INTEGRATED TRANSPORT ASSESSMENT

EAST OF ABERLINE PRECINCT STRUCTURE PLAN

VICTORIAN PLANNING AUTHORITY

15 SEPTEMBER 2025

East of Aberline Precinct Structure Plan

CLIENT: Victorian Planning Authority

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26720 ITAR EoA PSP_FINAL	15/9/2025	Final	Chirag Safi Luis Rodriguez	Chirag Safi

GLOSSARY OF TERMS

TERM / ACRONYM	DEFINITION
DCP	Development Contributions Plan
DTP	Department of Transport and Planning
EAC	Eastern Activity Centre
EoA	East of Aberline
FZ	Farming Zone
GRZ1	General Residential Zone
IDM	Infrastructure Design Manual
ITA	Integrated Transport Assessment
NAC	Neighbourhood Activity Centre
PSP	Precinct Structure Plan
PUZ1	Public Use Zone – Service and Utility
SCC	Strategic Cycling Corridor
SCATS	Sydney Coordinated Adaptive Traffic System
TMP	Traffic Management Plan
TfNSW	Transport for New South Wales
VISTA	Victorian Integrated Survey of Travel and Activity
VPA	Victorian Planning Authority
DoS	Degree of Saturation

1 INTRODUCTION

O'Brien Traffic has been engaged by the Victorian Planning Authority (VPA) to undertake an Integrated Transport Assessment (ITA) of the East of Aberline Precinct Structure Plan (EoA PSP).

The ITA provides recommendations regarding upgrades required for the transport network as part of future urban subdivisions and developments within the PSP. The recommended upgrades will inform the preparation of the Development Contribution Plan (DCP) and/or alternative delivery models by the responsible road authorities.

2 REVIEWED DOCUMENTS

In the course of preparing this report, the following documents have been reviewed:

- Warrnambool Long Term Growth Corridor Precinct Structure Plan, report *G22938R-01A*, prepared by Traffix Group, dated January 2018;
- Warrnambool Municipal Road Hierarchy Review and Traffic Management Plan, report *16M1943000* (Issue B), prepared by GTA Consultants, dated 10 March 2017;
- Horne Road Industrial Subdivision 80 Rodgers Road, Warrnambool Traffic Management Report, report *09257* (Revision A), prepared by Brian Consulting Pty Ltd, dated 23 August 2013;
- Proposed Residential Subdivision Aberline Road, Warrnambool, report *13438*, prepared by O'Brien Traffic, dated May 2012;
- Infrastructure Design Manual, Version 5.40, prepared Local Government Infrastructure Design Association, dated 1 September 2022; and
- Guide to Transport Impact Assessment Technical Guidance for Transport Practitioners, TS 00085 (Version 1.1), prepared by Strategic Transport Planning Branch, Transport for NSW (TfNSW), dated 4 November 2024.

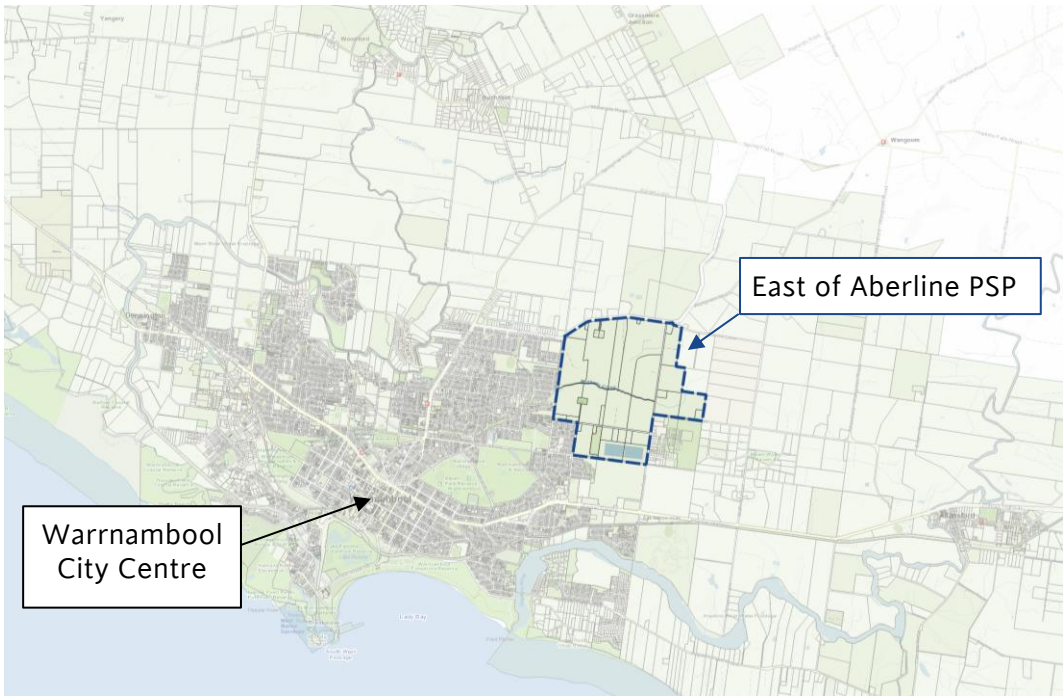
3 SITE CONTEXT

3.1 SUBJECT LAND

The EoA PSP is located approximately 4km northeast of the Warrnambool City Centre. It comprises an area of roughly 416 hectares. It is bounded by:

- Wangoom Road and Dixons Lane to the north;
- Boiling Down Road, Dales Road, and Rodgers Road to the south;
- Aberline Road and Gateway Road to the West; and
- Horne Road, 50 and 80 Dixons Lane, 213 Staffords Road, and 101 Rodgers Road to the east.

The location of the PSP and the surrounding area is shown in **Figure 1.** A recent aerial photograph is shown in **Figure 2**.



MAP SOURCE: VICPLAN

FIGURE 1: LOCATION OF EOA PSP

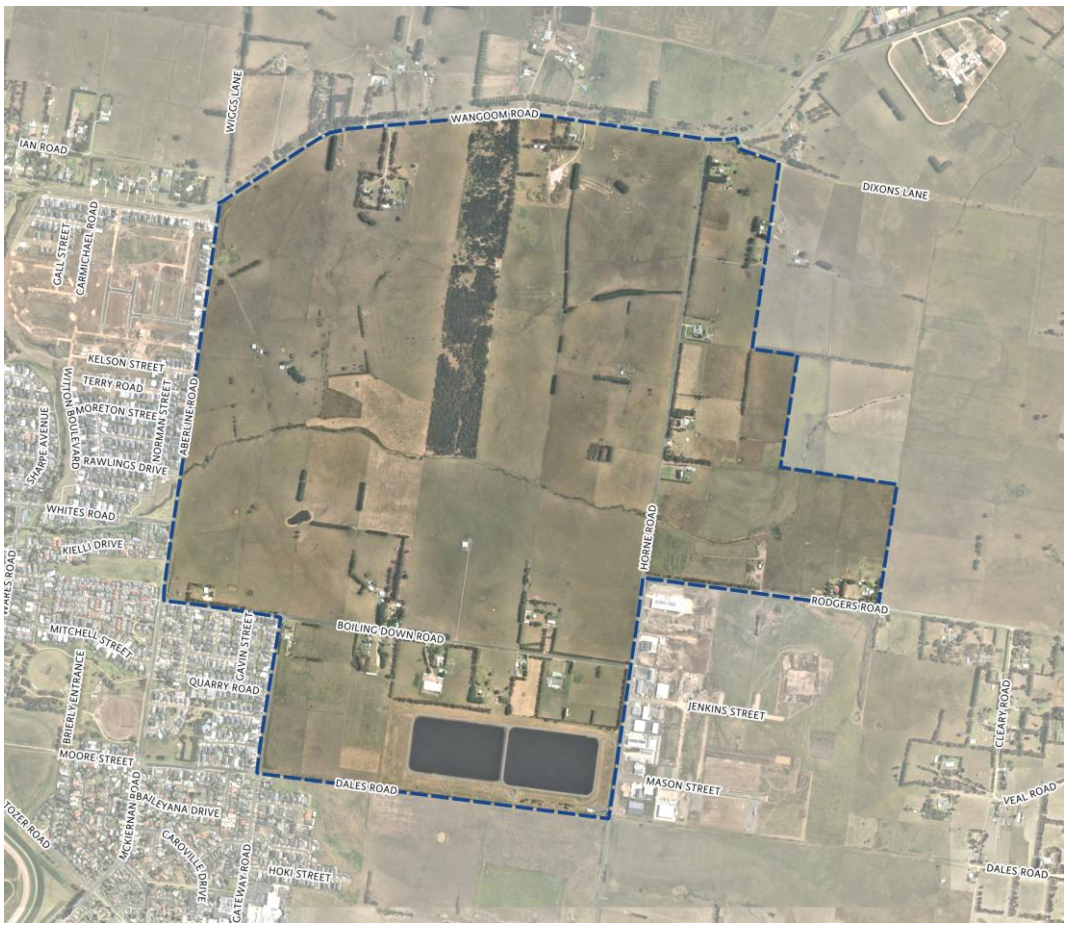


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FIGURE 2: AERIAL PHOTO OF EOA PSP

The land where the PSP is located, i.e. the subject land, is zoned *Farming Zone* (FZ) and *Public Use Zone – Service and Utility* (PUZ1) under the Warrnambool Planning Scheme.

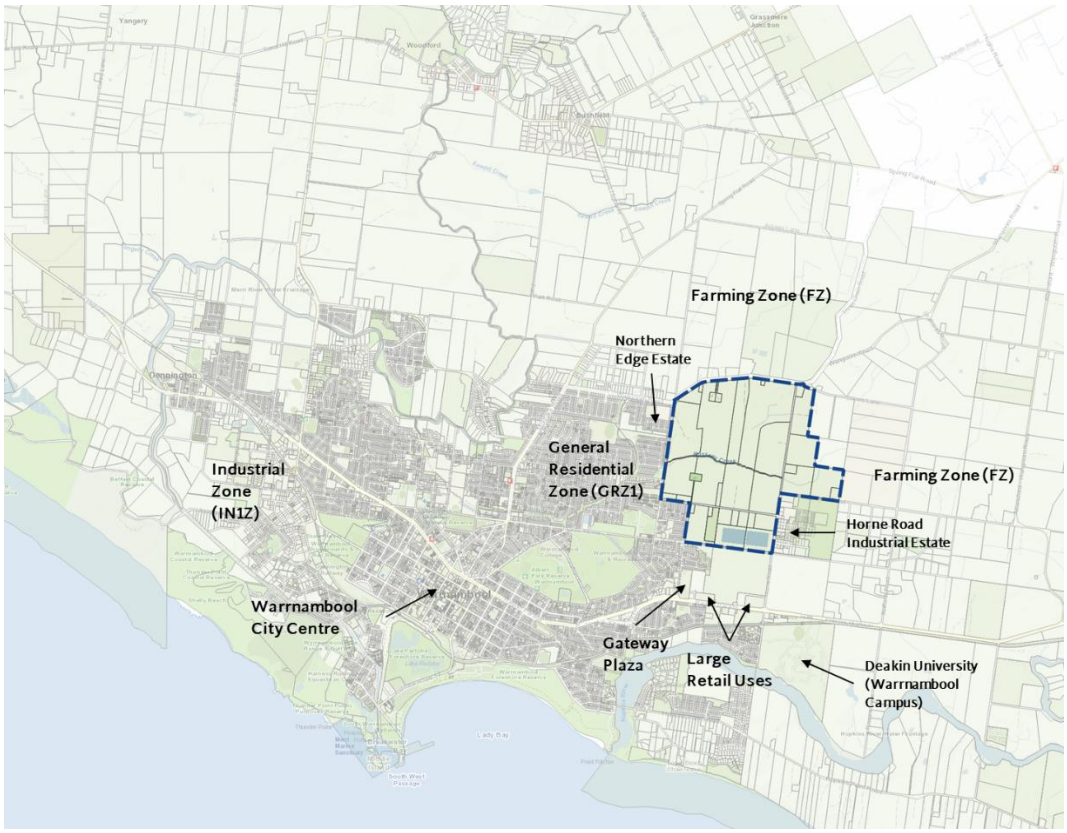
There are multiple single detached dwellings on the subject land, accessed via Wangoom Road, Boiling Down Road, and Horne Road. Russells Creek runs east to west, bisecting the subject land. Bridge crossings over Russells Creek are currently provided at Aberline Road and Horne Road. Tozer Reserve is located within the subject land comprising part of the land between Aberline Road and Horne Road, bounded by Wangoom Road to the north and Russells Creek to the south. The Wannon water storage ponds are located at the southeast corner of the PSP.

3.2 SURROUNDING LAND USES

Land to the west is residential, characterised by detached dwellings. A partially developed residential subdivision (Northern Edge Estate) is located at the southwest corner of the Wangoom Road / Aberline Road intersection. The partially developed Horne Road Industrial Precinct is located east of the subject land.

Land to the north and east is a zoned Farming Zone (FZ), utilised primarily for agriculture. There are no urban developments to the east. Land, approximately 400m to the south, is commercial with retail land uses. Gateway Plaza is located at the northeast corner of the Princes Highway / Raglan Parade / Gateway Road intersection and other shopping centres are located along both sides of Raglan Parade. Major retailers in this area include Bunnings Warehouse, Aldi, Kmart, Dan Murphy's, Woolworths, Coles, and McDonald's. The Deakin University Warrnambool Campus is located approximately 1.4km southeast. Warrnambool City Centre is located approximately 2km southwest of the PSP land.

