads for 2013 to 2017. Figure 3-21 illustrates the 'all injury' and 'fatality' crashes within Bannockburn within the 5 year period.

Figure 3-15 Location of Injury and Fatality crashes between 2013 -2017



Source: CrashStats

Key findings from the CrashStats analysis are:

- > A total of three accidents have occurred at the Midland Highway / Clyde Road intersection, with a single fatal accident in 2017 between two vehicles, resulting in two fatalities;
- > A total of seven accidents have occurred either at or on the Midland Highway approaches to the Geelong Road intersection over the last 5 years, with two being serious injury accidents;
- > Three accidents have occurred at the Clyde Road / Kelly Road / Geelong Road intersection, all other injury accidents involving alcohol as a factor; and
- > A significant portion of accidents in Bannockburn are alcohol related, whereby 13 (38%) of the 34 accidents have alcohol recorded as a factor.

A more detailed summary of the accidents is provided in Table 3-4.

Table 3-4 Summary of CrashStats data

| Date | Road Name | Intersection | No. of persons killed | No. of people injured |
|------------|----------------------------|---------------------------|-----------------------|-----------------------|
| 23/04/2013 | Midland Highway | Geelong Road | 0 | 1 |
| 23/04/2013 | Midland Highway | Madden Road | 0 | 2 |
| 7/05/2013 | Midland Highway | Madden Road | 0 | 3 |
| 24/05/2013 | Moreillon Boulevard | Sunset Way | 0 | 1 |
| 8/07/2013 | Geelong Road | Gillett Street | 0 | 1 |
| 2/11/2013 | Burnside Road | Glen Avon Drive | 0 | 1 |
| 19/11/2013 | Midland Highway | Geelong Road | 0 | 1 |
| 2/02/2014 | Garonne Drive | Knights Park Crescent | 0 | 1 |
| 13/06/2014 | Bannockburn-Shelford Road | Bruce Street | 0 | 4 |
| 10/08/2014 | Geelong Road - High Street | McPhillips Road | 0 | 1 |
| 18/08/2014 | Midland Highway | Kelly Lane | 0 | 1 |
| 21/12/2014 | Clyde Road | Lowndes Road | 0 | 2 |
| 23/02/2015 | Guinane Court | Holder Road | 0 | 1 |
| 3/03/2015 | Midland Highway | Kelly Lane | 0 | 1 |
| 4/04/2015 | Geelong Road | Clyde Road | 0 | 1 |
| 6/09/2015 | Glen Avon Drive | Macrossan Avenue | 0 | 2 |
| 12/09/2015 | Midland Highway | Geelong Road | 0 | 2 |
| 27/10/2015 | Burnside Road | Yverdon Drive | 0 | 1 |
| 5/02/2016 | Midland Highway | Clyde Road | 0 | 2 |
| 25/05/2016 | High Street | Milton Street | 0 | 1 |
| 28/05/2016 | Moreillon Boulevard | Bannockburn-Shelford Road | 0 | 2 |
| 7/07/2016 | High Street | High Street | 0 | 1 |
| 17/11/2016 | Midland Highway | Geelong Road | 0 | 1 |
| 11/12/2016 | Midland Highway | Kelly Road | 0 | 2 |
| 14/3/2017 | Midland Highway | Clyde Road | 0 | 1 |
| 12/04/2017 | Midland Highway | Clyde Road | 2 | 2 |
| 15/05/2017 | Burnside Road | Charlton Road | 0 | 1 |
| 29/5/2017 | Midland Highway | Geelong Road | 0 | 1 |
| 4/06/2017 | Glen Avon Drive | n/a | 0 | 1 |
| 16/08/2017 | Midland Highway | Madden Road | 0 | 1 |

Source: VicRoads CrashStats

3.4 Public Transport Accessibility

Bannockburn currently has limited access via public transport, as outlined in the following sections.

3.4.1 Existing Bus Network

Bannockburn Growth Area has a single local bus service with bus route 19 providing a single PM service to Geelong in each direction per day between Monday – Friday and no services on the weekends. This service only stops at a single location in Bannockburn town centre, on High Street, south of McPhillips Road, with a second stop on the Midland Highway, just south of the Geelong Road roundabout. Otherwise it stops at Gheringhap, Batesford, Hamlyn Heights, and terminating at Geelong rail station.

A V/Line coach service between Bendigo and Geelong via Ballarat stops at Bannockburn with two services in each direction per day between Monday – Friday and again with no services on the weekends.

Whilst both of the above services stop at Geelong rail station, neither provide a useful commuter connection to trains from Geelong to Melbourne or vice versa.

Existing bus service route maps can be found in Appendix D.

A summary of the existing bus services is shown in Table 3-5.

Table 3-5 Bannockburn Bus Services Summary

| Bus Route Number | Service Description | Departure Time | Arrival Time | Arrival/Departure time at Bannockburn |
|------------------|-------------------------------------------|----------------|--------------|---------------------------------------|
| 19 | Bannockburn via Batesford, Gheringhap | 4:30pm | 5:00pm | 5:00pm |
| 19 | Geelong Station via Gheringhap, Batesford | 5:10pm | 5:35pm | 5:10pm |
| V/Line | Ballarat to Geelong | 6:15am | 7:50am | 7:16am |
| V/Line | Bendigo to Geelong | 6:35am | 11:15am | 10:47am |
| V/Line | Ballarat to Geelong | 3:00pm | 4:45pm | 4:05pm |
| V/Line | Geelong to Ballarat | 8:00am | 9:35am | 8:24am |
| V/Line | Geelong to Bendigo | 11:35am | 4:05pm | 12:01pm |
| V/Line | Geelong to Ballarat | 5:45pm | 7:15pm | 6:09pm |

Source: PTV / V/Line Website

3.4.2 Existing Train Network

Passenger rail services no longer operate on the Geelong to Ballarat line hence the existing Bannockburn Train Station is no longer in operation and as such no trains currently serve Bannockburn Growth Area. Freight trains between Ballarat and the north west of the state and Geelong utilise the rail line passing through Bannockburn infrequently.

