

Traffix Group

Traffic Engineering Report

Proposed Residential Subdivision

5, 20, 25 & 30 Ormond Street, Bannockburn

Prepared for
Barbara and Ian Hinchliffe

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1. Introduction

Traffix Group has been engaged by Barabara and Ian Hinchliffe to prepare a traffic engineering report for the proposed residential subdivision located at 5, 20, 25 & 30 Ormond Street in Bannockburn.

This report provides a traffic engineering assessment of the proposal with particular attention to traffic and access considerations.

In particular, this report addresses the criteria set out in the Infrastructure Design Manual (IDM¹) for both a Traffic Impact Assessment Report (addressing external road network impacts) and a Traffic Management Assessment Report (addressing the internal road layout, road widths, functions, and connectivity).

¹ *The Infrastructure Design Manual (IDM) is a joint initiative of Victorian rural and regional Council's working together to formulate and maintain a set of consistent requirements and standards for the design and development of infrastructure. The current version is Version 5.20 (March 2019) – www.designmanual.com.au. Benalla Rural City Council has adopted the manual.*

2. Existing Conditions

2.1. Subject Site

The subject site is located on the east side of Harvey Street and straddles both sides of Ormond Street in Bannockburn. It is bounded by Bruce Street and Bruces Creek, as shown in the locality plan presented at Figure 1.

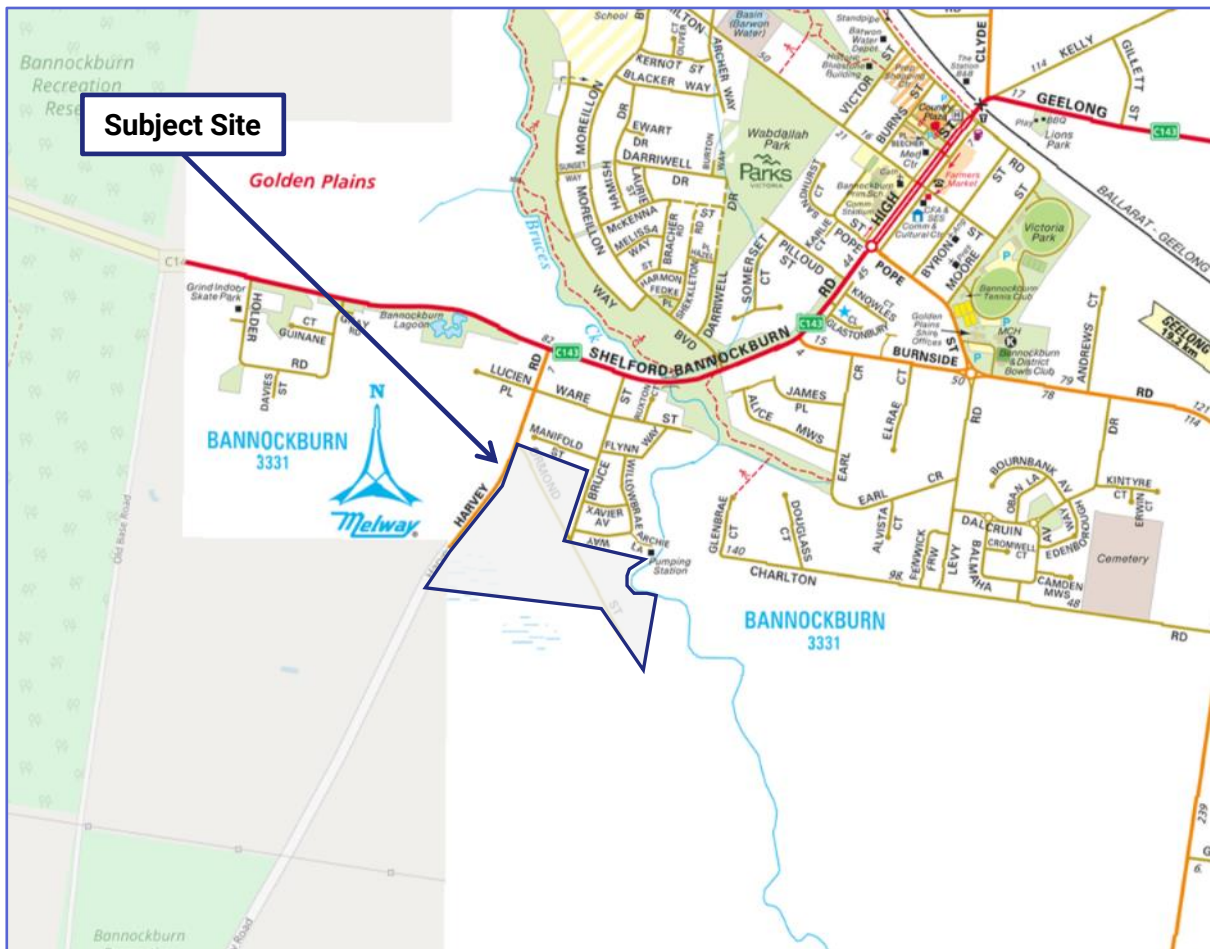


Figure 1: Locality Map

The subject site is irregular in shape with an area of 16.14 hectares and comprises 4 allotments, numbers 5, 20, 25 and 30 Ormond Street.

The site is located south of existing residential development, and has road frontages to Ormond Street, Bruce Street, and Harvey Road of approximately 820m, 230m and 430m respectively.

The site is currently used as farming land with four residential dwellings.

An aerial view of the site is shown in Figure 2 below.