A map of the surrounding land uses is shown in **Figure 3**.



MAP SOURCE: VICPLAN

FIGURE 3: SURROUNDING LAND USES

4 EXISTING TRANSPORT NETWORK

4.1 ROAD NETWORK

The characteristics of key roads adjacent to the PSP area are summarised in **Table 1**. All roads listed are understood to be managed by Council.

TABLE 1: ROAD NETWORK AND CHARACTERISTICS

ROAD NAME	BETWEEN	CLASSIFICATION / HIERARCHY	ALIGNMENT	CROSS-SECTION	SEALED CARRIAGEWAY WIDTH	FOOTPATH PROVISION	BICYCLE FACILITIES	CAR PARKING	SPEED LIMIT
Aberline Road	Wangoom Road to Rawlings Drive	Collector	North to south	Two-way / two lane	8.8m	West	None	West side	60 km/h
Aberline Road	Rawlings Drive to Boiling Down Road	Collector	North to south	Two-way / two lane	8.8m	West	None	None	60 km/h
Wangoom Road	Aberline Road to Horne Road	Link	East to west	Two-way / two lane	9.0-10.0m	None	Partial provision of on-road bicycle lanes	None	80 km/h
Horne Road	Wangoom Road to Rodgers Road	Local Access	North to south	Two-way / two lane	7.0m	None	None	None	80 km/h
Horne Road	Rodgers Road to Dales Road	Local Access	North to south	Two-way / two lane with median	12.0m	East	Bicycle lane on east side	Indented car parking on east side	80 km/h
Boiling Down Road	Aberline Road to Gateway Road	Local Access	East to West	Two-way / two lane	12.5m	South	None	Indented parking on south side	60 km/h
Boiling Down Road	Gateway to Horne Road	Local Access	East to west	Two-way / two lane	8.6m	None	None	None	60 km/h
Gateway Road	Boiling Down Road to Dales Road	Local Access	North to south	Two-way / two lane	12.5m	West	None	Kerbside both sides	50 km/h

ROAD NAME	BETWEEN	CLASSIFICATION / HIERARCHY	ALIGNMENT	CROSS-SECTION	SEALED CARRIAGEWAY WIDTH	FOOTPATH PROVISION	BICYCLE FACILITIES	CAR PARKING	SPEED LIMIT
Rodgers Road	East of Horne Road	Local Access	East to West	Two-way not line marked	4.9m	None	None	None	Default rural 100 km/h
Dixons Lane	East of Wangoom Road	Local Access	East to West	Two-way not line marked partially sealed	3.0m	None	None	None	Default rural 100 km/h

4.2 INTERSECTIONS

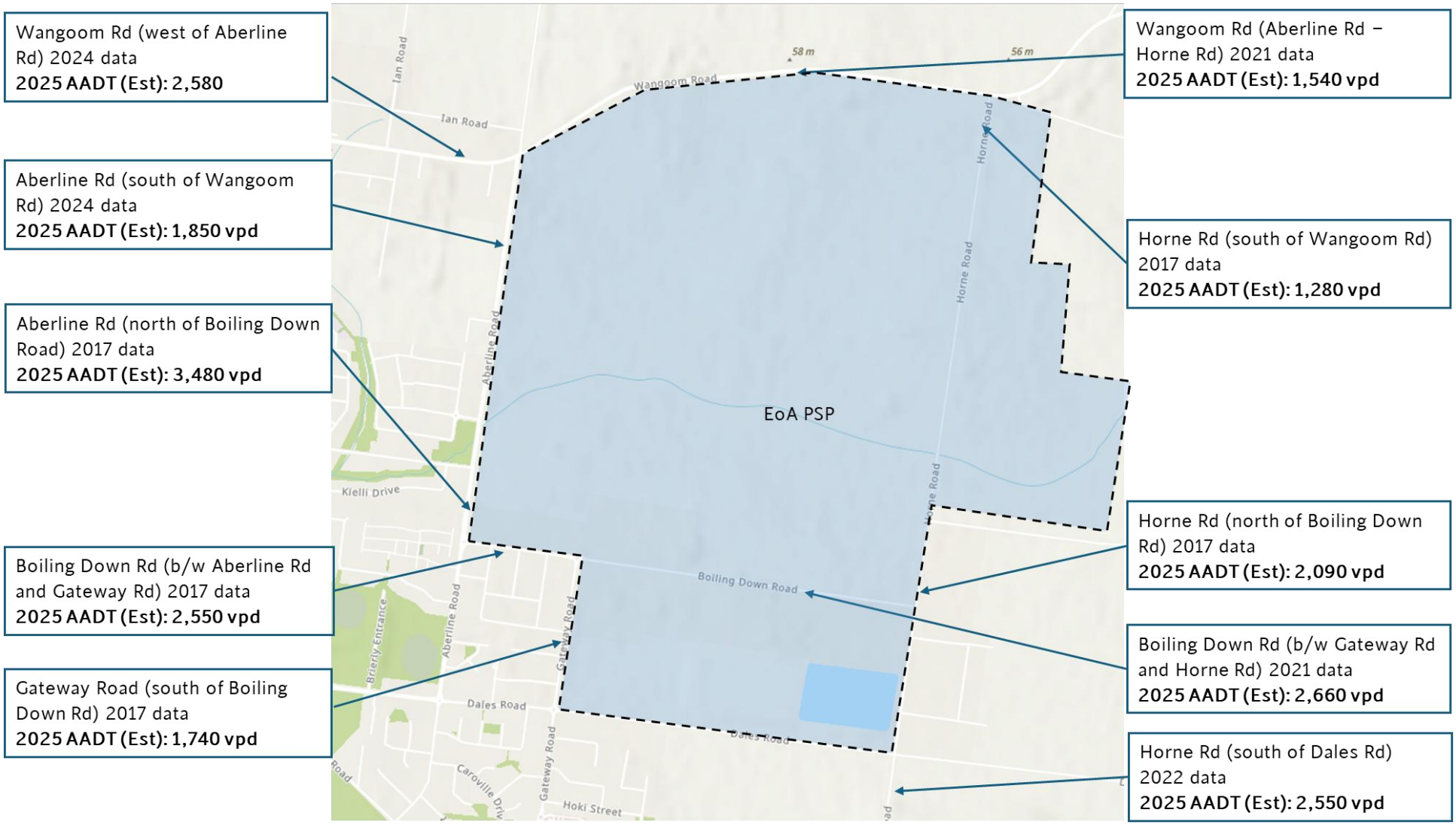
Key intersections adjacent to the PSP area and their key features are summarised in Table 2.

TABLE 2: KEY INTERSECTIONS

INTERSECTION	TYPE	NOTABLE FEATURES
Wangoom Road / Aberline Road	Unsignalised T-intersection	Channelised right turn lane on Wangoom Road
Wangoom Road / Horne Road	Unsignalised T-intersection	Channelised right and left turn lanes on Wangoom Road
Aberline Road / Whites Road	Unsignalised T-intersection	No channelised turn lane treatments
Aberline Road / Boiling Down Road	Roundabout	Single lane approaches
Horne Road / Boiling Down Road	Unsignalised T-intersection	Channelised right and left turn lanes on Horne Road
Horne Road / Rodgers Road	Unsignalised T-intersection	Channelised right-turn lane on Horne Road
Dales Road / Gateway Road	Roundabout	Single lane approaches and east leg not constructed

4.3 TRAFFIC VOLUME DATA

Warrnambool City Council provided historical traffic volume data for the area adjacent to the PSP. These traffic counts were commissioned in 2017, 2021, and 2024. A growth rate of 2% per annum has been applied to any data older than 2024 to estimate 2025 volumes. This growth rate would reasonably capture traffic generated by recent residential developments in Warrnambool, including subdivision west of Aberline Road and the Horne Road Industrial Precinct. This estimated weekday daily data has been adopted in the transport assessment, and it is summarised in Figure 4.



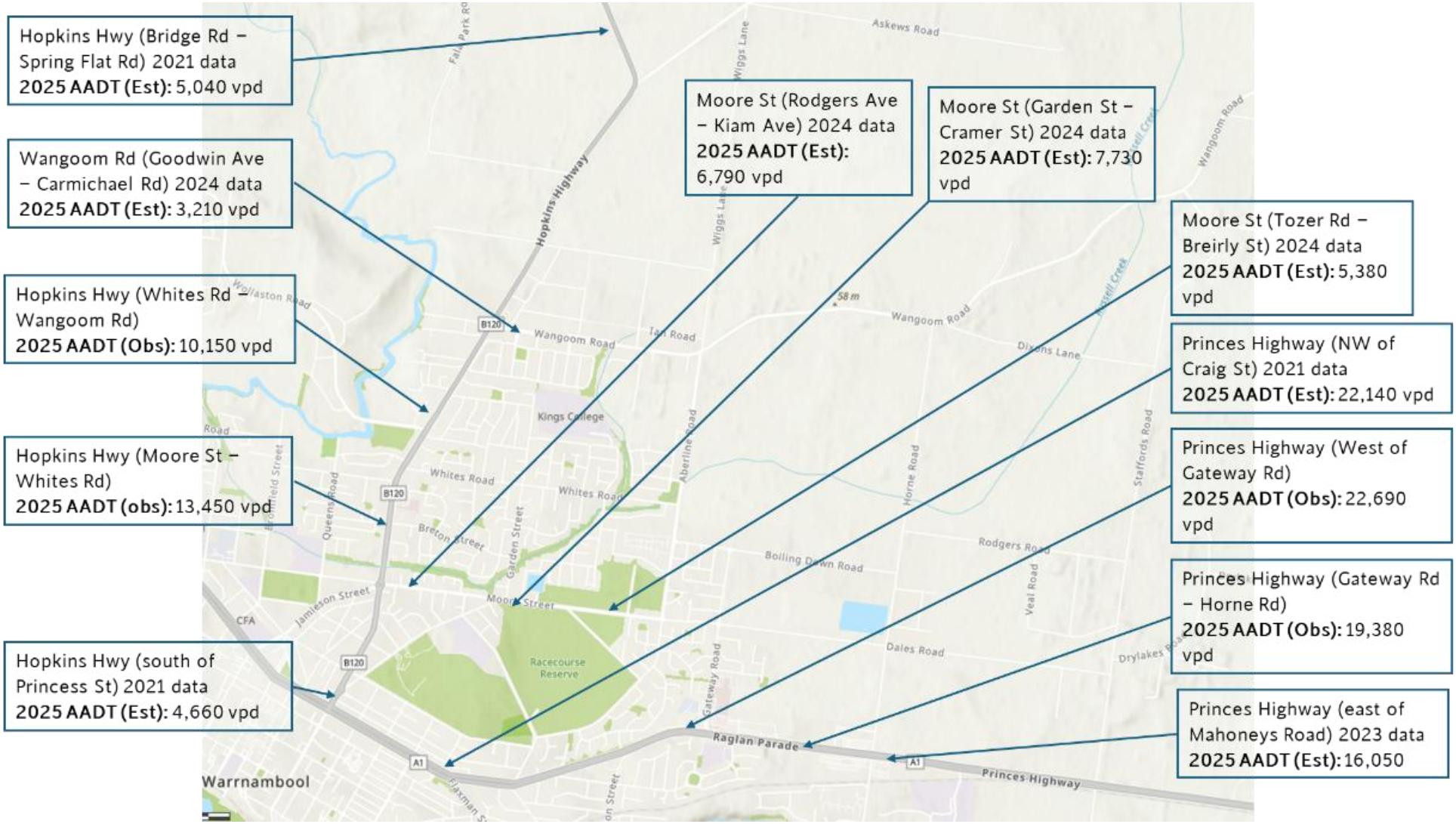
MAP SOURCE: NEARMAP

FIGURE 4: ESTIMATED EXISTING WEEKDAY DAILY TRAFFIC VOLUMES ADJACENT TO THE PSP AREA

Council and DTP provided 2021-2024 traffic counts on the wider road network to inform traffic distribution and assess declared arterial roads, such as the Princes Highway and Hopkins Highway/Mortlake Road. This data was supplemented by SCATS loop counts at signalised intersections to complete a profile of daily traffic along Mortlake Road and Princes Highway.

Any counts older than 2024 were factored up to 2025 using a growth rate of 2% per annum to reasonably account for the development growth in Warrnambool. The 2024 count data was adjusted based on an annual growth rate of 1% per annum to account for the passage of less than one year.

The estimated weekday daily traffic volumes in the wider road network used for this transport assessment are shown in **Figure 5**.