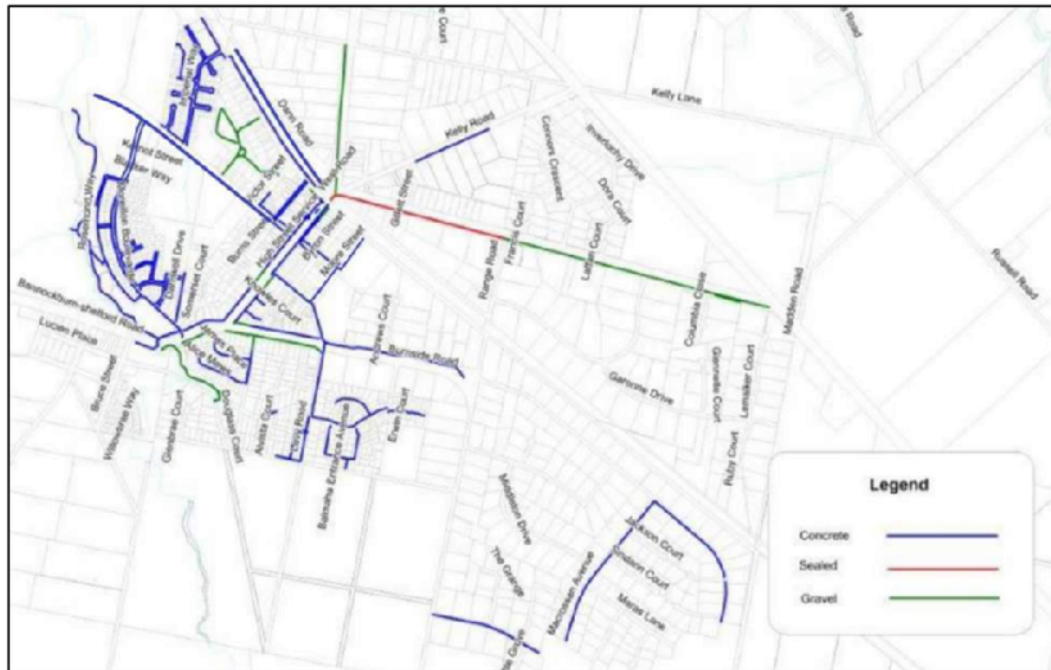
It is understood that there are currently no plans to reinstate a passenger service on the Geelong to Ballarat rail line through Bannockburn.

3.5 Pedestrian and Cycle Network

The pedestrian and cycle network within the BGA is very limited with few existing on-road and off-road cycle routes. Currently no TravelSmart or Principle Bicycle Network routes have been mapped for Bannockburn Growth Area. It was observed on site that there have been some recent improvements to the pedestrian network, with new paths extending along Milton Street both west toward the new P12 school, and also east to Byron Street, and along McPhillips Road toward the aged care centre. Otherwise there are a number of streets without any pedestrian facilities.

Figure 3-16 highlights the existing paths and trails within the BGA.

Figure 3-16 Existing Paths and Trails



Source: Golden Plains Open Space & Paths & Trails Strategy

3.6 Car Parking

Cardno commissioned Nationwide Traffic Surveys P/L to undertake parking occupancy surveys on Thursday 1st March 2018 and Saturday 3rd March 2018 between 7am – 7pm to determine existing parking restrictions and occupancy's within Bannockburn Town Centre. A comprehensive summary of the survey results including existing parking provision, restrictions, and demand in terms of both occupancy and duration of stay is found in Appendix E.

3.6.1 Parking Supply

Bannockburn Growth Area's existing formal parking provision is primarily located within the Bannockburn Town Centre. On and off-street car parking is available with limited restrictions varying depending on locality to schools, commercial businesses and residential dwellings. Less formal on street parking is allowed on residential streets outside the town centre, however it was observed to be minimal whilst on site.

Table 3-6 indicates a summary of total formal car parking spaces within Bannockburn Town Centre.

Table 3-6 Summary Car Parking Provision within Bannockburn Town Centre

| Type | On Street | Off Street | Total | % Provision |
|-----------------------------------|-----------|------------|-------|-------------|
| Unrestricted | 333 | 167 | 500 | 88% |
| Disabled | 7 | 5 | 12 | 2% |
| 2P | 33 | - | 33 | 5.8% |
| 1/2P | 14 | | 14 | 2.5% |
| Bus Zone | 3 | | 3 | 0.5% |
| Loading Zone | 3 | | 3 | 0.5% |
| No Standing (CFA Excepted) | 4 | | 4 | 0.7% |
| Total | 397 | 172 | 569 | 100% |

Currently there are 569 existing car spaces within the Bannockburn Town Centre for use by staff, visitors and residents which includes 397 on-street and 172 off-street car spaces.

Existing parking supply within Bannockburn Town Centre is predominately Unrestricted parking, with 88% of on-street and off-street parking spaces being all-day. All off-street car parks are unrestricted with some disabled car spaces with restricted parking located on High Street and Milton Street.

It is understood that approximately 85% of total car parking is managed by Golden Plains Shire Council, including all on-street parking, with the remaining 15% privately owned and managed (Woolworths).