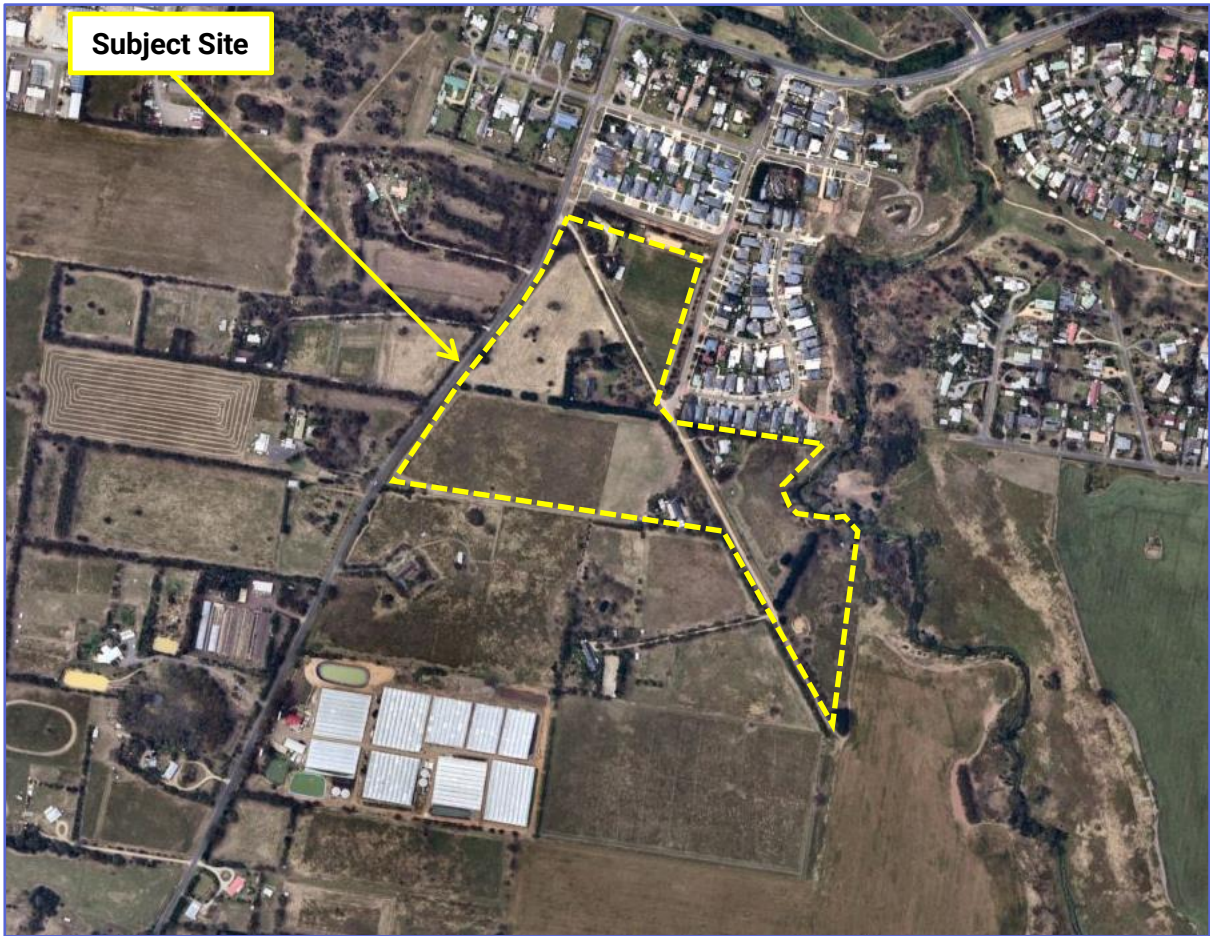


Figure 2: Subject Site – Aerial View

2.2. Land Use

The site is predominantly located within the Farm Zone (FZ) under the Golden Plains Planning Scheme as presented in Figure 3 below.

The part of the site to the east of Ormond Street is also affected by an Environmental Significance Overlay – Schedule 2 (ESO2).

The whole site is within a designated bushfire prone area.

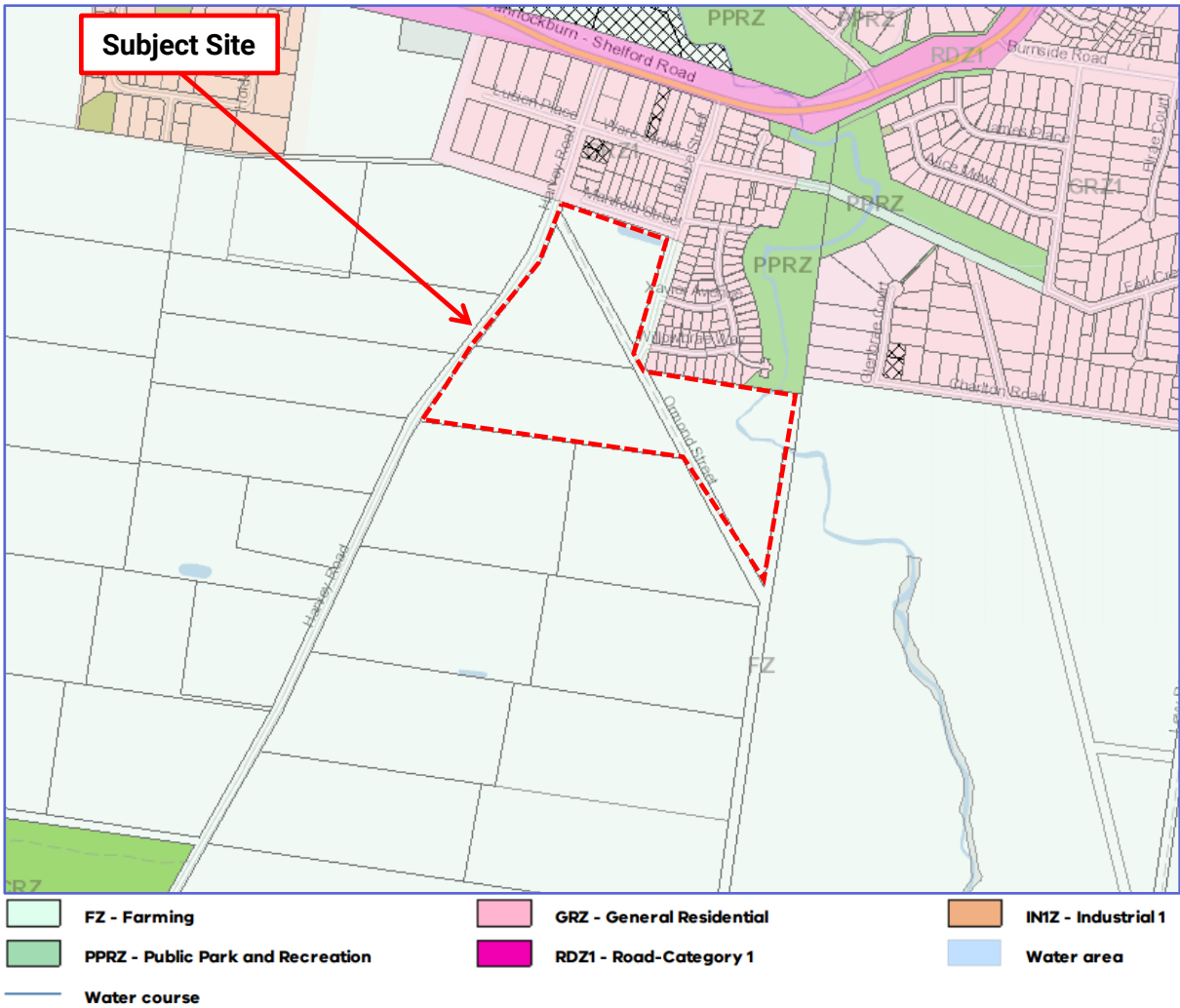


Figure 3: Land Use Zoning Map

Surrounding land uses include residential to the north, farm zoned land to the south, east, and west and a small pocket of industrial zoned land to the northwest. A public park follows Bruce Creek from the Farming Zone towards the north.