MAP SOURCE: VICPLAN

FIGURE 5: ESTIMATED EXISTING WEEKDAY DAILY TRAFFIC VOLUMES SURROUNDING THE PSP AREA

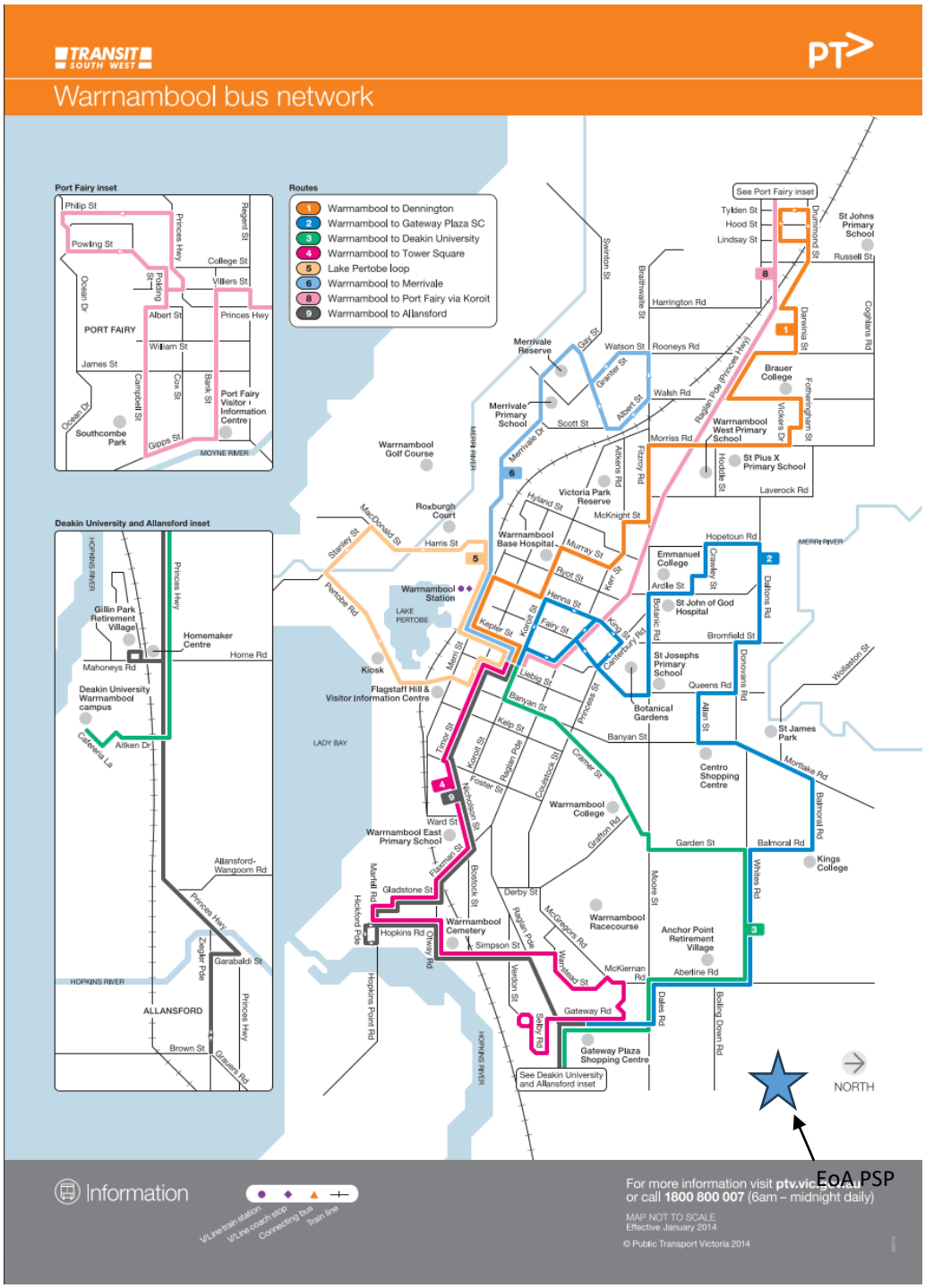
It is noted that the above traffic volume estimates represent average weekday daily traffic conditions, which is the standard basis for transport assessments of this nature. While some fluctuations in traffic volumes are expected across different days, weeks, and seasons, the use of average weekday conditions provides a reasonable and widely accepted measure for assessing long-term road network performance.

4.4 PUBLIC TRANSPORT

Existing public transport services are available adjacent to the PSP area.

The existing bus network in Warrnambool is provided in **Figure 6**. The following bus routes operate in the surrounding area:

- Bus route 2 operating between Warrnambool and Gateway Shopping Centre, and the nearest stop is located along Whites Road just west of Aberline Road; and
- Bus route 3 operating between Warrnambool and Deakin University, and the nearest stop is located along Whites Road just west of Aberline Road.



SOURCE: TRANSPORT FOR VICTORA WEBSITE

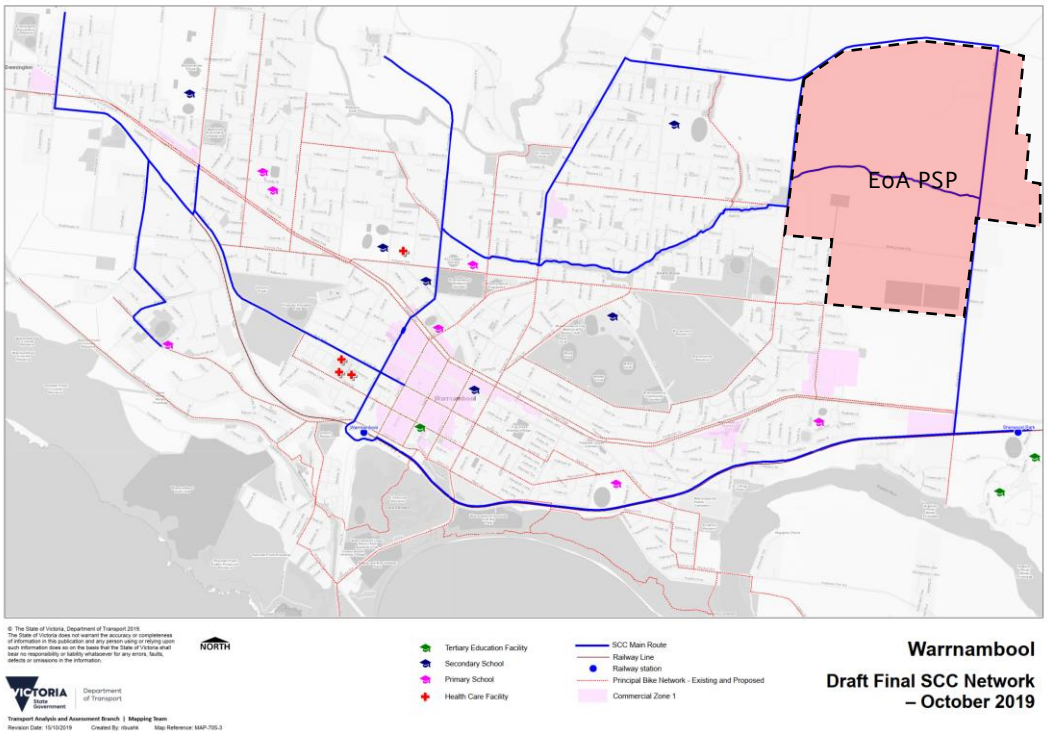
FIGURE 6: EXISTING PUBLIC TRANSPORT NETWORK

4.5 BICYCLE FACILITIES

The EoA PSP is largely surrounded by vacant sites with limited cycling infrastructure. Wangoom Road and Horne Road accommodate on-road cycling within the road shoulders.

Potential cycling corridors are identified in the Draft Strategic Cycling Corridor (SCC) Network, prepared by the Department of Transport and Planning (DTP) for Warrnambool City Council. SCC routes comprise Wangoom Road, Aberline Road and Horne Road along the EoA PSP's boundary and within the EoA PSP along Russells

Creek. A map of the SSC network is provided in **Figure 7**.

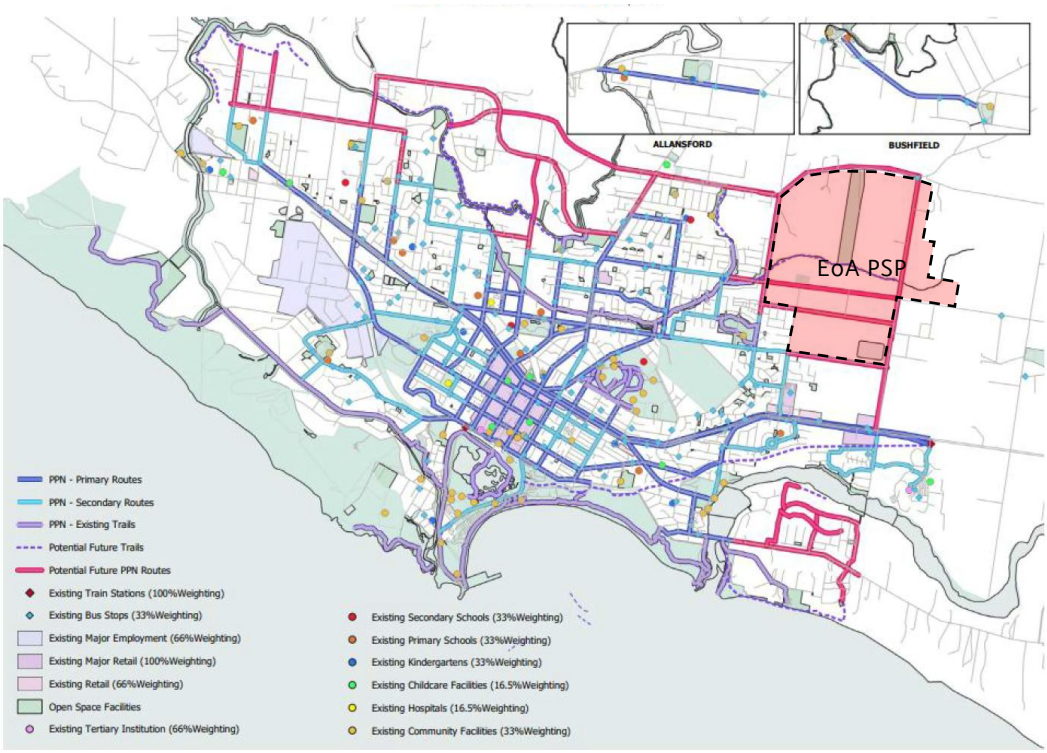


SOURCE: TRANSPORT FOR VICTORIA WEBSITE

FIGURE 7: DRAFT SCC ROUTES

4.6 PRINCIPAL PEDESTRIAN NETWORK

A draft Principal Pedestrian Network (PPN) prepared by Warrnambool City Council is provided in **Figure 8**. This plan informs the potential future pedestrian connectivity within the EoA PSP. Potential future PPN routes identified within the PSP comprise Aberline Road, Wangoom Road, Boiling Down Road, and Dales Road. Russells Creek has been identified as a potential future trail.

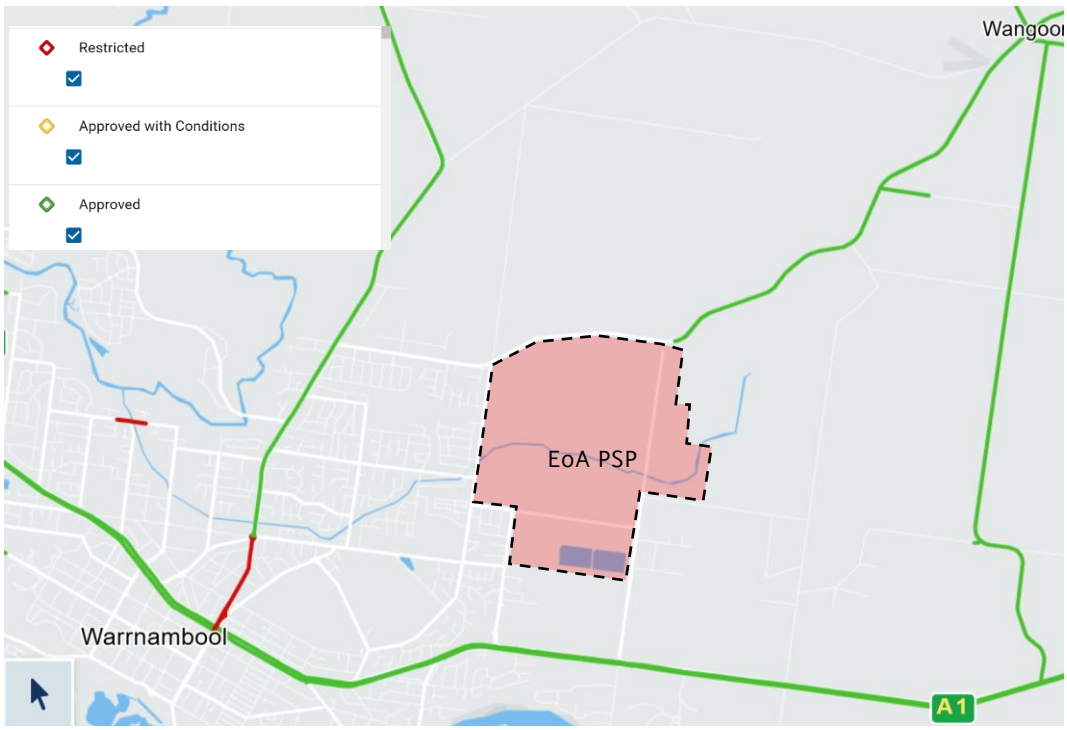


SOURCE: WARRNAMBOOL CITY COUNCIL

FIGURE 8: DRAFT PRINCIPAL PEDESTRIAN NETWORK

4.7 FREIGHT NETWORK

The gazetted arterial and municipal roads for Class 2 B-Doubles and Class 3 B-doubles vehicles are provided in **Figure 9**.