3.6.2 Car Parking Demand

The parking survey area includes the key on-street and off-street areas within Bannockburn Town Centre for residents, visitors and staff to park and access commercial precinct and surrounding services.

A summary of the parking occupancy over a 12 hour period is shown in Table 3-7.

Table 3-7 Summary of parking occupancy surveys

| Time | Total Car Spaces | Thursday 1st March 2018 | | Saturday 3rd March 2018 | |
|------|------------------|-------------------------|----------------|-------------------------|-----------------|
| | | Occupied Spaces | Occupancy Rate | Occupied Spaces | Occupancy Rate% |
| 7am | 569 | 39 | 7% | 42 | 7% |
| 8am | 569 | 70 | 12% | 93 | 16% |
| 9am | 569 | 101 | 18% | 133 | 23% |
| 10am | 569 | 182 | 32% | 251 | 44% |
| 11am | 569 | 179 | 31% | 260 | 46% |
| 12pm | 569 | 179 | 31% | 205 | 36% |
| 1pm | 569 | 186 | 33% | 143 | 25% |
| 2pm | 569 | 145 | 25% | 101 | 18% |
| 3pm | 569 | 184 | 32% | 96 | 17% |
| 4pm | 569 | 139 | 24% | 89 | 16% |
| 5pm | 569 | 140 | 25% | 69 | 12% |
| 6pm | 569 | 119 | 21% | 100 | 18% |
| 7pm | 569 | 92 | 16% | 106 | 19% |

The parking survey occupancy results indicate that when looking at the Bannockburn Growth Area as a whole the following has been identified:

- > The maximum identified parking occupancy within Bannockburn Town Centre was 33% on Thursday 1st March 2018.
- > The maximum identified parking occupancy within Bannockburn Town Centre was 46% on Saturday 3rd March.
- > The average occupancy on Thursday 1st March was 23.4% for the duration of the survey period.

- > The average occupancy on Saturday 3rd March was 22.9% for the duration of the survey period.

Figure 3-17 and Figure 3-18 highlight the maximum parking occupancy's between 7am – 7pm within the town centre for on-street parking and off-street car parks to determine where existing parking deficiencies are present and where changes to existing parking restrictions may occur to increase turnover parking in high demand areas.

Figure 3-17 Bannockburn Town Centre existing maximum Thursday parking occupancy's



Figure 3-18 Bannockburn Town Centre existing maximum Saturday parking occupancy's



The above figures indicate that parking proximate to Bannockburn Plaza generally exceeds 60% with the off-street plaza car parks exceeding 80% occupancy. Car parking occupancy is higher, generally between 10am and 12pm on Saturday mornings, reflecting peak shopping demand.

Overall, the car parking surveys conducted indicate there is currently adequate parking within Bannockburn Town Centre as a whole for the current land uses and population.

3.6.3 Duration of Stay

Analysis of the duration of stay surveys suggests that for on-street parking, approximately 76% of cars are parked for no longer than 1 hour and 86% within 2 hours. It was observed that for the off-street parking, around 82% of vehicles are parked for no longer than 1 hour and 91% within 2 hours.

This suggests a generally high turnover of parking spaces within the town centre.

3.7.1 Bannockburn Statistical Area

Figure 3-19 Statistical area data obtained through ABS data

Figure 3-20 summarises the mode of travel to work within Bannockburn Growth Area and compares this data to the ABS data for Golden Plains Shire LGA and the City of Greater Geelong.

Mode of Transport to Work %

| Mode of Transport | 2011 | 2016 | Golden Plains Shire LGA | City Of Greater Geelong |
|-------------------|------|------|-------------------------|-------------------------|
| Car (Driver) | 74% | 77% | 75% | 69% |
| Public Transport | 1% | 2% | 2% | 5% |
| Bicycle | 0% | 0% | 0% | 1% |
| Walk | 1% | 1% | 1% | 2% |
| Other | 25% | 20% | 22% | 22% |

The ABS data indicates that there has been little change in mode shift in Bannockburn, with 98% of journey to work trips made by car in 2011 and 97% in 2016 (either as driver or passenger), however there has been a 5% increase in driver trips over this time. This compares with 94.5% of car trips across Golden Plains Shire and 91% in Greater Geelong.

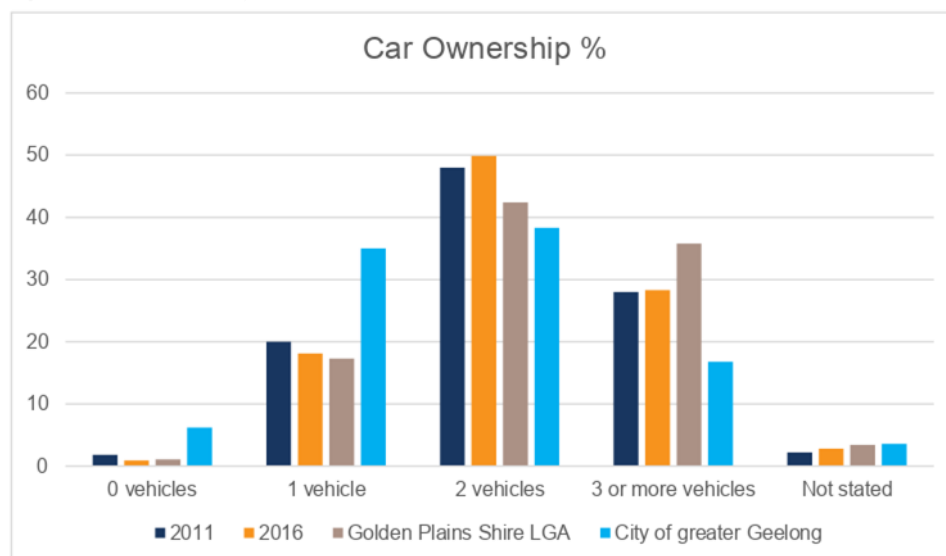
Public and active transport represents only 3% in Bannockburn, reflecting the poor provision of bus access and residents walking or cycling to local employment.