2.3. Road Network

Ormond Street is a Council controlled unsealed access street that extends approximately 820m southeast from Harvey Road. The southern 200m (approx.) is unconstructed.

Ormond Street is constructed with a 4.5m wide unsealed carriageway which is suitable for a single lane of through traffic. Grass verges provide passing opportunities if required. The road reservation measures approximately 20m.



Figure 4: Ormond Street view Northwest



Figure 5: Ormond Street view Southeast

Bruce Street is a Council controlled access street that extends approximately 510m in a north-south direction between Bannockburn-Shelford Road to the north and Ormond Street to the south.

In the vicinity of the site, Bruce Street is constructed with a 6.1m wide carriageway which allows for a through traffic lane in each direction. Further to the north in the developed area, the carriageway is 7.3m wide which allows for kerbside parking on both sides and a through traffic lane.

The urban default speed limit of 50km/h applies.



Figure 6: Bruce Street view North



Figure 7: Bruce Street view North

Harvey Road is a Council controlled local access street that extends approximately 6.6km in a general north-south direction between Bannockburn-Shelford Road to the north and Hamilton Highway to the south.

In the vicinity of the site, Harvey Road is constructed with a 6.6m wide sealed carriageway which allows for a through traffic lane in both direction within a 20m road reservation.

A posted speed limit of 80km/h applies.



Figure 8: Harvey Road view North



Figure 9: Harvey Road view North

2.4. Existing Traffic Volumes

Traffix Group has sourced traffic volume data² for Harvey Road in the vicinity of its intersection with Ormond Street and at its intersection with Bannockburn-Shelford Road from 2018.

A summary of the information is presented below.

The AM and PM peak hours occurred at 8:15am – 9:15am and 4:45pm – 5:45pm respectively.

The recorded AM and PM peak hour turning movements are illustrated in Figure 10 below.

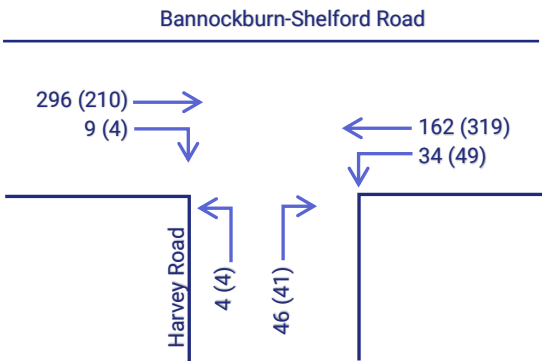


Figure 10: AM (PM) Peak Hour Turning Movements

Based on the available data, the two-way daily traffic volume for Harvey Road is 930 vehicles per day.

No information is available for Ormond Street or Bruce Street, however having regard to the existing dwellings which take access to each road and their function for local traffic only, we estimate the following:

- Ormond Street: 50vpd
- Bruce Street: 900vpd

Having regard to the locality of this site, we would not expect that there would have been any meaningful growth since the data was collected and thus, the data presented above is considered to be representative of current traffic volumes.

² Bannockburn Transport Strategy prepared by Cardno 2019

3. Proposal

It is proposed to develop the site for the purposes of a residential subdivision comprising 172 lots ranging from 445m² to 6137m².

The subdivision also includes a drainage reserve at the eastern end of the site with an area of 9,513m².

Vehicular access is proposed to be provided to the site from Bruce Street and Ormond Street. A copy of the proposed subdivision plan prepared by TGM Group Pty Ltd and dated November 2021 is attached at Appendix A.

4. Traffic Engineering Assessment

4.1. Traffic Generation

The RTA Guide to Traffic Generating Developments (2002) (RTA Guide) sets out traffic generation rates for a range of developments, based on survey data collected in New South Wales, and is generally regarded as a standard for metropolitan development characteristics.

The RTA Guide sets out the following rates for dwelling houses, based on surveys conducted where new subdivisions are being built:

Standard Dwellings:

- *Daily Vehicle Trips = 9 per dwelling*
- *Weekday Peak Hour Vehicle Trips = 0.85 per dwelling*

Clause 12.3.1 of the Infrastructure Design Manual (IDM) specifies that estimated traffic volumes for undeveloped areas should normally be based upon at least 10 vehicle movements per day (vpd) per lot.

For the purpose of undertaking a conservative assessment of the traffic impacts, a rate of 10 vpd per lot has been adopted, i.e. the upper end of the range for larger units and townhouses.

The anticipated daily and peak hour traffic generation is calculated in Table 2 below.

Table 1: Traffic Generation Summary

Type	No.	Daily Traffic Generation		Peak Hour Traffic Generation	
		Rate	Volume	Rate	Volume
Standard Lots	172	10/dwelling	1,720 vpd	0.85/dwelling	146 vph

Table 2 indicates that the proposed subdivision is anticipated to generate in the order of 1,720 vehicle trips per day with 146 vehicle trips occurring during the road network peak hours, based on full build-out of the subdivision.

4.2. Traffic Distribution

Having regard to the site's locality in relation to key traffic generators (schools, shops, employment, and freeway access), the following traffic distribution assumptions have been adopted:

- 80% out and 20% in during the AM road network peak hour,
- 30% out and 70% in during the PM road network peak hour,
- 25% south via Harvey Road
- 75% north
 - 30% via Harvey Road
 - 70% via Bruce Street
 - 5% to the west via Bannockburn-Shelford Road,
 - 95% to the east via Bannockburn-Shelford Road

Figure 11 below shows the anticipated AM and PM peak hour turning movements generated by the site based on the preceding assumptions.