SOURCE: NHVR WEBSITE

FIGURE 9: GAZETTED B-DOUBLE NETWORK

In addition, some local roads have been approved for B-double and higher mass limit trucks. The local roads that have been approved by DTP adjacent to the PSP area are:

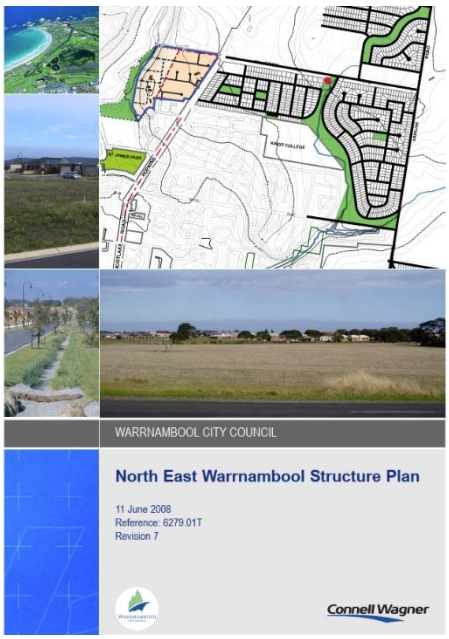
- Wangoom Road and Horne Road – Gazetted/permit freight route
- Boiling Down Road – Load limit freight route

5 BACKGROUND DOCUMENT REVIEW

A review of relevant local plans, strategies and documents has been undertaken to inform this transport assessment.

North East Warrnambool Structure Plan

North East Warrnambool Structure Plan is located just west of the EoA PSP area.



This Structure Plan, dated 11 June 2008, provides for in the order of 1,500 – 1,600 residential lots west of Aberline Road, the majority of which have already been constructed. The total anticipated traffic increase was forecast to be 16,000 vehicle movements per day.

This plan identified that Mortlake Road provides a crucial north-south link along the western boundary of the plan area, which will be heavily utilised to access the land. Increased traffic needs to be considered in the future planning of Mortlake Road.

Additionally, the plan identified Whites Road as another critical east-west link, which is expected to experience increased traffic, particularly as it connects to Mortlake Road.

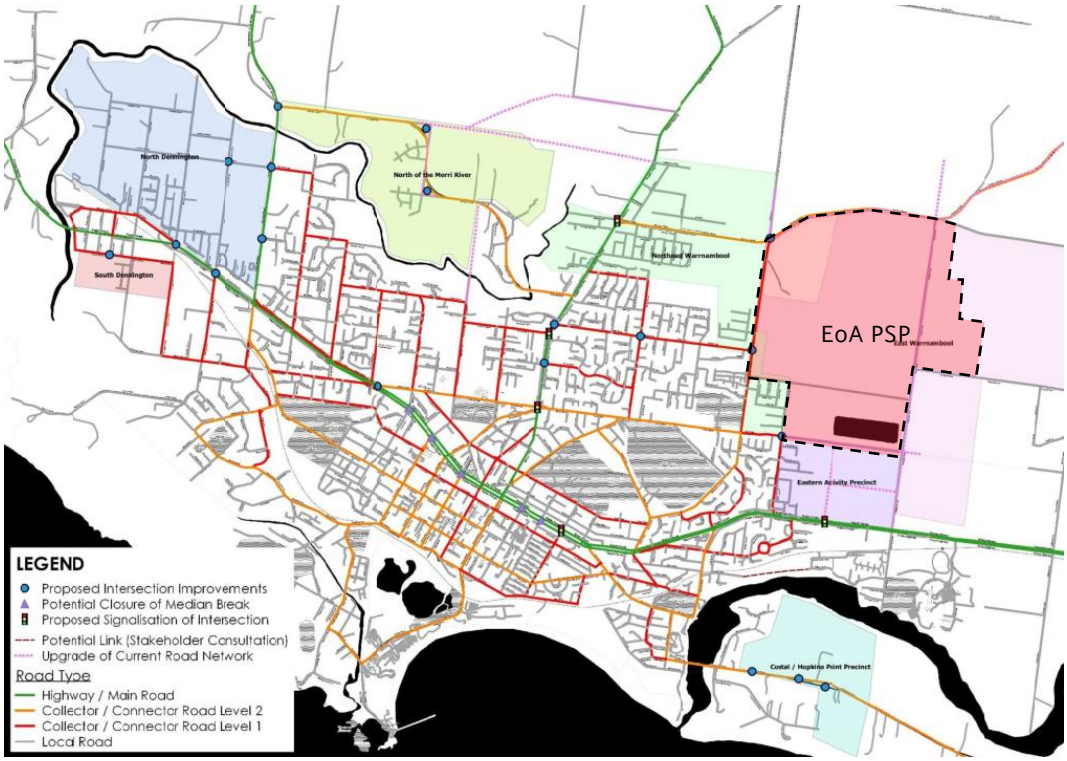
To address transport connectivity issues, Wangoom Road and Abeline Road have been upgraded primarily to support increased vehicle movements in the northeast of Warrnambool. This plan also identified that Wangoom Road serves as part of a ring road, connecting to the Princes Highway via Horne Road.

Warrnambool Municipal Road Hierarchy Review and Traffic Management

Warrnambool City Council commissioned GTA Consultant (now, Stantec) to update and refresh the 2011 Road Hierarchy Review and Traffic Management Plan (TMP) to cope with the forecast growth and identify road network upgrades and improved sustainable transport facilities and pedestrian amenity.

Stantec's report, dated 13 March 2017, proposed a road network hierarchy to support the future land use yields in various structure plans, development plans, and recent development applications. The growth assumptions included surrounding developments, such as Eastern Activity Centre (EAC), which comprises a mix of residential, retail, and commercial uses, North East Warrnambool (residential), and East Warrnambool (a mix of residential, commercial and industrial). Part of the East Warrnambool growth area is included in the EoA PSP.

The proposed future road hierarchy in Warrnambool in this Study is shown in **Figure 10**.



SOURCE: 2011 ROAD HIERARCHY REVIEW AND TRAFFIC MANAGEMENT PLAN

FIGURE 10: FUTURE ROAD HIERARCHY MAP

The proposed road hierarchies adjacent to the EoA PSP include:

- Wangoom Road: Collector Road Level 2
- Aberline Road: Collector Road Level 1
- Gateway Road: Local Road
- Boiling Down Road: Local Road
- Horne Road: Arterial Road (single lane each direction north of Dales Road)

This study also identified Wangoom Road and Horne Road as inner alternate truck link.

Warrnambool Eastern Activity Centre

The Warrnambool Eastern Activity Centre (EAC) Structure Plan, amended in 2020, interfaces with the southern boundary of the EoA PSP. This plan addresses key transport challenges and proposes recommendations to support sustainable growth and improved connectivity. The EAC Structure Plan is shown in **Figure 11** and its Movement Network Plan in **Figure 12**.

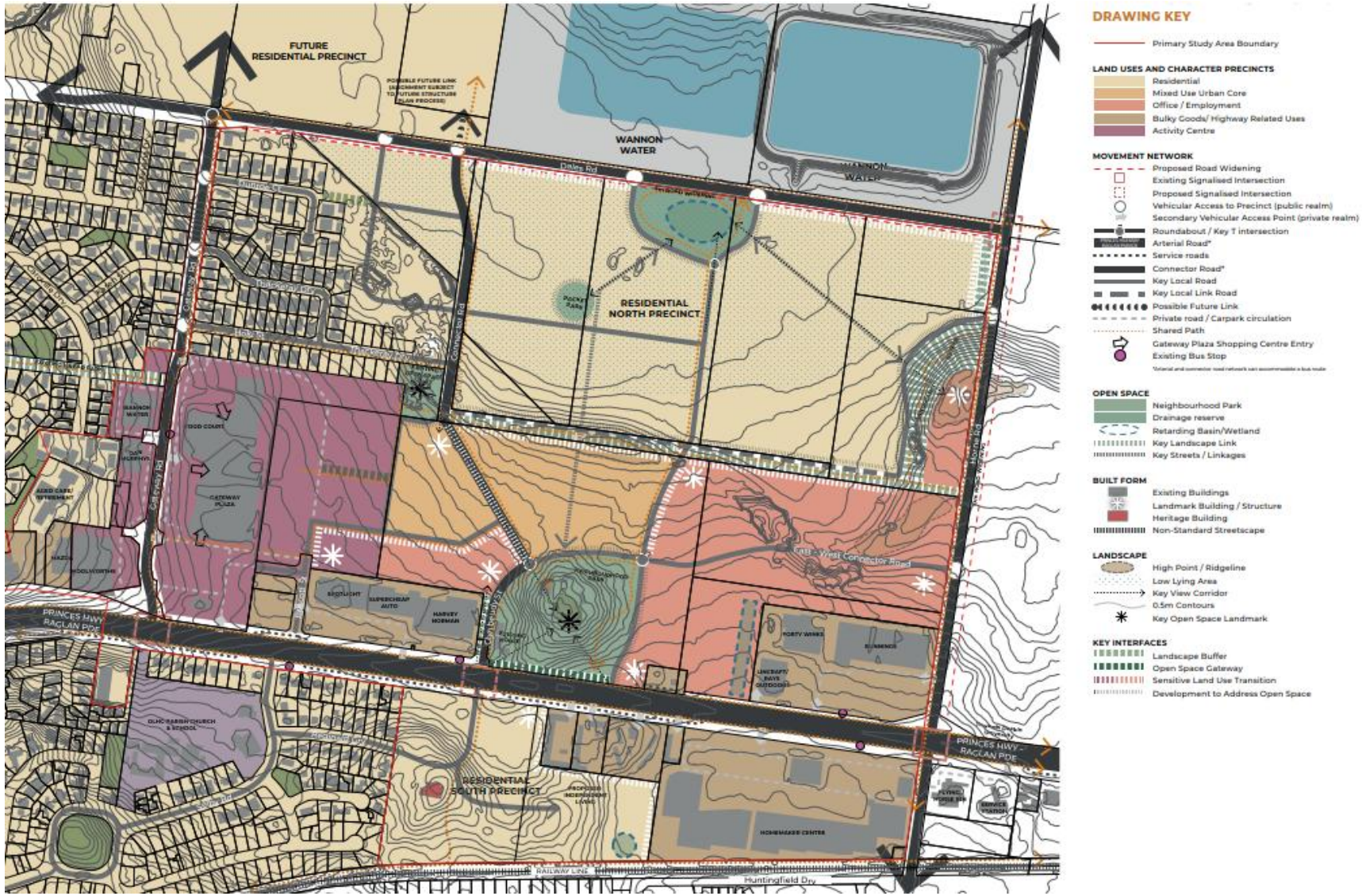


FIGURE 11: EAC STRUCTURE PLAN

FIGURE 12: EAC MOVEMENT NETWORK PLAN

Key features of the movement network plan, for the context of the EoA PSP, include:

- Dales Road (RD01) is to be constructed from Gateway Road to Horne Road as a connector street, capable of supporting bus and active transport movements.
  - Land required for the ultimate road reserve of Dales Road is to be set aside on the EAC side.
  - A shared path (2.5m wide) is proposed to be provided on the north side of Dales Road (i.e. on the EoA PSP side).
  - Direct property access will be permitted via Dales Road.
  - Delivery of Dales Road and its intersection with Horne Road have been identified as part of the EAC Structure Plan via a shared funding scheme.
- The Dales Road and Horne Road intersection (IN02) is to be upgraded to a four-way signalised intersection.
- A north-south connector street is to be provided east of Gateway Road, allowing connection from Dales Road to the Princes Highway.
  - There may be an opportunity to extend this street further north through to the PSP area.