The Victorian State Government has an objective of public transport having a 20% mode share of all motorised trips by the year 2020. The current mode share for public transport on the urban fringe is less than 5% and as such increased public transport infrastructure within Bannockburn needs to improve dramatically for an increased population.

3.7.3 Car ownership

Figure 3-21 summarises car ownership within Bannockburn Growth Area and compares this data to the ABS data for Golden Plains Shire LGA and the City of Greater Geelong.

Figure 3-21 Car ownership within Bannockburn Growth Area



The results of the census indicate that car ownership in both 2011 and 2016 was greater than 98% for Bannockburn Growth Area and Golden Plains Shire LGA. In comparison the City of Greater Geelong which has superior access to public transport has a car ownership of 94%. It is shown that Bannockburn households are more likely to own 2 or more vehicles (78%), in line with the rest of Golden Plain Shire, but significantly less than greater Geelong (55%). The ABS data suggests that residents of both Bannockburn Growth Area and Golden Plains Shire are heavily car reliant due to poor access to public transport facilities including bus and rail.

3.7.4 Summary of ABS Data

The Australian Bureau of Statistics data obtained from the 2011 and 2016 Census highlights the following trends in Bannockburn Growth Area and Golden Plains Shire LGA:

- > Car reliance to travel to work within Bannockburn increased from 73.64% in 2011 to 77.55% in 2016.
- > Public and active transport made up 2.71% of travel to work modes in 2016 up from 1.56% in 2011.
- > Car ownership in Bannockburn Growth Area increased from ~98.2% in 2011 to 99.1% in 2016 which indicates a heavy reliance on private motor vehicle within the growth area.
- > Heavy reliance on private motor vehicle and poor public and active transport opportunities means access to Bannockburn Town Centre for new and existing residents will be highly dependent on motor vehicle.
- > An increase in residential and commercial development within Bannockburn will require additional on-street and off-street car parking to cater for the increased population and visitors to the town centre.

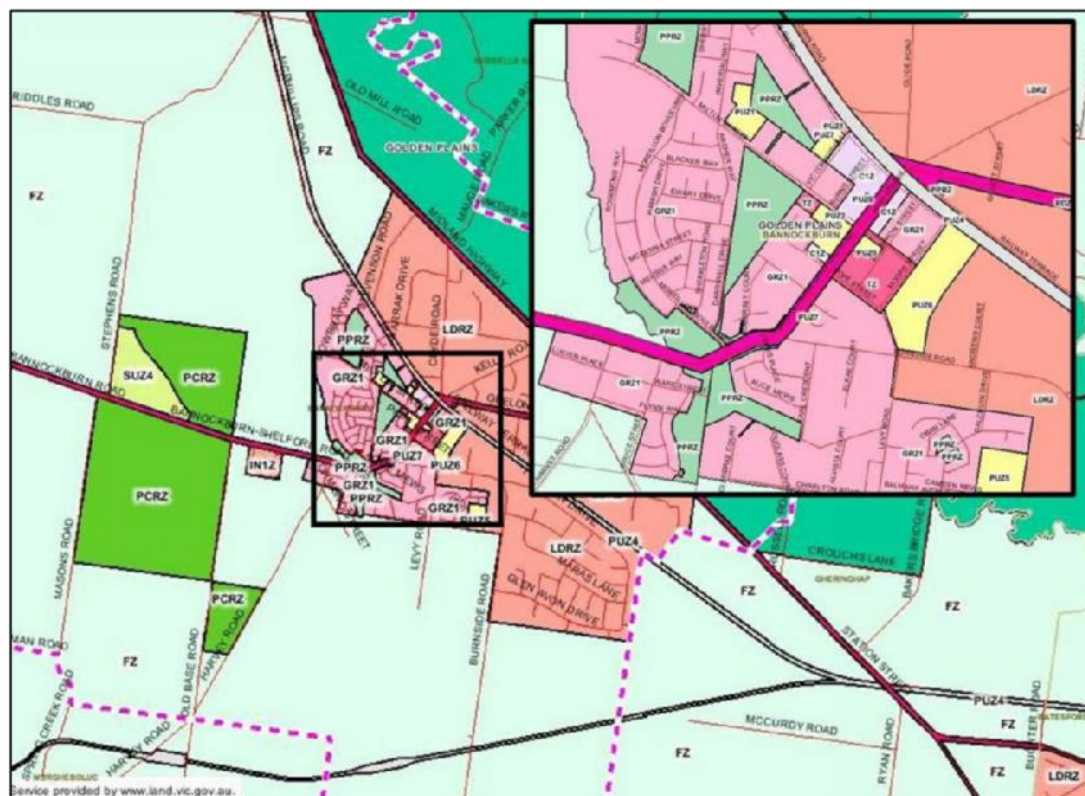
4 Existing and Proposed Land Use

4.1 Existing Population and Land Use

The population of Bannockburn at the 2016 Census was 5,283 people, with 1,739 private dwellings.

The Bannockburn Growth Area is currently a mix of Farming (FZ), Low Density Residential (LDRZ), General Residential (GRZ), Industrial (IN1Z) and Public Park/Conservation & Recreation (PPRZ, PCRZ), around the core centre with Commercial (C1Z), Township (TZ), and Public Use (PUZ). Figure 4-1 highlights the existing land uses zones within the Bannockburn Growth Area.