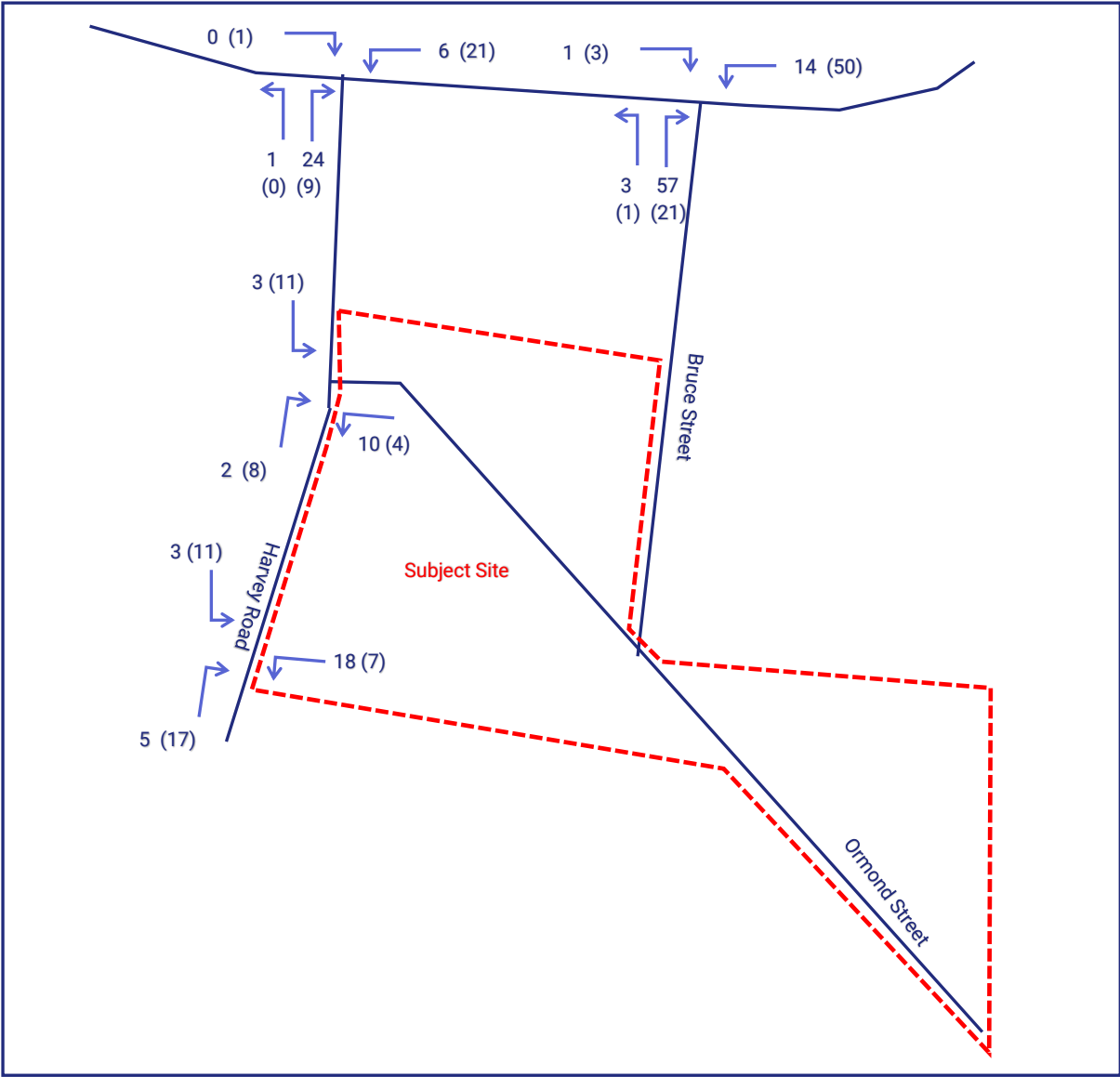


Figure 11: AM (PM) Peak Hour Site-Generated Traffic Movements

4.3. Traffic Impact

Having regard to the traffic distribution, it is evident that majority of movements at Bannockburn-Shelford Road are to/from the west (Bannockburn Town Centre). Bannockburn-Shelford Road is constructed with left-turn lanes at its intersections with both Harvey Road and Bruce Street and the additional traffic will be suitably accommodated.

Traffix Group has prepared SIDRA³ assessments for both intersections under existing conditions and post development conditions.

For unsignalised intersections, degrees of saturation (DOS) of less than 0.8 are considered to be good operating conditions.

Tables 2 and 3 below summarises the SIDRA output for the AM and PM road network peak hours. Full SIDRA output is attached at Appendix B.

Table 2: SIDRA Output – Bannockburn-Shelford Road/Bruce Street

Approach	Degree of Saturation		Average Delay		95 th Percentile Queue	
	Existing	Post Dev.	Existing	Post Dev.	Existing	Post Dev.
AM Peak						
Bruce Street (S)	0.148	0.275	10.9 sec	11.9 sec	3.9m	8.3m
Bannockburn-Shelford Road (E)	0.109	0.109	0.5 sec	5.8 sec	0.0m	0.0m
Bannockburn-Shelford Road (W)	0.152	0.153	0.0 sec	0.0 sec	0.1m	0.2m
PM Peak						
Bruce Street (S)	0.068	0.129	12.4 sec	13.2 sec	1.7m	3.2m
Bannockburn-Shelford Road (E)	0.205	0.205	0.8 sec	1.3 sec	0.0m	28.1m
Bannockburn-Shelford Road (W)	0.114	0.117	0.1 sec	0.3 sec	0.3m	0.6m

³ SIDRA is a computer software package used to analyse the capacity and function of intersections.

Table 3: SIDRA Output – Bannockburn-Shelford Road/Harvey Road

Approach	Degree of Saturation		Average Delay		95 th Percentile Queue	
	Existing	Post Dev.	Existing	Post Dev.	Existing	Post Dev.
AM Peak						
Harvey Road (S)	0.093	0.122	12.2 sec	12.3 sec	2.5m	3.3m
Bannockburn-Shelford Road (E)	0.090	0.090	1.0 sec	1.1 sec	0.0m	0.0m
Bannockburn-Shelford Road (W)	0.173	0.173	0.2 sec	0.2sec	0.7m	0.7m
PM Peak						
Harvey Road (S)	0.094	0.116	13.2 sec	13.5 sec	2.4m	3.0m
Bannockburn-Shelford Road (E)	0.178	0.178	0.8 sec	1.0 sec	0.0m	0.0m
Bannockburn-Shelford Road (W)	0.122	0.123	0.2 sec	0.3 sec	0.4m	0.5m

Tables 2 and 3 indicate that the unsignalised intersections currently operate well within acceptable limits with minimal queues and delays and will continue to do so under post-development conditions.

4.4. Traffic Management and Mitigating Works

The road layout within the subdivision has been designed to minimise long straight stretches where possible. Bruce Street and Ormond Street are likely to equally share the access demands to the proposed lots.

The intersection of Ormond Street/Bruce Street and the internal road creates a cross-intersection which needs to be controlled. A suitable treatment for this intersection is a roundabout in accordance with Austroads Guide to Traffic Engineering Management Part 8: Local Area Traffic Management.

Having regard to the relatively few number of movements expected at each of the site's access points to Harvey Road, we do not believe that it is necessary to provide any formal turning treatments. However, the introduction of residential allotments taking access from Harvey Road provides sufficient justification to reduce the speed limit on Harvey Road to 60km/h between Bannockburn-Shelford Road and the site's southern boundary.

No additional traffic management treatments are necessary within, or to facilitate the subdivision. Figure 15 shows the proposed traffic management plan.