6 EOA PSP OVERVIEW

A draft Place-Based Plan for the EoA PSP, prepared by the VPA, is shown in

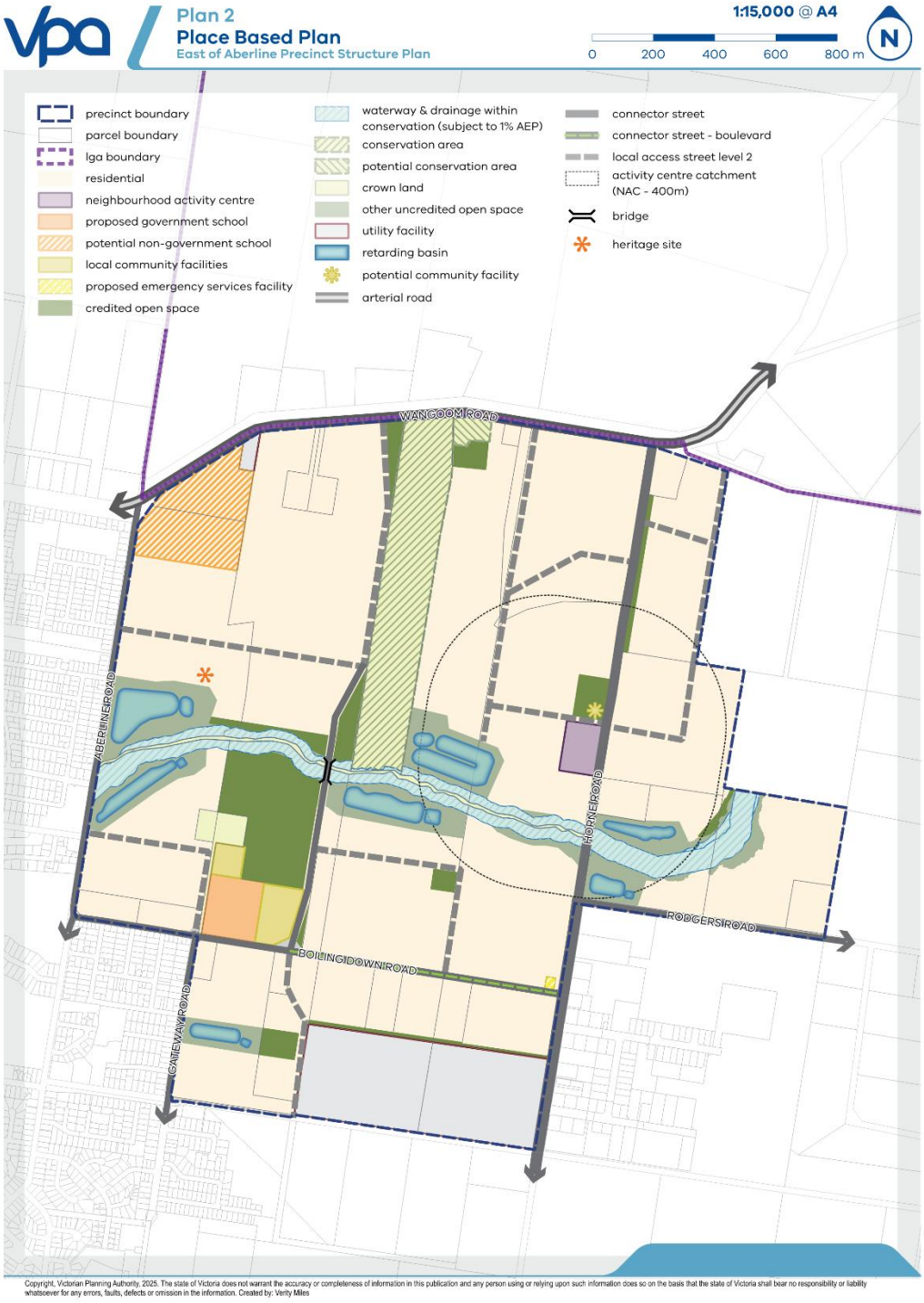

Plan 2
Place Based Plan
East of Aberline Precinct Structure Plan
1:15,000 @ A4
0 200 400 600 800 m
N
precinct boundary
parcel boundary
lga boundary
residential
neighbourhood activity centre
proposed government school
potential non-government school
local community facilities
proposed emergency services facility
credited open space
waterway & drainage within conservation (subject to 1% AEP)
conservation area
potential conservation area
crown land
other uncredited open space
utility facility
retarding basin
potential community facility
arterial road
connector street
connector street - boulevard
local access street level 2
activity centre catchment (NAC - 400m)
bridge
heritage site
WANGOOM ROAD
ABERLINE ROAD
HORNE ROAD
RODGERS ROAD
BOLINGIDOWN ROAD
CANEWAY ROAD
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Figure 13.

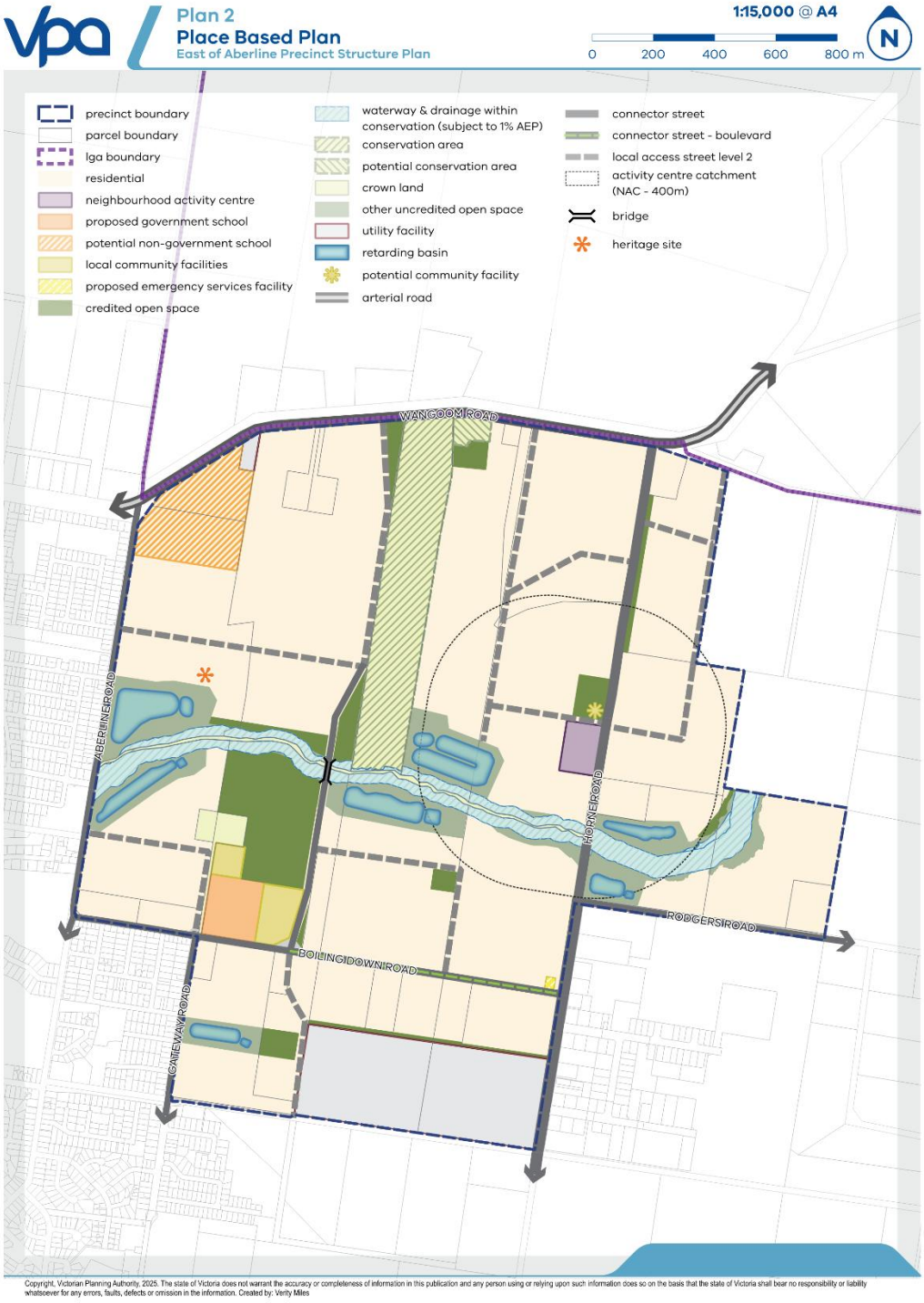


FIGURE 13: DRAFT PLACE-BASED PLAN

The EoA PSP area will comprise predominantly residential development with an indicative yield of 4,227 dwellings and a population of approximately 11,835 people.

A summary of the key land uses proposed in the Draft PSP, provided by the VPA, is summarised in **Table 3**.

TABLE 3: KEY LAND USE WITHIN EOA PSP

LAND USE	SIZE	EMPLOYMENT	STUDENT ENROLMENT[1]
Residential (mix of conventional, medium and high densities)	4,227 dwellings	225	NA
Neighbourhood Activity Centre (NAC)	3ha, 7,700 sqm retail floor space	140	NA
Education – Government Primary School	4ha	40	411
Education – Non-Government/Catholic P-12 School	10ha	140	601
Civic and Sports Precinct, potentially comprising: Multipurpose Community Centre. Likely facilities: kindergarten, maternal and child health consulting rooms, meeting room, indoor basketball courts, medium pavilion Sports Reserve. Likely facilities: AFL field, 1 shared cricket/2 x soccer field Outdoor Court. Likely facilities: 4 x tennis courts, netball	11.6ha, incl: 15,600 sqm floor space 6ha 0.8ha 2.2ha	11	NA
TOTAL		**556**	**1,012**

1 – ASSUMED BASED ON EXPECTED STUDENT DEMAND GENERATED BY PSP

6.1 MOVEMENT NETWORK

The draft Movement Network Plan, developed by the VPA, is provided in **Figure 14.** This movement network provides an overview of the likely future road network to be delivered as part of the EoA PSP.

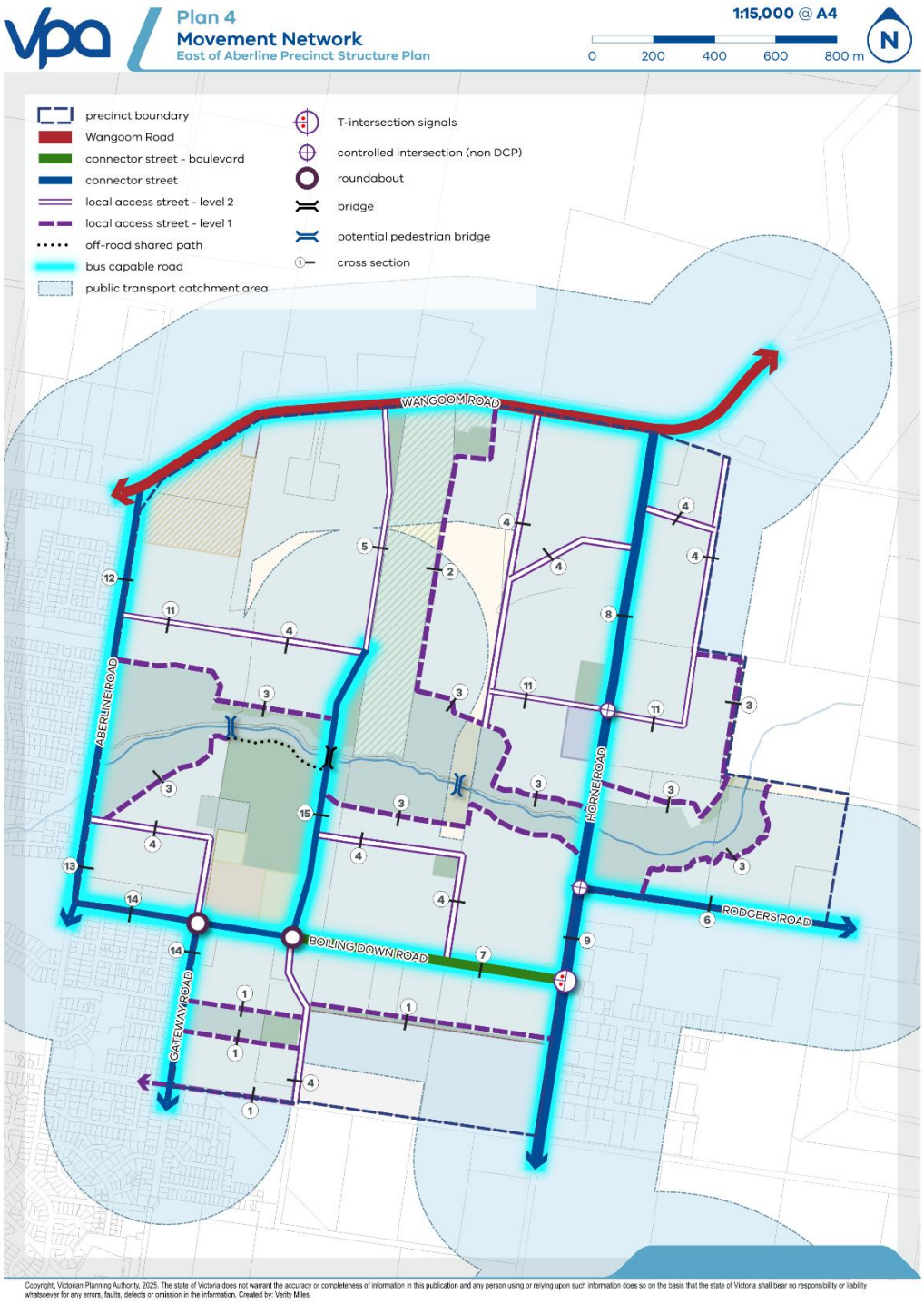


FIGURE 14: DRAFT MOVEMENT NETWORK PLAN

The draft Movement Network Plan illustrates the higher-order local road network, comprising level 2 access streets, access streets adjacent to parkland/drainage reserves, connector streets and Council/local arterials. Lower-order local access street networks are not shown on the plan and will be planned and delivered entirely as part of future subdivision applications.

The PSP area will be accessed via the existing local road network that runs adjacent to and through the site. This includes Aberline Road, Wangoom Road, Horne Road, Boiling

Down Road and Gateway Road.

6.2 STAGING PLAN

The draft Staging Plan, developed by the VPA, is provided in **Figure 15.** It provides an overview of the likely short, medium and long-term staging for developments and infrastructure provision to be delivered as part of the EoA PSP.