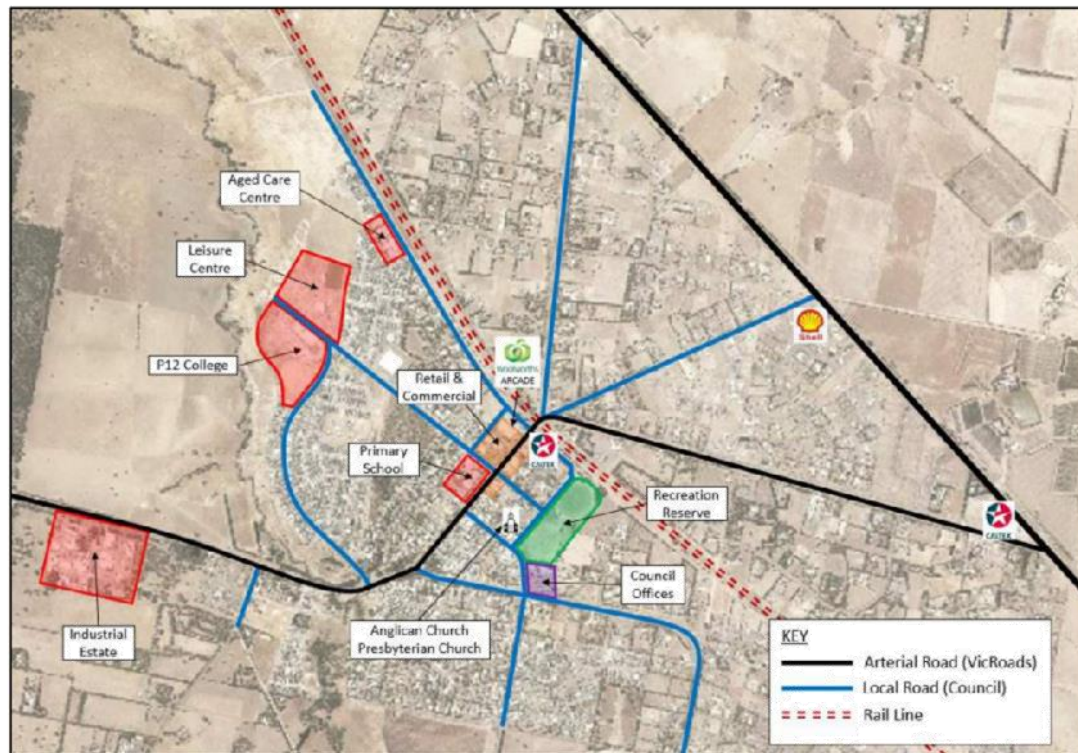
Figure 4-1 Existing Land Uses Zones



Source: www.land.vic.gov.au

Bannockburn has a range of different employment and retail areas, education, services and facilities to support the existing population. These existing services, supported by additional services and facilities will continue to support a growing population within Bannockburn Growth Area. Current facilities in Bannockburn are highlighted in Figure 4-2.

Figure 4-2 Existing Services in Bannockburn



4.2 Future Population and Land Use

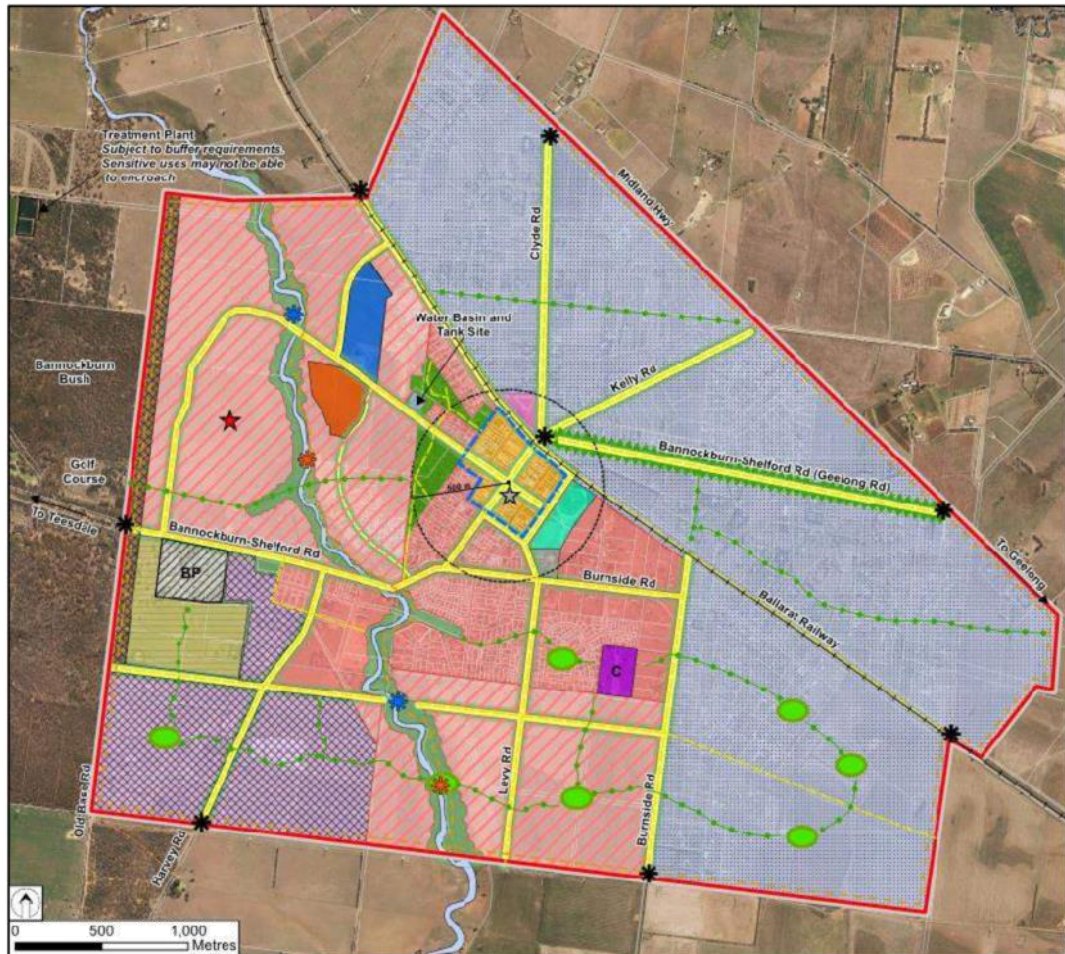
The nature and location of future residential land use and supporting services and facilities to support the growing population for the wider growth area has been outlined in the Bannockburn Growth Area Urban Design Framework Plan (2011). Additionally, development proposals for the town centre to cater for the local population growth were identified in the Bannockburn Town Centre Investment Strategy (2008). A detailed analysis of both documents is provided in Appendix A and the following sections summarise the future land use and development proposals both in the context of the wider growth area and focussing on the town centre.