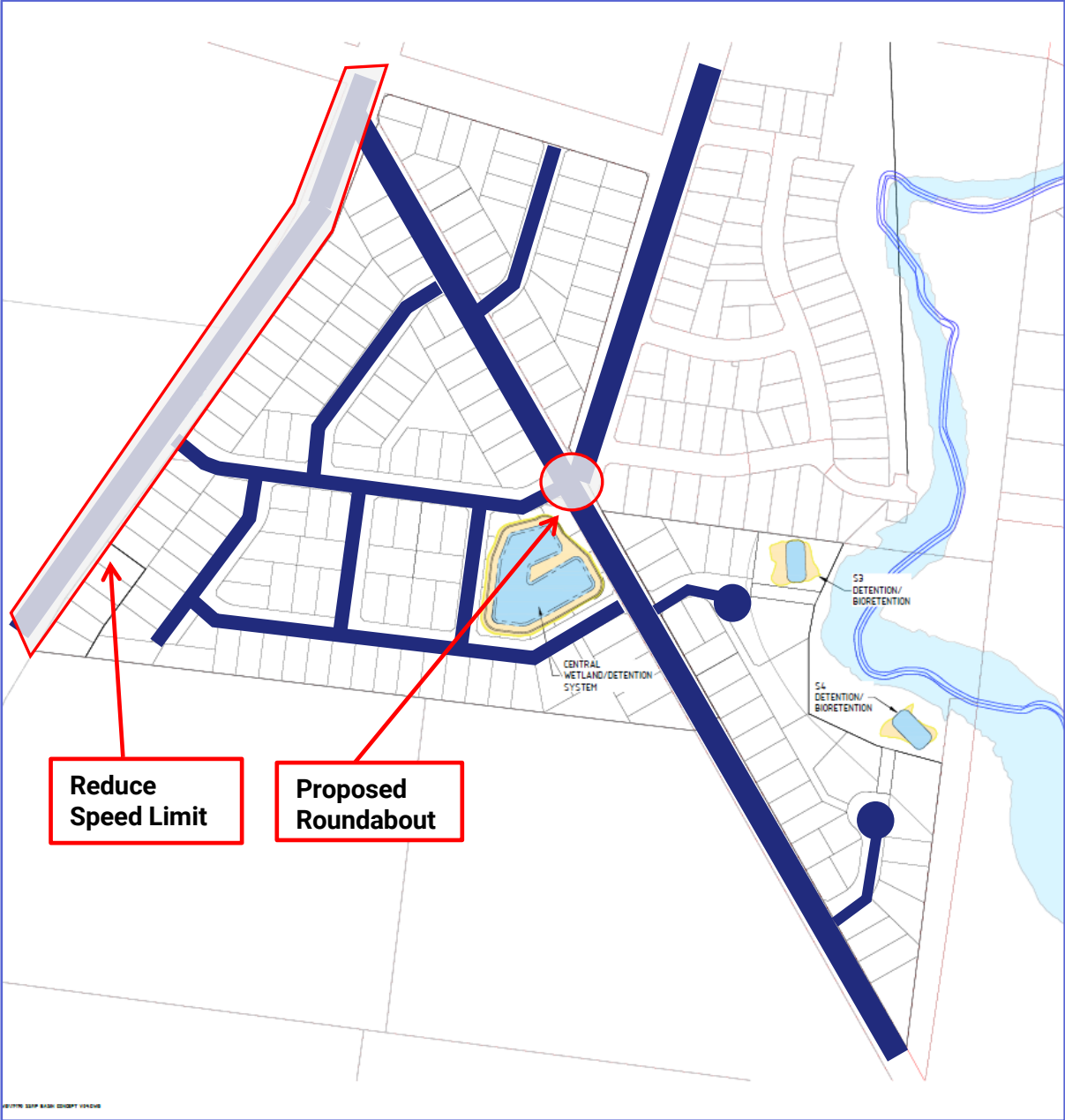


Figure 12: Traffic Management Plan

4.5. Cross-Sections and Road Hierarchy

Based on traffic generation rates detailed in Table 1 and taking into account the adopted traffic distribution assumptions, Table 4 below summarises the two-way daily traffic volumes on key roads.

Table 4: Daily Traffic Volumes

Road Name	Existing Traffic Volume	Site-Generated Traffic	Future Traffic Volume
Harvey Road	500 vpd*	410 vpd	910 vpd
Ormond Street	50 vpd*	365 vpd	415 vpd
Bruce Street	900 vpd*	880 vpd	1,700 vpd

Clause 12.3.2 of the Infrastructure Design Manual sets out the following indicative maximum traffic volumes for different street classifications:

- Access Place: 300vpd
- Access Street: 1,000 – 2,500vpd

It is significant to note that all of the new roads within the subdivision will be provided with a 16m cross-section consistent with an Access Street. The main east-west link will be provided with an 18m wide cross-section.

The existing roads (Ormond Street and Bruce Street) are to be constructed to Access Street Standard.

Under the provisions of the IDM:

- An Access Place is required to be constructed with a 6m carriageway within a 14m road reservation, with footpaths provided on both sides. Parking is permitted within the carriageway on one side only.
- An Access Street is required to be constructed with a 7.3m carriageway within a 16m reservation with footpaths provided on both sides. Parking is permitted within the carriageway on both sides.
- A Court Bowl is required to be constructed with a 10m radius pavement with a 28m reservation.

The IDM Access Street cross-section requirements are consistent with the Victorian Planning Authority (VPA) Guidelines, as shown in Figure 12 below.

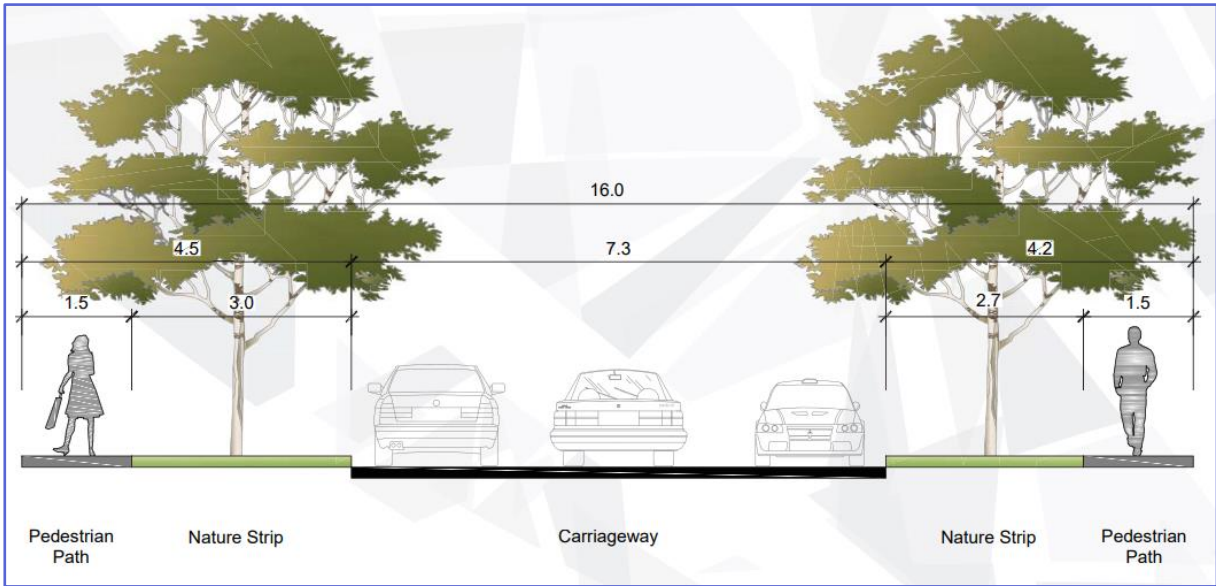


Figure 13: Access Street Cross-Section (VPA)