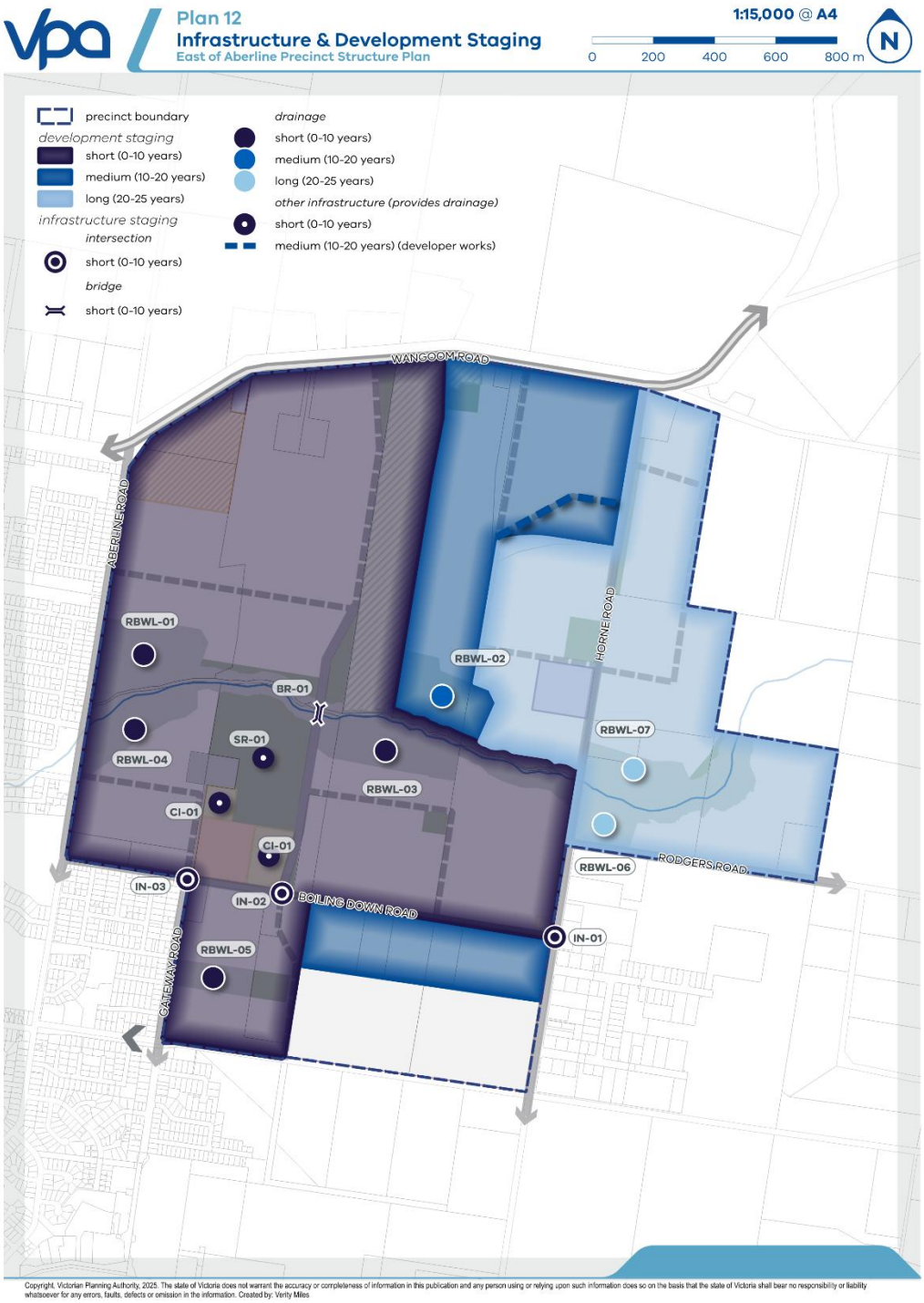


FIGURE 15: DRAFT STAGING PLAN

7 TRANSPORT MODELLING

To determine future traffic volumes generated by the development of the EoA PSP and their respective impacts on the road network, a spreadsheet traffic model was developed, considering the following:

- Draft Movement Network Plan, including local intersections between higher-order access streets and connector streets bordering the EoA PSP;
- Draft Place-Based Plan and uses within the EoA PSP, broken down by 10 Zones/Precincts;
- Estimated existing traffic volumes;
- Estimated background traffic, comprising:
  - Traffic generated by the approved residential subdivisions west of Aberline Road;
  - The Horne Road Industrial Precinct to the east of the PSP; and
  - An annualised growth (applicable only to state-managed arterials, i.e. Mortlake Road/Hopkins Highway and Princes Highway).
- Estimated EoA PSP traffic, based on
  - Traffic generation rates;
  - External and internal traffic distributions; and
  - Traffic assignment/route choice.

The traffic model outputs ultimate traffic volumes (existing + background + EoA PSP) at key roads and intersections within and bordering the PSP, which have been used to assess the requirements for the road infrastructure capacity. The traffic model covers an ultimate scenario (assumed to be Year 2051) where the PSP is fully developed.

DTP has requested that the capacity of Mortlake Road/Hopkins Highway and Princes Highway in the vicinity of the EoA PSP be assessed to inform the need for upgrades and, hence, their subsequent inclusion in the DCP if required. To address this, a subarea traffic model was prepared to estimate ultimate scenario traffic on Hopkins Highway/Mortlake Road from Wangoom Road to Moore Street and Princes Highway from the west of Gateway Road to Horne Road based on the ultimate development of the EoA PSP.

7.1 TRAFFIC ZONES

For transport assessment purposes, the EoA PSP is divided into 10 Precincts (referred to as Traffic Analysis Zones or Zones for this transport assessment). The proposed indicative lot yield for each Precinct is also shown in **Figure 16**.

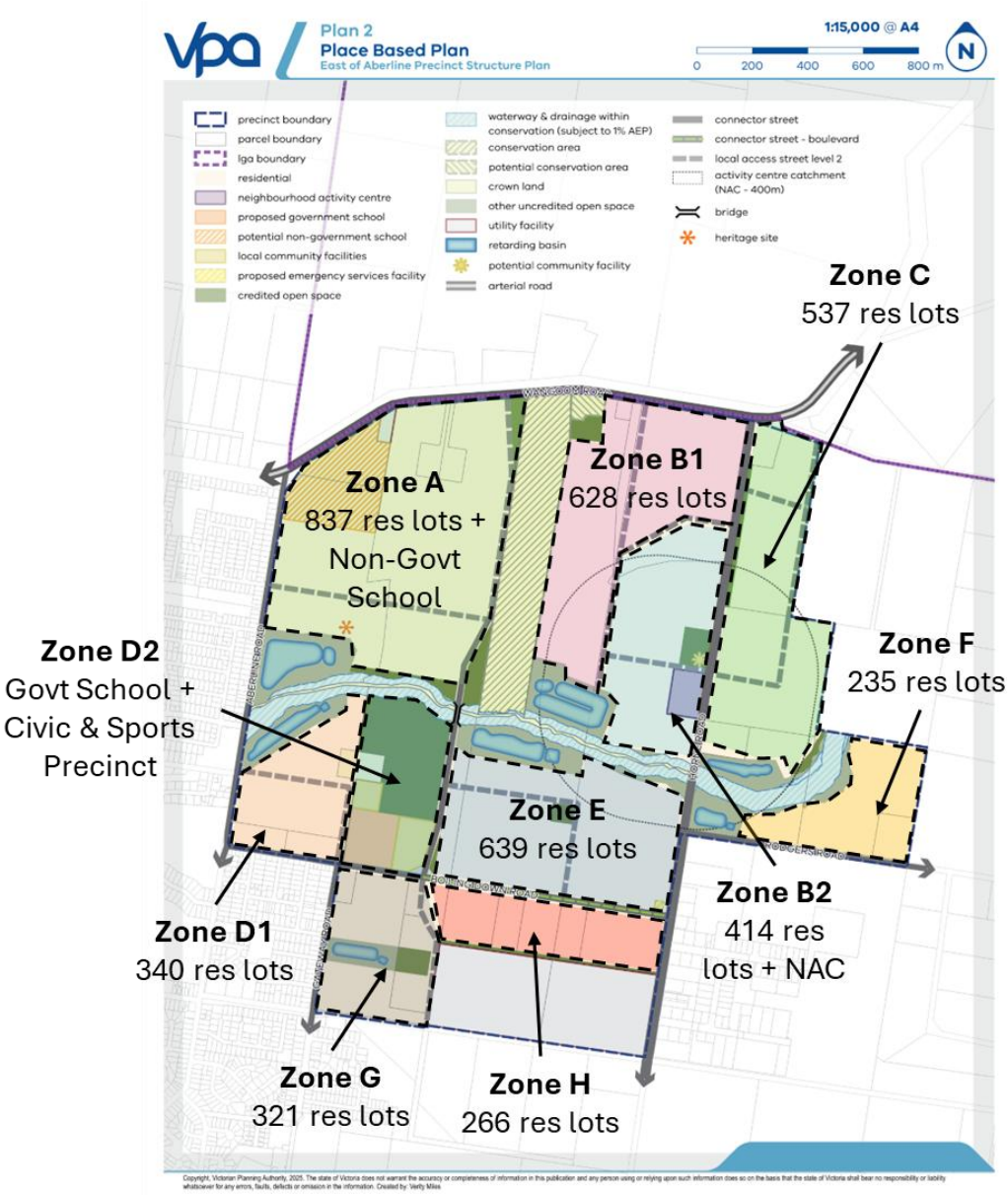


FIGURE 16: TRAFFIC ANALYSIS ZONES AND LAND USE DATA

Key uses in the draft Place-Based plan include:

- Zone A: non-government school on the northwest corner, balance land for residential use. Vehicle access to this private school is assumed from Wangoom Road for the purposes of this transport assessment.
- Zone B1: residential uses
- Zone B2: A NAC near the southeast corner, balance land for residential use. Vehicle access to the NAC is assumed from a local street abutting to the north.
- Zone C: residential use
- Zone D1: residential use
- Zone D2: a community and civic Precinct and a government school. Vehicle access to this precinct is assumed from two local streets abutting to the east and west.
- Zones E-H: residential use

7.2 TRAFFIC GENERATION

7.2.1 Residential

The EoA PSP is expected to accommodate approximately 4,227 dwellings, which will represent the primary source of traffic generated within the Precinct.

The Infrastructure Design Manual (IDM v5.4) recommends that traffic generation for typical residential subdivisions be based on 10 vehicle movements per day per dwelling. However, this rate can be lower in areas with reasonable public transport access, walkable layouts, and a high provision of local amenities. Moreover, the IDM rate does not account for internal trips—that is, trips occurring within the Precinct between homes and the proposed non-residential land uses such as schools, shops, and community facilities.

A review of transport assessments prepared by other traffic/transport consultants for comparable Victorian PSPs suggests adoption of 8 to 10 vehicle trips per day per dwelling.

- Shepparton South East PSP (Transport Impact Assessment, prepared by Stantec dated September 2023): 10 vehicle trips per day
- Greenvale North Part 2 PSP (Transport Impact Assessment, prepared by Stantec, dated May 2024): 9 vehicle trips per day
- Craigieburn West PSP (Transport Impact Assessment, prepared by Onemilegrid dated 9 November 2020): 9 vehicle trips per day
- Wonthaggi North Est PSP (Transport Assessment, prepared by Stantec, dated 10 November 2021): 6.8 vehicle trips per day (external only)

The Transport for New South Wales (TfNSW)Guide to Transport Impact Assessment (Ver 1.1, Nov 2024) establishes the following rates for low-density residential developments in regional areas:

- 0.83 vehicle trips per dwelling in the AM peak hour;
- 0.84 vehicle trips per dwelling in the PM peak hour; and
- 7.53 daily vehicle trips per dwelling.

Further, 2021 Census data for Warrnambool shows that approximately 4.6% of employed residents aged 15+ used non-motorised modes (walking, cycling, or bus) for their work commute. The future road and path network in the PSP area is expected to support and potentially grow this share, with the inclusion of active transport infrastructure and local services.

Based on the considerations outlined above, a daily traffic generation rate of 9 vehicle trips per dwelling has been adopted in this assessment.

Applying this rate to the 4,227 lots proposed equates to a total of 43,200 daily trips (50% inbound and 50% outbound). It is anticipated that 10% of these trips will occur in the AM and PM peak hours with:

- AM peak: 30% of the trips being inbound trips to the PSP area and 70% being outbound trips from the PSP area; and

- PM peak: 60% of the trips being inbound trips to the PSP area and 40% being outbound trips from the PSP area.

The daily and peak-hour vehicle trips generated by the residential component of the EoA PSP are outlined in **Table 4.** A proportion of this traffic generation would be internal to the PSP area, to and from the complementary non-residential uses (such as neighbourhood activity centre, schools, sports and community uses, etc.), while a high proportion of trips would be to and from the external road network.

TABLE 4: RESIDENTIAL TRAFFIC GENERATION OF EoA PSP AT FULL DEVELOPMENT

PEAK	INBOUND	OUTBOUND	TWO-WAY
Weekday Daily	19,022	19,022	38,044
AM Peak Hour	1,141	2,663	3,804
PM Peak Hour	2,282	1,522	3,804

7.2.2 Non-Residential Uses

The non-residential uses and their associated traffic generation have been considered to inform the proportion of internal trips (i.e., trips between zones) and external trips (i.e., trips to and from the PSP and the wider road network). These land uses have also been considered to inform the distribution of internal trips.

Traffic from non-residential uses has been estimated using a combination of empirical surveys conducted by O'Brien Traffic and other traffic and transport engineering consultants, the *TfNSW Guide to Transport Impact Assessment* (2024), and first-principles analysis.

The traffic generation rates and vehicle trips adopted in the assessment of the PSP for non-residential uses are summarised in **Table 5**. Note that student enrolments have been estimated based on the likely student demand data provided by the VPA and comparison with similar facilities in Warrnambool.