4.2.1 Bannockburn Growth Area

The Bannockburn Growth Area Urban Design Framework Plan predicted a future population of almost 10,500 residents by 2023. In order to accommodate the future projected population, an increase in the current educational, recreational, residential, commercial and retail sectors of the town are desirable to ensure the long term economic viability of the town.

As such future land uses and activities throughout the Bannockburn Growth Area build upon the existing urban structure as illustrated in Figure 4-3.

Figure 4-3 Bannockburn Growth Area Urban Design Framework Plan



Source: Bannockburn Growth Area Urban Design Framework Plan (2011)

A larger scale of this plan that includes population projections is provided in Appendix A. As shown, key expansion areas are generally to the south and west of the existing development. Some areas identified in the plan have already been developed to some extent since this plan was published in 2011.

Approximately 140 hectares of priority residential development is allocated south of Charlton Road between Burnside Road and west of Bruce's Creek, with access off Charlton Road and an extended Levy Road.

A second residential precinct, Bruce's Creek Precinct, lies west of the town, generally bound by the rail line to the north, Bannockburn Bushland reserve to the east, Bannockburn Bush to the west and Sheldford- Bannockburn Road to the south. A masterplan was developed for Bruce's Creek in 2009, a summary of which is included in Appendix A.

The total Bruce's Creek precinct area is approximately 300 hectares, however an amount of this is occupied with education and recreation facilities, as well as the creek reserve running north-south through the precinct, as shown on the precinct plan in Appendix A. Intended primary access is via an extension of Milton Street west of the P12 College with a bridge over the creek, before heading south connecting to Sheldford- Bannockburn Road. A significant amount of the precinct between the town and Bruce's Creek has been recently developed, including the P12 College and sections of the Sporting Precinct. The masterplan for the Sporting precinct is provided in Appendix A.

Approximately 130 hectares of currently rural land in the south west corner of the growth area is proposed to be rezoned for future Low Density Residential development, as is a small parcel of land between the

Business Park and Harvey Road. Otherwise sections of the existing Low Density Residential areas east of the town have also been earmarked for further low density housing.

A 35 hectare area south and west of the existing Business Park has been identified for future expansion, pending further investigation.

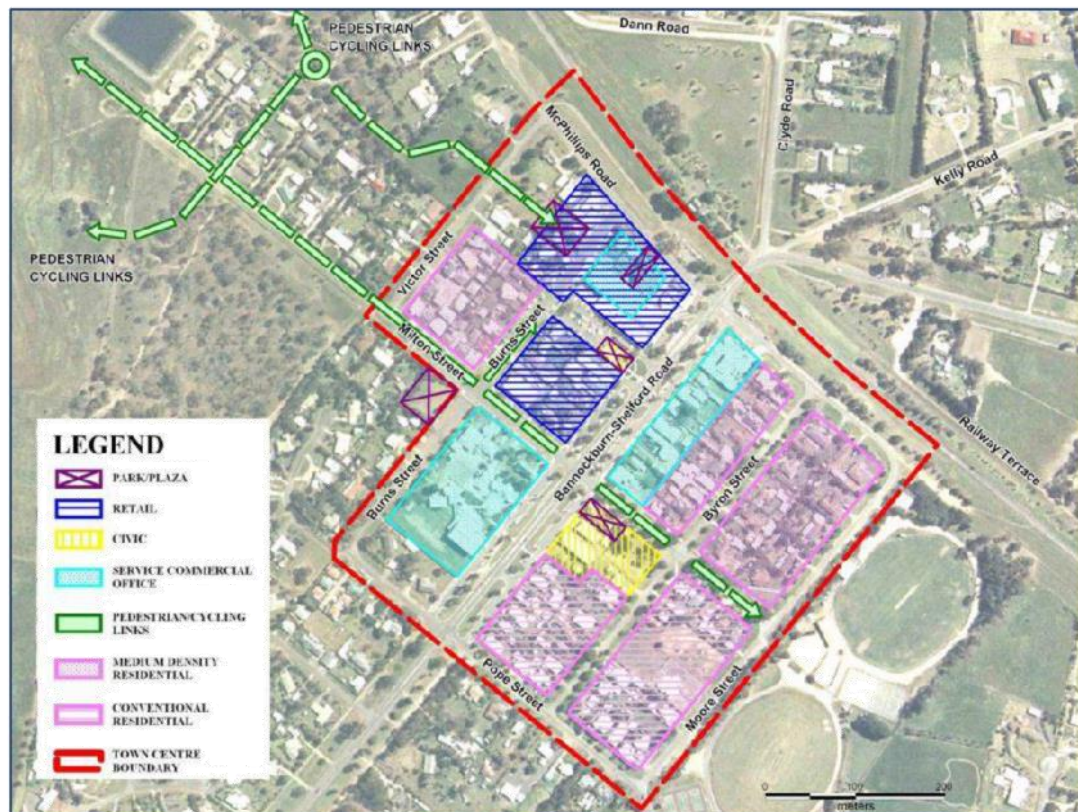
A network of open space corridors linking future green spaces and small recreation reserves has been identified throughout the growth area either along existing road reserves or new reserves through residential areas, as shown on Figure 4-3 above.