All of the proposed roads within the subdivision have a reservation of at least 16m. The court bowl has a 28m reservation.

The proposed road reservations meet or exceed the minimum requirements of Clause 56.06-8 of the Planning Scheme and the IDM.

Figure 14 below shows the proposed road hierarchy and road reservation widths within the subdivision.

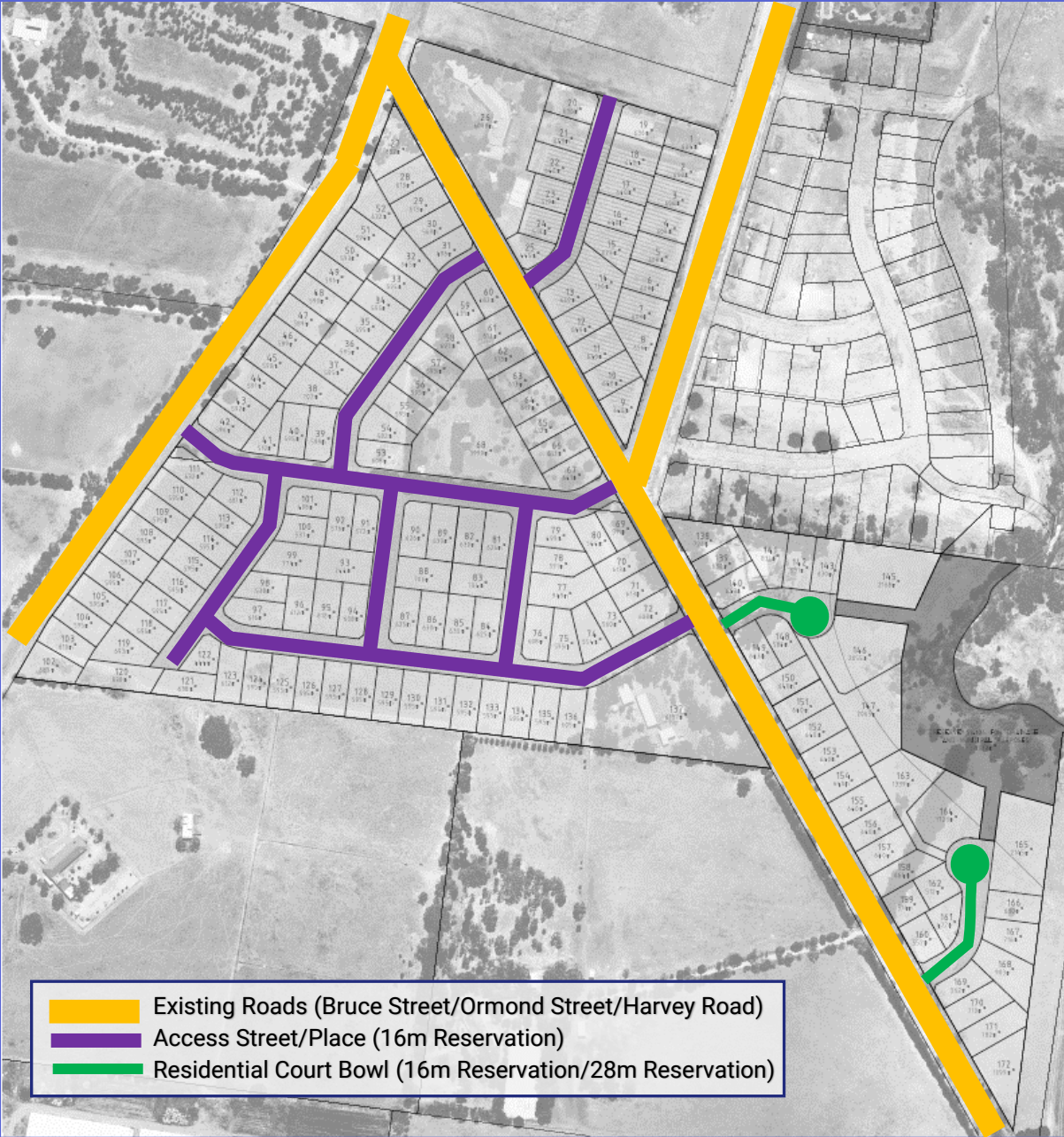


Figure 14: Road Hierarchy

4.6. Bicycle & Pedestrian Network

Footpaths will be provided on both sides of all residential streets within the subdivision.

All of the streets within the proposed subdivision will be low-volume local access streets, and separate formal bicycle path provision is therefore not required.

We are satisfied that the proposed pedestrian and cycle provision is in accordance with Clause 56.06-8 requirements and the IDM and will provide appropriate connectivity to the broader network.

4.7. Access for Service & Emergency Vehicles

The CFA 'Requirements for Water Supplies and Access for Subdivisions in Residential 1 and 2 and Township Zones' document (dated 9th October 2006) indicates the following in relation to access for fire trucks:

"The road width must allow room for safe passage of a fire truck with additional margins for human error and safe clearances. A 3.5 metre clearance is required horizontally and 4 metres vertically for access by a fire truck. A road at least 7.3 metres wide will allow for parking on both sides of the road and still enable access by a fire truck. A road 5.5 metres wide will allow parking on one side of the road only. Widths in between these may encourage parking on both sides of the road so that access by a fire truck is not possible."

All of the proposed access streets (including the two short dead-end access places) are proposed to have a carriageway width of 7.3m, which is sufficient to allow parking to occur on both sides, whilst maintaining access by a fire truck.

In relation to dead-ends, the CFA Guidelines state that ... *"constructed roads more than 60m in length from the nearest intersection must have a turning circle with a minimum radius of 8m (including roll-over kerbs if they are provided)"*.