TABLE 5: NON-RESIDENTIAL TRAFFIC GENERATION OF EOA PSP AT FULL DEVELOPMENT

USE	TRAFFIC GENERATION RATES			SOURCE
	WEEKDAY DAILY	AM PEAK HOUR	PM PEAK HOUR[1]	
Retail – 8,800 sqm floor area (Zone B2)	108.6 trips / 100 sqm 8,359 trips	1.96 trips / 100 sqm 151 trips	8.3 trips / 100 sqm 641 trips	TfNSW Guide, Traffic generation studies
Government School – 411 students (Zone D2)	1.6 trips / student 658 trips	0.75 trips / student 308 trips	0.15 trips/student 62 trips	TfNSW Guide, Traffic Generation Studies
Non-Government School[2] – 601 students (Zone A)	1.44 trips / student 865 trips	0.68 trips/student 406 trips	0.15 trips / student 90 trips	Traffic generation Studies, First principles
Civic and sports Precinct (Zone D2)	Variable rates[3] 1,160 trips	Variable rates[4] 194 trips	Variable rates[5] 266 trips	First principles
Total Traffic Generation	**11,042 trips**	**1,059 trips**	**1,058 trips**	

NOTES:
1 – PM PEAK HOUR OCCURS BETWEEN 4-6 PM AND DOES NOT COINCIDE WITH SCHOOL PICKUP TIME
2 – RATES FOR NON-GOVERNMENT SCHOOL CONSIDER USE OF BUS TRANSPORT TO SERVE WIDER CATCHMENT AND INCLUDE 10% DISCOUNT RELATIVE TO GOVERNMENT SCHOOLS
3 – KINDERGARTEN: 3 TRIPS PER STUDENT, MATERNAL AND CHILD SERVICES ROOMS: 20 TRIPS PER ROOM, COMMUNITY CENTRE: 30 TRIPS PER 100 SQM, INDOOR COURTS: 60 TRIPS PER COURT, SPORTING OVAL: 50 TRIPS PER FIELD, OUTDOOR COURTS: 20 TRIPS PER COURT
4 – KINDERGARTEN: 0.8 TRIPS PER STUDENT, MATERNAL AND CHILD SERVICES ROOMS: 15% OF DAILY TRAFFIC, ALL OTHER USES: 5% OF DAILY TRAFFIC
5 – KINDERGARTEN: 0.8 TRIPS PER STUDENT, MATERNAL AND CHILD SERVICES ROOMS: 10% OF DAILY TRAFFIC, ALL OTHER USES: 20% OF DAILY TRAFFIC

7.2.3 Internal vs External Traffic

The non-residential components of the PSP are primarily designed to serve the local community. Given the PSP's proximity to existing services, the majority of trips to these uses are expected to originate within the PSP, particularly in the case of schools, shops, and community and sports facilities. However, external traffic is likely to occur due to:

- Employees commuting from outside the Precinct;
- Visitors or retail trips; and
- Students enrolled in the proposed private school, which is likely to serve a broader catchment.

Non-residential uses are expected to generate approximately 29% as many daily trips as the residential component (11,042 vs. 38,044), with a large proportion of these trips representing internal circulation.

Travel data sources from the Victorian Integrated Survey of Travel and Activity (VISTA), ABS 2021 Census and other strategic planning documents indicate that the likely distribution of trip purposes at a regional location would be as shown in **Table 6**.

TABLE 6: INDICATIVE TRIP PURPOSE DISTRIBUTION AT REGIONAL LOCATIONS

TRIP PURPOSE	DAILY	AM PEAK HOUR	PM PEAK HOUR
Work	35%	50%	40%
Retail	20%	8%	20%
Education	10%	25%	10%
Recreation	15%	5%	10%
Other	20%	12%	20%

It is anticipated that a large portion of trips for education, recreation, and retail will stay internal to the PSP due to the provision of complementary uses within the PSP.

To further inform the internal vs external trip distribution for the EoA PSP, a review of strategic modelling reports for other comparable PSPs in regional Victoria and outer Melbourne Metropolitan was undertaken. In particular, the Shepparton South East Growth Corridor Transport Impact Assessment (prepared by Stantec, 13 September 2023), based on outputs from the State-wide Victorian East Transport Model (S-VITM), provides a relevant benchmark. The Shepparton South East PSP is directly comparable to the EoA PSP due to regional setting and land use composition (a mix of residential, shops, schools and community/recreational uses).

The S-VITM outputs for the Shepparton South East PSP indicate that:

- Approximately 75% of residential and staff trips are external, meaning they begin or end outside the PSP area; and
- Approximately 25% of residential trips are internal, servicing local schools, retail and community destinations;
- Trips generated by a majority of students and patrons of non-residential uses are internal, as they originate from within the new residential catchment.

Based on the above considerations, 78% external and 22% internal have been adopted for residential trip distribution in this assessment.

The above assumption is supported by the use of a higher-than-benchmark residential trip generation rate (9 daily trips per dwelling compared to the TfNSW figure of 7.53), which implicitly accommodates a proportion of internal trips to non-residential uses. In the traffic model, internal trips are attributed to residential use rather than their non-residential destinations to avoid double counting.

Summary

Table 7 shows the anticipated total, internal and external traffic generation for each zone within the PSP.

TABLE 7: ANTICIPATED RESIDENTIAL TRAFFIC GENERATED BY ZONE AT FULL DEVELOPMENT OF EOA PSP

ZONE	RESIDENTIAL YIELD	WEEKDAY DAILY (TWO-WAY)			AM AND PM PEAK HOURS (TWO-WAY)		
		TOTAL TRIPS	INTERNAL TRIPS	EXTERNAL TRIPS	TOTAL TRIPS	INTERNAL TRIPS	EXTERNAL TRIPS
A	837	7,533	1,657	5,876	753	166	588
B1	628	5,742	1,263	4,479	574	126	448
B2	414	3,726	820	2,906	373	82	291
C	537	4,833	1,063	3,770	483	106	377
D1	340	3,060	673	2,387	306	67	239
E	639	5,751	1,265	4,486	575	127	449
F	235	2,115	465	1,650	212	47	165
G	321	2,889	636	2,253	289	64	225
H	266	2,394	527	1,867	239	53	187
TOTAL	**4,227**	**38,043**	**8,369**	**29,674**	**3,804**	**837**	**2,967**

Based on the above, the external traffic generation of the EoA PSP will be equivalent to approximately 7 vehicle trips per day per dwelling (i.e. 9 vehicle trips per day per dwelling x 78% of external traffic).

7.3 TRAFFIC DISTRIBUTION AND ASSIGNMENT

7.3.1 Traffic Distribution

External Traffic

The distribution of traffic generated by the EoA PSP on the external road network (i.e., external trips) has been determined based on the surrounding locations for employment, retail/commercial, and educational uses, as well as the arterial road network. According to the 2021 Census data, 16% of working residents of Warrnambool City travelled outside the area for work, while 84% worked within the city – this was factored into the traffic distribution assumption out of Warrnambool.

External trips have been distributed across six destinations within Warrnambool and its surrounding region.

The destinations included in the model and their significant attractors, the proportion of external trips assigned to these destinations in the model, and the resulting daily and peak hour traffic of external trips by the EoA PSP are summarised in **Table 8.**

TABLE 8: EXTERNAL TRAFFIC DISTRIBUTION

DESTINATION	SIGNIFICANT ATTRACTORS	ESTIMATED PERCENTAGE	ESTIMATED WEEKDAY DAILY TRAFFIC	ESTIMATED AM AND PM PEAK HOUR TRAFFIC
East	Horne Road Industrial Precinct, Allansford and other small towns, Farming, Great Ocean Road, Deakin University	12%	3,561	356
North	Bushfield and other small towns, Farming communities, Warrnambool Airport	4%	1,187	119
North Warrnambool	Northpoint Shopping Centre, St John of God Hospital, Caramut Road Industrial Estate, Warrnambool College, Kings College, Brauer College	17%	5,045	505
West on Princes Hwy	Port Fairy, Portland and other small towns, Farming	5%	1,484	148
South Warrnambool	City Centre - major retail and employment, Recreation and Tourism industries, West Industrial Precinct	45%	13,353	1,353
South	Gateway Shopping Centre, Wannon Water, Bunnings, Commercial uses off Princes Highway	17%	5,045	505
TOTAL		**100%**	**29,674**	**2,967**

Internal Traffic

Natural barriers within the EoA PSP area, such as Russells Creek and Tozer Reserve, necessitate the use of perimeter roads, including Wangoom Road, Horne Road, Aberline Road, and Boiling Down Road, for many internal trips to access key destinations, such as the NAC, schools and community and sports Precincts. For example, a proportion of trips originating from Zone A and destined to the NAC in Zone B2 will utilise Wangoom Road and then Horne Road.

The distribution of internal trips within the EoA PSP has been determined based on the projected share of non-residential trips generated by each zone in the AM and PM peak hours, ensuring a realistic representation of travel patterns. For example, in the AM

peak hour, a high proportion of vehicle trips will be attracted to schools in Zone D2 and Zone A. In the PM peak hour, a high proportion of vehicle trips will be attracted to retail uses in Zone B2 and recreation/sports uses in Zone D2.

7.3.2 Traffic Assignment

The anticipated external traffic (i.e., traffic between the zones and external destinations) and internal traffic (i.e., traffic between zones) have been assigned to various routes. Route selection was manually assessed and incorporated into the spreadsheet model.

The proposed road connections within the EoA PSP, as outlined in the draft Movement Network Plan, were evaluated in relation to the external road network.

Preference was given to the shortest routes utilising higher-classification roads, such as Council/local arterial and collector roads. The characteristics of existing roads in the surrounding area were also taken into account. For external traffic, route selection was guided by the *Warrnambool Municipal Road Hierarchy Review and Traffic Management Plan*, prepared by GTA Consultants in 2017. Additionally, the layouts of existing intersections connecting to major roads in the wider network were considered, as these features influence traffic assignment.

Overall traffic assignment assumptions to each of the six destinations are summarised below:

- East: Most of this traffic would utilise Horne Road, with a small proportion using Gateway Road to access Princes Highway. A small proportion of traffic would also use Wangoom Road to access farming destinations to the east.
- North: Traffic travelling north is expected to use Mortlake Road/Hopkins Highway via Wangoom Road.
- North Warrnambool: Westbound traffic is expected to be distributed across multiple roads, including Wangoom Road, Whites Road and Moore Street.
- West on Princes Highway: Traffic would split between Moore Street and Horne Road to access Princes Highway and travel out of the town.
- South Warrnambool: This traffic would be distributed to Mortlake Road/Hopkins Highway and Princes Highway via Wangoom Road, Whites Road, Moore Street, McGregors Road, Gateway Road and Horne Road.
- South: The southbound traffic would mainly split between Horne Road and Gateway Road.

7.4 PSP-GENERATED TRAFFIC

Based on the traffic generation, distribution and assignment assumptions provided in the above sections, the estimated daily traffic volumes generated by the EoA PSP in the study area for the ultimate scenario are shown in **Figure 17**. These volumes include the internal traffic that will utilise roads bordering the PSP boundaries.

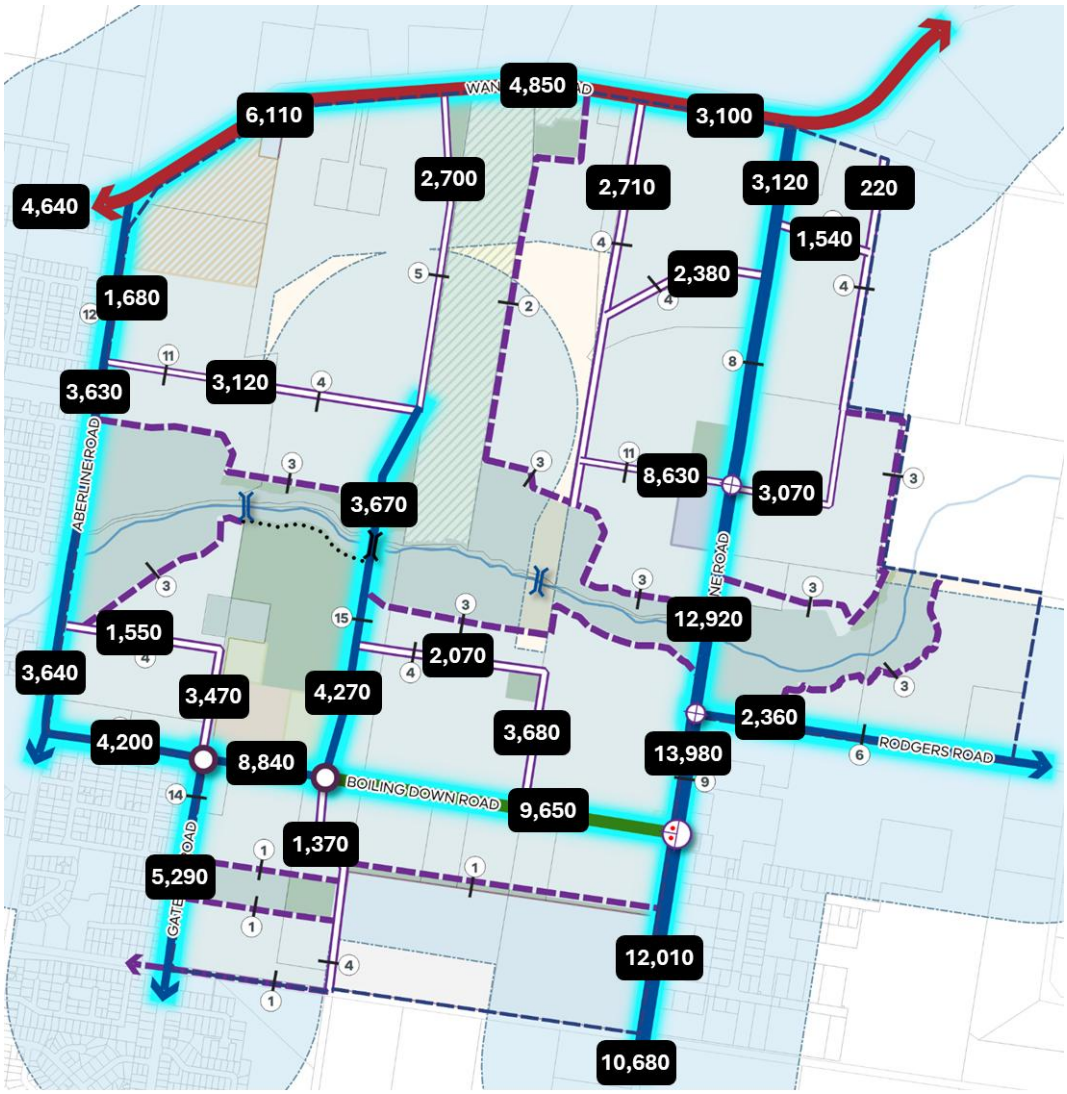


FIGURE 17: MAXIMUM DAILY TRAFFIC VOLUMES GENERATED BY EOA PSP (LOCAL ROAD NETWORK)

The estimated daily traffic volumes generated by the EoA PSP on Hopkins Highway / Mortlake Road, Princes Highway and Wangoom Road at Mortlake Road for the ultimate scenario are shown in **Figure 18**.