4.2.2 Bannockburn Town Centre

Bannockburn's commercial and retail has a wider catchment than just the growth area, as it provides for a significant rural catchment, particularly north and west of the town. The 2008 Bannockburn Town Centre Investment Strategy predicted a future population of Bannockburn and the surrounding rural catchment at 12,800 by 2021.

The Bannockburn Town Centre Land Use Strategy considered the wider growth when prioritising investment to meet the future retail and commercial development requirements within an expanded town centre. The Town Centre strategy identifies a number of land use zones as illustrated in Figure 4-4.

Figure 4-4 Investment and Land Use Strategy for Bannockburn Town Centre



Source: Bannockburn Town Centre Investment Strategy (2008) (Connell Wagner)

The Town Centre Investment Strategy identifies a range of existing and proposed land use changes including extending the Commercial Zone to between High Street and Burns Street south of Milton Street, and introducing Medium Density Residential on Byron Street and Moore Street between Milton Street and McPhillips Road. A more detailed summary of the 2008 Bannockburn Town Centre Investment Strategy is provided in Appendix A, and specific projects currently in the planning or early implementation stage are outlined in the following sections.

4.2.2.2 Bannockburn Plaza Expansion

The strategy identifies the consolidation and expansion of the retail areas between High Street and Burns Street, including the expansion of the existing Woolworths shopping centre plaza across the northern section of Burns Street into the adjacent block to Victor Street. This project has progressed through the planning stages with updated plans for the plaza currently the subject of a planning permit application. Current plans are provided at Appendix A.

In summary, the plaza development will provide a total 5523 sqm Supermarket floor area, 3603 sqm shop floor area and 659 sqm office floor area. The current plans show a total car parking provision of 400 spaces, requiring a dispensation of 43 spaces. It has been determined that the plaza development will generate an additional 563 vehicles movements in the peak hour, split evenly inbound and outbound over the peak hour.

Directional split onto the surrounding road network has been determined to be 40% from the south of the growth area via High Street, split evenly to Milton Street and McPhillips Road, 40% from the north west split evenly via Milton Street and McPhillips Road, and the remaining 20% from the north of the rail line via High Street and Milton Street. SIDRA Intersection analysis has determined that both the Milton Street / High Street roundabout and the Milton Street / Burns Street intersection providing access to the plaza will both operate well within capacity during the peak hour with the additional traffic.¹

4.2.2.3 Bannockburn Civic Heart

The Bannockburn Town Centre Land Use Strategy identifies a number of open space areas and also a larger Civic precinct on the southern side of Milton Street, between High Street and Byron Street. A key project since identified for that location is the Bannockburn Civic Heart Project, in the area encompassing the existing Public Library and Cultural Centre, the SES and CFA facilities, and the existing carpark that has recently been paved, and two vacant lots on Byron Street.

A planning and design process has been undertaken, including considerable community and stakeholder consultation, culminating in a Final Vision Plan for the Civic Heart, as presented in the Bannockburn Civic Heart Project – Vision Plan Report (2014). It has been later refined in 2017, with a concept masterplan developed, as illustrated in Appendix A. Key features include:

- > Maintenance of and improvements to the Cultural Centre and Library;
- > Provision of a Village Green;
- > Provision of a Central Plaza;
- > An adventure playground and activity area;
- > Footpaths providing pedestrian permeability through the area; and
- > Off-Street Car Parking

¹ Source: Proposed Shopping Centre Expansion Traffic Impact Assessment Report (TTM 2017)

5 Issues and Opportunity Assessment

Analysis of the preceding sections in addition to early stakeholder and public consultation has identified a number of existing issues and potential opportunities for consideration when developing the Car Parking, Traffic Management and Pedestrian Movement Strategies. The following sections summarise the issues and opportunities for each mode or strategy element.

5.1 Traffic and Road Network

Based on a review of available information, site observations and early consultation, the following traffic and road network issues have been identified for the area, including:

1. A high volume of heavy vehicles including B-Double trucks utilise Shelford-Bannockburn Road and travel through the town centre to access the Midland Highway.
2. There is a high number of service road entry and exit points along High Street between McPhillips Road and Pope Street with poor sight lines for drivers exiting the service roads, creating conflict points.
3. The Geelong Road / Clyde Road / Kelly Road intersection immediately north of the rail crossing is currently in poor condition, with a number of issues observed, including:
 - > Sight line issues, particularly the unsafe alignment of Kelly Road approach, forcing drivers to look over their shoulder at an acute angle to check for oncoming traffic;
 - > Confusing priority, particularly between Kelly Road and Clyde Road; and
 - > The location of an additional informal access to the rail station.
4. The high volumes of vehicles travelling on Geelong Road make it difficult for vehicles to egress from side roads onto Geelong Road during morning and afternoon peak hours.
5. Speeding vehicles not adhering to the posted speed limit reducing safety of motorists and pedestrians on a number of streets in the area.
6. The limited public transport opportunities promote car usage within the area.