Two short dead-end access places are proposed within the subdivision. Both are proposed to be provided with a formalised court-bowl turning treatment with a 28m diameter reservation. This accords with the IDM requirements, with Clause 12.3.2 of the IDM specifying a 10m radius pavement and a 28m reservation width and exceeds the CFA requirements.

Accordingly, we are satisfied that adequate provision is made for service and emergency vehicle access within the proposed subdivision.

CFA's Guidelines provide the following guidance on grades for emergency vehicle access:

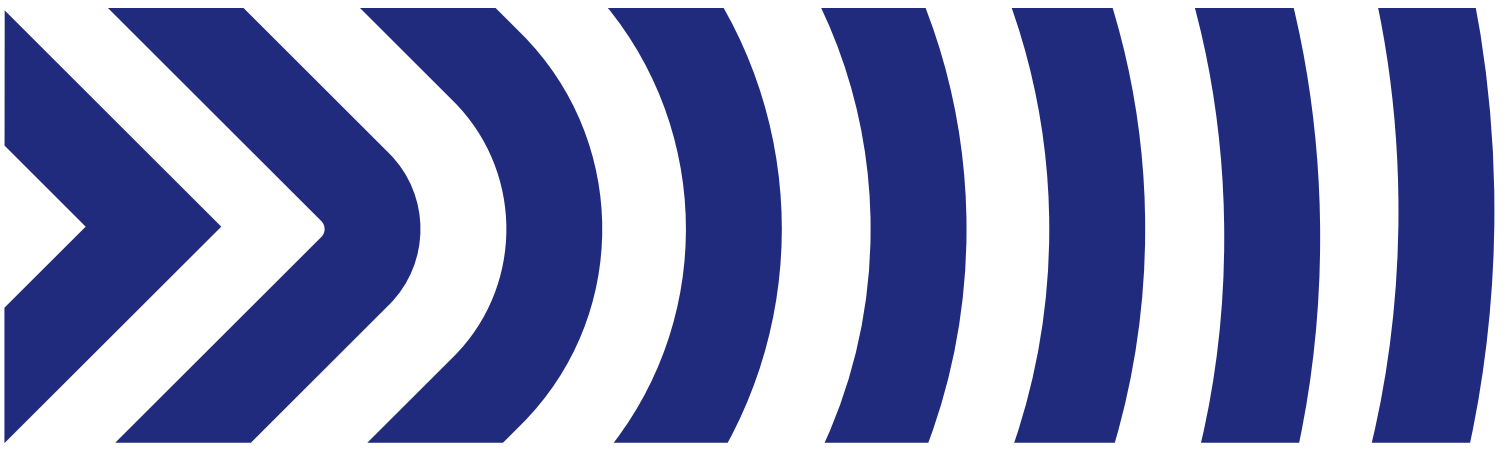
- *The average grade must be no more than one in seven (14.4%) (8.1 degrees) with a maximum of no more than one in five (20%) (11.3 degrees) for no more than 50 metres. Dips must have no more than a one in eight (12%) (7.1 degree) entry and exit angle.*

The site is relatively flat and all grades within the proposed roadways will easily comply with these requirements.

5. Conclusions

Having undertaken a detailed traffic engineering assessment of the proposed residential subdivision at 5, 20, 25 & 30 Ormond Street, Bannockburn, we are of the opinion that:

- a) the proposed residential subdivision provides appropriate connections to the surrounding road network,
- b) the likely traffic volume on each of the streets will be consistent with (or less than) the volumes suggested within the IDM for each given street,
- c) traffic generated by the proposed residential subdivision can easily be accommodated on the surrounding road network and intersections without any adverse impacts and no mitigating works are required,
- d) the road reservations exceed the statutory Clause 56.06-8 requirements and meet or exceed the IDM requirements,
- e) appropriate traffic management treatments will be provided at critical intersections,
- f) adequate provision is made within the subdivision for pedestrians and cyclists in accordance with the Planning Scheme and IDM requirements,
- g) the proposed road geometry will be sufficient for the passage of service and emergency vehicles, and
- h) there are no traffic engineering reasons why a permit should not be granted for the proposed residential subdivision at 5, 20, 25 & 30 Ormond Street, Bannockburn.



Appendix A

Development Plan

**OVERALL LAYOUT PLAN
ORMOND STREET
BANNOCKBURN, VIC 3331**

N.T.S
NOVEMBER 2021



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Email: victoria@cardno.com.au
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Appendix B

SIDRA Output

MOVEMENT SUMMARY

Site: 101v [Bannockburn-Shelford Road/Bruce Street - AM Peak Existing]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	4	0.0	0.148	6.4	LOS A	0.6	3.9	0.57	0.81	0.57	49.7
3	R2	72	0.0	0.148	11.1	LOS B	0.6	3.9	0.57	0.81	0.57	49.5
Approach		76	0.0	0.148	10.9	LOS B	0.6	3.9	0.57	0.81	0.57	49.5
East: Bannockburn-Shelford Road												
4	L2	18	0.0	0.010	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	206	5.0	0.109	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		224	4.6	0.109	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.4
West: Bannockburn-Shelford Road												
11	T1	360	5.0	0.152	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
12	R2	1	0.0	0.152	6.5	LOS A	0.0	0.1	0.00	0.00	0.00	57.7
Approach		361	5.0	0.152	0.0	NA	0.0	0.1	0.00	0.00	0.00	60.0
All Vehicles		661	4.3	0.152	1.4	NA	0.6	3.9	0.07	0.11	0.07	58.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101v [Bannockburn-Shelford Road/Bruce Street - AM Peak Post Dev]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	7	0.0	0.275	6.9	LOS A	1.2	8.3	0.61	0.85	0.68	49.1
3	R2	132	0.0	0.275	12.1	LOS B	1.2	8.3	0.61	0.85	0.68	48.9
Approach		139	0.0	0.275	11.9	LOS B	1.2	8.3	0.61	0.85	0.68	48.9
East: Bannockburn-Shelford Road												
4	L2	33	0.0	0.018	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	206	5.0	0.109	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		239	4.3	0.109	0.8	NA	0.0	0.0	0.00	0.08	0.00	59.0
West: Bannockburn-Shelford Road												
11	T1	360	5.0	0.153	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	59.9
12	R2	2	0.0	0.153	6.6	LOS A	0.0	0.2	0.01	0.00	0.01	57.7
Approach		362	5.0	0.153	0.0	NA	0.0	0.2	0.01	0.00	0.01	59.9
All Vehicles		740	3.8	0.275	2.5	NA	1.2	8.3	0.12	0.19	0.13	57.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [Bannockburn-Shelford Road/Bruce Street - PM Peak Existing]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	1	0.0	0.068	7.3	LOS A	0.2	1.7	0.63	0.83	0.63	48.7
3	R2	27	0.0	0.068	12.6	LOS B	0.2	1.7	0.63	0.83	0.63	48.5
Approach		28	0.0	0.068	12.4	LOS B	0.2	1.7	0.63	0.83	0.63	48.5
East: Bannockburn-Shelford Road												
4	L2	63	0.0	0.034	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	387	5.0	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		451	4.3	0.205	0.8	NA	0.0	0.0	0.00	0.08	0.00	59.0
West: Bannockburn-Shelford Road												
11	T1	264	5.0	0.114	0.1	LOS A	0.0	0.3	0.02	0.01	0.02	59.9
12	R2	3	0.0	0.114	7.9	LOS A	0.0	0.3	0.02	0.01	0.02	57.6
Approach		267	4.9	0.114	0.1	NA	0.0	0.3	0.02	0.01	0.02	59.8
All Vehicles		746	4.4	0.205	1.0	NA	0.2	1.7	0.03	0.08	0.03	58.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [Bannockburn-Shelford Road/Bruce Street - PM Peak Post Dev]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	2	0.0	0.129	7.4	LOS A	0.5	3.2	0.66	0.86	0.66	48.2
3	R2	49	0.0	0.129	13.4	LOS B	0.5	3.2	0.66	0.86	0.66	48.0
Approach		52	0.0	0.129	13.2	LOS B	0.5	3.2	0.66	0.86	0.66	48.0
East: Bannockburn-Shelford Road												
4	L2	116	0.0	0.062	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	387	5.0	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		503	3.8	0.205	1.3	NA	0.0	0.0	0.00	0.13	0.00	58.4
West: Bannockburn-Shelford Road												
11	T1	264	5.0	0.117	0.1	LOS A	0.1	0.6	0.04	0.01	0.04	59.7
12	R2	6	0.0	0.117	8.3	LOS A	0.1	0.6	0.05	0.02	0.05	57.4
Approach		271	4.9	0.117	0.3	NA	0.1	0.6	0.04	0.01	0.04	59.6
All Vehicles		825	3.9	0.205	1.7	NA	0.5	3.2	0.05	0.14	0.05	58.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: 101vv [Bannockburn-Shelford Road/Harvey Road - AM Peak Existing]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	4	1.0	0.093	8.7	LOS A	0.3	2.5	0.52	0.95	0.52	49.5
3	R2	48	1.0	0.093	12.5	LOS B	0.3	2.5	0.52	0.95	0.52	49.3
Approach		53	1.0	0.093	12.2	LOS B	0.3	2.5	0.52	0.95	0.52	49.3
East: Bannockburn-Shelford Road												
4	L2	36	1.0	0.019	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	171	5.0	0.090	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		206	4.3	0.090	1.0	NA	0.0	0.0	0.00	0.10	0.00	58.8
West: Bannockburn-Shelford Road												
11	T1	312	5.0	0.173	0.0	LOS A	0.1	0.7	0.03	0.02	0.03	59.7
12	R2	9	1.0	0.173	6.5	LOS A	0.1	0.7	0.03	0.02	0.03	57.4
Approach		321	4.9	0.173	0.2	NA	0.1	0.7	0.03	0.02	0.03	59.7
All Vehicles		580	4.3	0.173	1.6	NA	0.3	2.5	0.06	0.13	0.06	58.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: 101vv [Bannockburn-Shelford Road/Harvey Road - AM Peak Post Dev]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	5	1.0	0.122	8.8	LOS A	0.5	3.3	0.53	0.96	0.53	49.4
3	R2	63	1.0	0.122	12.6	LOS B	0.5	3.3	0.53	0.96	0.53	49.2
Approach		68	1.0	0.122	12.3	LOS B	0.5	3.3	0.53	0.96	0.53	49.3
East: Bannockburn-Shelford Road												
4	L2	42	1.0	0.023	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	171	5.0	0.090	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		213	4.2	0.090	1.1	NA	0.0	0.0	0.00	0.11	0.00	58.6
West: Bannockburn-Shelford Road												
11	T1	312	5.0	0.173	0.0	LOS A	0.1	0.7	0.03	0.02	0.03	59.7
12	R2	9	1.0	0.173	6.5	LOS A	0.1	0.7	0.03	0.02	0.03	57.4
Approach		321	4.9	0.173	0.2	NA	0.1	0.7	0.03	0.02	0.03	59.6
All Vehicles		602	4.2	0.173	1.9	NA	0.5	3.3	0.07	0.16	0.07	57.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: 101vv [Bannockburn-Shelford Road/Harvey Road - PM Peak Existing]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	4	1.0	0.094	9.6	LOS A	0.3	2.4	0.57	0.97	0.57	48.9
3	R2	43	1.0	0.094	13.5	LOS B	0.3	2.4	0.57	0.97	0.57	48.7
Approach		47	1.0	0.094	13.2	LOS B	0.3	2.4	0.57	0.97	0.57	48.8
East: Bannockburn-Shelford Road												
4	L2	52	1.0	0.028	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	336	5.0	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		387	4.5	0.178	0.8	NA	0.0	0.0	0.00	0.08	0.00	59.0
West: Bannockburn-Shelford Road												
11	T1	221	5.0	0.122	0.1	LOS A	0.0	0.4	0.02	0.01	0.02	59.8
12	R2	4	1.0	0.122	7.5	LOS A	0.0	0.4	0.02	0.01	0.02	57.5
Approach		225	4.9	0.122	0.2	NA	0.0	0.4	0.02	0.01	0.02	59.7
All Vehicles		660	4.4	0.178	1.5	NA	0.3	2.4	0.05	0.12	0.05	58.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 Site: 101vv [Bannockburn-Shelford Road/Harvey Road - PM Peak Post Dev]

Bannockburn-Shelford Road/Bruce Street
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	4	1.0	0.116	9.6	LOS A	0.4	3.0	0.59	0.99	0.59	48.8
3	R2	53	1.0	0.116	13.8	LOS B	0.4	3.0	0.59	0.99	0.59	48.6
Approach		57	1.0	0.116	13.5	LOS B	0.4	3.0	0.59	0.99	0.59	48.6
East: Bannockburn-Shelford Road												
4	L2	74	1.0	0.040	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	336	5.0	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		409	4.3	0.178	1.0	NA	0.0	0.0	0.00	0.10	0.00	58.7
West: Bannockburn-Shelford Road												
11	T1	221	5.0	0.123	0.1	LOS A	0.1	0.5	0.03	0.01	0.03	59.7
12	R2	5	1.0	0.123	7.7	LOS A	0.1	0.5	0.03	0.01	0.03	57.4
Approach		226	4.9	0.123	0.3	NA	0.1	0.5	0.03	0.01	0.03	59.7
All Vehicles		693	4.2	0.178	1.8	NA	0.4	3.0	0.06	0.15	0.06	58.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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