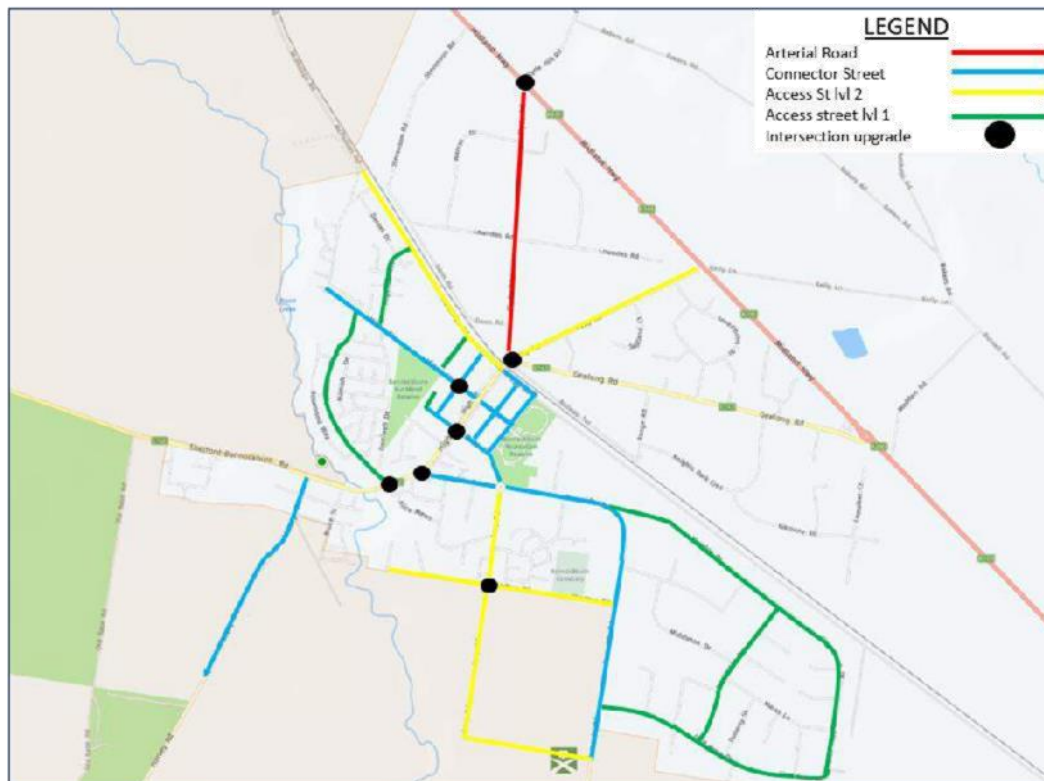
Based on a review of existing conditions and identified issues, including an assessment of recommendations made in previous strategy documents, the following opportunities have been identified to both improve the existing traffic and road network and to cater for expanding development within the Bannockburn Growth Area, including:

1. Upgrade the existing local and connector road network to ensure future traffic volumes due to development are catered for and do not have an adverse effect on local streets.
2. Consider upgrading key intersections within the growth area for safety reasons and to adequately handle increased traffic volumes as growth continues, including:
 - > Geelong Road / Clyde Road / Kelly Road;
 - > Midland Highway / Clyde Road;
 - > Shelford-Bannockburn Road / Burnside Road;
 - > Shelford-Bannockburn Road / Moreillon Boulevard; and
 - > Milton Street / Burns Street.
3. There is an opportunity to improve the Charlton Road / Levy Road intersection including the southern extension of Levy Road as development south of Charlton Road progresses.
4. There is an opportunity to review the road hierarchy within Bannockburn Growth Area so that it remains appropriate for the nature of traffic characteristics as residential and commercial development increases.
5. Investigate speed reduction measures on certain links with the growth area.
6. Consider investigating and altering the service road ingress and egress to Shelford-Bannockburn Road within the town centre.

7. Review the proposed road network outlined in the Bruce's Creek Masterplan and Growth Area Urban Design Framework Plan, to ensure that it remains appropriate for the location and nature of future development, including links over Bruce's Creek.
8. Consider a heavy vehicle bypass to detour freight vehicles around Bannockburn Town Centre onto the Midland Hwy.
9. Consider extending the service road south of Pope Street along the west side of High Street, to reduce the number of direct property access points to the main road.

Figure 5-1 illustrates the traffic and road network opportunities within Bannockburn Growth Area.

Figure 5-1 Traffic and Road Network Opportunities



5.2 Public Transport

Based on a review of available information and site observations the following public transport issues have been identified for the area, including:

1. Bannockburn has very limited bus services with existing services comprising of a single local service to and from Geelong in the afternoon, and 3 V/Line services in each direction between Geelong and Ballarat/Bendigo – two in the morning and one in the evening.
2. There is one existing bus stop within the Bannockburn town centre located on the corner of McPhillips Road and Shelford-Bannockburn Road, with a single additional stop on the Midland Highway east of the Geelong Road intersection used by the local service only.
3. Existing bus timetables do not make it feasible for Bannockburn residents to commute to Melbourne CBD or even Geelong via public transport without the use of a motor vehicle.
4. The majority of existing residential dwellings within the growth area are not within an acceptable walking distance to the nearest bus stop.