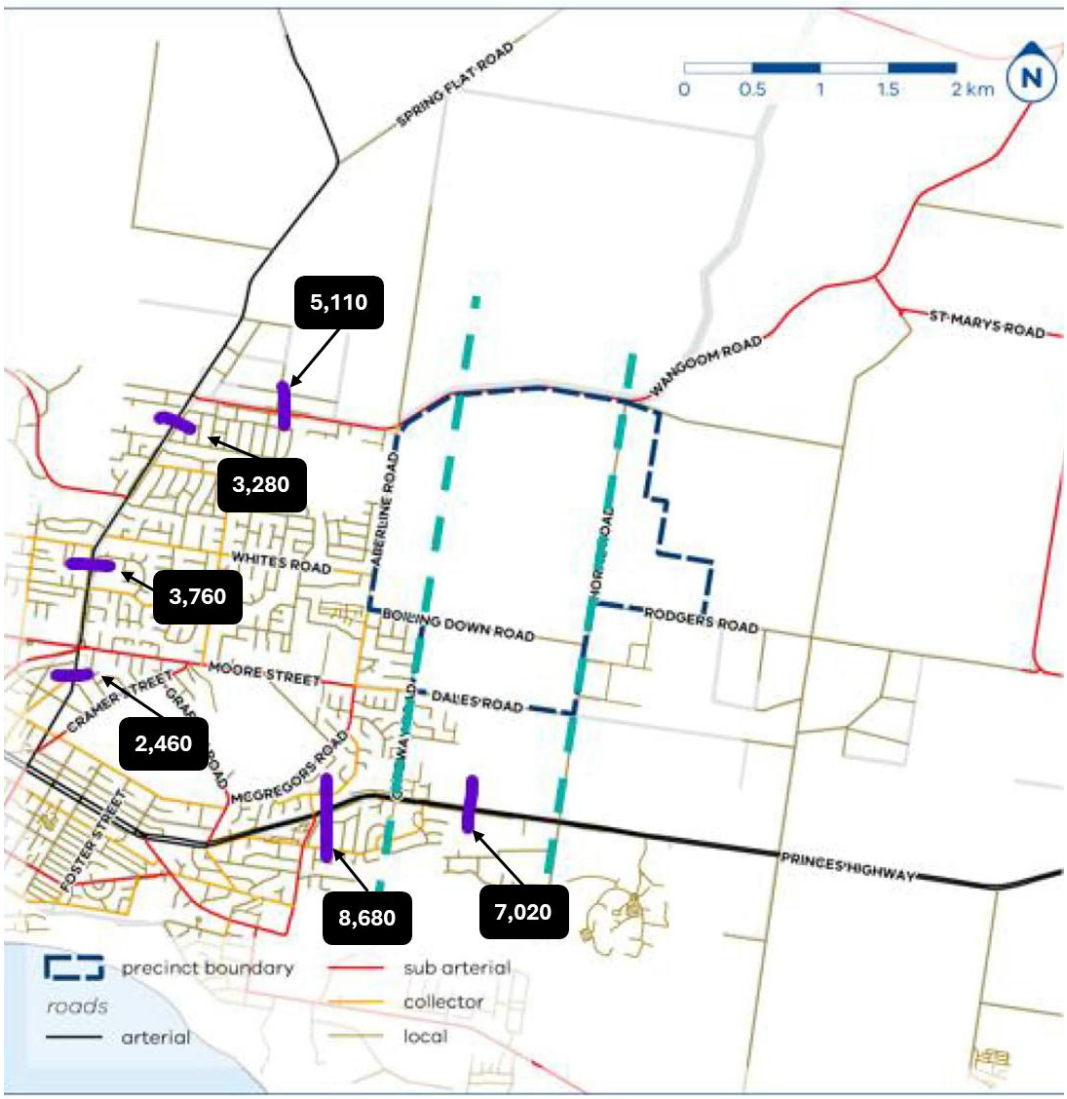


FIGURE 18: DAILY TRAFFIC VOLUMES GENERATED BY EOA PSP (WIDER ROAD NETWORK)

The estimated AM and PM peak hour turning movements generated by EoA PSP at the key intersections are included in **Appendix A**.

7.5 BACKGROUND TRAFFIC VOLUMES

Traffic generated by approved surrounding developments that are not captured in the existing traffic data has been included in the model. These developments are likely to generate significant levels of traffic, which are anticipated to impact the proposed road network within and bordering the PSP. This traffic is referred to as background traffic volumes in the model and comprises traffic generated by:

- The Horne Road Industrial Precinct, currently under development and located at the southeast corner of the Horne Road / Rodgers Road intersection; and
- Northern Edge Estate, currently under development and located at the southwest corner of the Aberline Road / Wangoom Road intersection.

The location of these developments is provided in **Figure 19**.

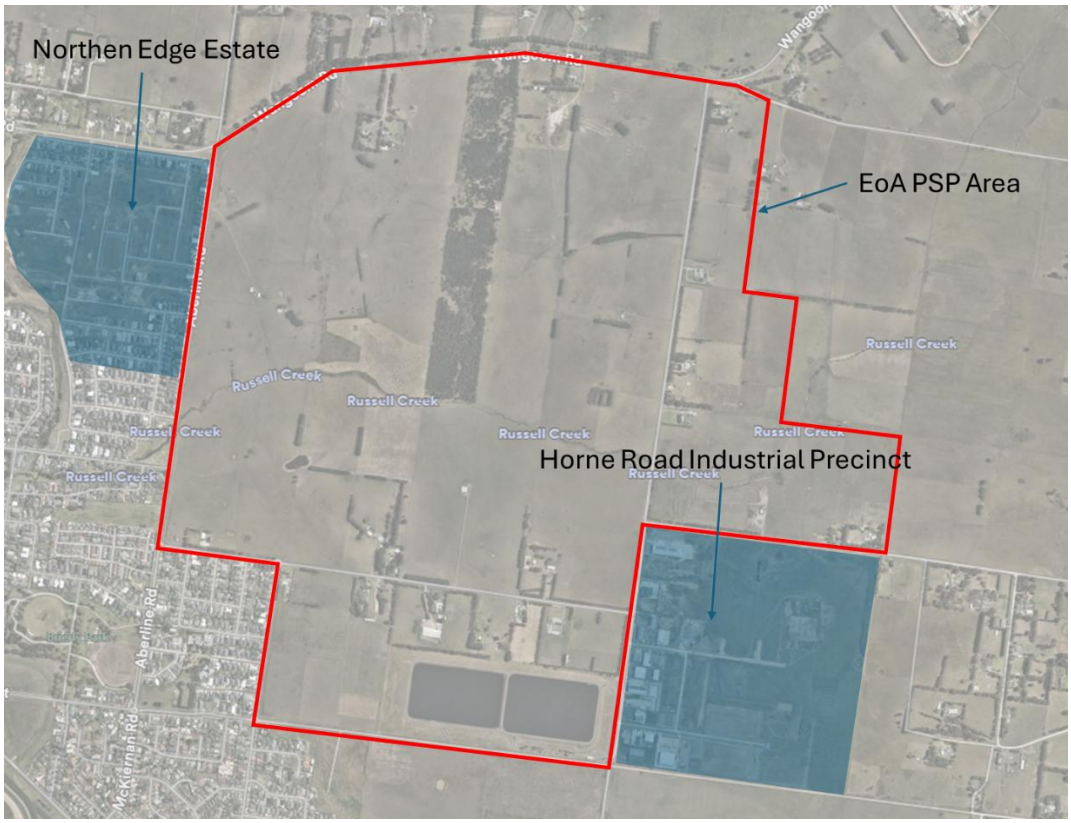


FIGURE 19: SURROUNDING LAND DEVELOPMENTS (APPROVED/PLANNED)

7.5.1 Horne Road Industrial Precinct

Warrnambool Council endorsed the Horne Road Development Plan in February 2015. The Precinct encompasses approximately 65 hectares of land and will accommodate a number of industrial allotments of varying sizes. This Precinct is currently under development. An aerial photo from March 2025 suggests that approximately 25% of this Precinct has already been constructed and occupied.

The total daily traffic expected to be generated by this development is 11,150 vehicles per day, according to the traffic report prepared by Brian Consulting Pty Ltd dated 22 August 2013. This equates to a traffic generation rate of 171.5 vehicle trips per ha, which is considered excessive for an industrial subdivision, likely comprising uses such as warehousing, light manufacturing, and the service industry. The anticipated traffic distribution from the Brian Consulting report is shown in **Figure 20**.

FIGURE 20: DAILY TRAFFIC GENERATION OF FULL HORNE ROAD INDUSTRIAL PRECINCT

It is anticipated that some of the trips generated by the PSP will be destined to the Horne Road Industrial Precinct. The traffic model for the PSP assumes that approximately 7% of the external traffic generated by the PSP (i.e. 7% of 29,674 = 2,077 daily vehicle trips) will be to and from the Horne Road Industrial Precinct. This equates to approximately 20% of the daily traffic generated by this industrial development.

A balance of 55% of the traffic generated by the Horne Industrial Precinct (i.e., 6,133 daily vehicle trips) has been considered as background traffic in the PSP traffic model,

reflecting the fully build out of this industrial area. This traffic has been distributed using the same traffic patterns shown in **Figure 20**, i.e., to and from the south via Horne Road, to and from the north via Wangoom Road, and to and from the west via Boiling Down Road. In addition to the traffic distribution assumptions extracted from the Brian Consulting report, a small proportion of traffic has also been assumed to be distributed east via Rodgers Road.

For the purposes of this assessment, the following assumptions have been made to estimate peak hour volumes likely to be generated by the balance development of the Horne Road Industrial precinct:

- 10% of the daily traffic will occur in the AM and PM peak hours;
- During the AM peak, 70% of the trips will be inbound trips to the industrial Precinct and 30% will be outbound trips from the industrial Precinct; and
- During the PM peak, 30% of the trips will be inbound trips to the industrial Precinct, and 70% will be outbound trips from the industrial Precinct.

The Brian Consulting report did not provide traffic distribution assumptions for the wider road network. The EoA PSP traffic model has been based on the following traffic distribution assumptions for the wider road network:

- 80% of traffic to/from north on Horne Road will access Mortlake Road via Wangoom Road, while the remaining 20% will be to/from the east on Wangoom Road.
- 60% of traffic to/from the west on Boiling Down Road will access Moore Street via Aberline Road, while the remaining 40% will be to/from Whites Road via Aberline Road.
- All traffic to/from the south on Horne Road will access the Princes Highway.

7.5.2 Northern Edge Residential Estate

The Aberline Road Development Plan was adopted by Council in April 2014. The latest development plan indicates that, at full development, the subdivision will comprise 480 residential dwellings. According to Nearmap aerial photography captured on January 6, 2024, approximately 155 dwellings have been developed in the estate. This equates to 325 dwellings that remain undeveloped.

A daily traffic generation rate of 9 vehicle trips per day per dwelling is adopted for this estate. This is the same rate used to estimate PSP-generated traffic. The balance of 325 residential lots would generate approximately 3,000 daily vehicle trips. 10% of daily trips, i.e. 300 vehicles will be generated in each of the AM and PM peak hours. The same directional split as the PSP-generated traffic was used (i.e. 30/70 in the AM peak hour and 60/40 split in the PM peak hour between inbound/outbound traffic).

The distribution assumptions include:

- 50% traffic via Wangoom Road, 10% to/from the east and 90% to/from the west; and
- 50% traffic via Aberline Road, 10% to/from the north and 90% to/from the south; and

The traffic distribution in the broader road network was assumed to be the same as the EoA PSP, summarised in **Table 7**.

7.5.3 Through Traffic

Local Road Network

Most background traffic growth will originate from the Horne Road Industrial Precinct and the Northern Edge Estate. As discussed in previous sections, this anticipated traffic growth has already been incorporated into the analysis. Hence, there is no justification for applying an annual growth rate to account for "through" traffic along roads adjacent to the PSP area.

It is further noted that:

- The PSP area is bordered by farmland to the north and east. Future growth to the north and east is expected to be negligible.
- To the west, residential subdivisions, except for the Northern Edge Estate, are primarily built out.
- Future growth, extending further west of the study area, will generate only negligible daily traffic on roads bordering the EoA PSP.
- Future developments south of the EoA PSP, within the Eastern Activity Centre (EAC), are expected to comprise residential and non-residential land uses. The status of EAC development is unknown. A portion of PSP-generated traffic has been assigned to existing commercial and retail developments. Residential traffic from this EAC would not be attracted to the EoA PSP uses, except for the proposed schools, noting the EAC itself will comprise complementary retail and commercial uses.

Based on the above, no annual growth rate has been applied to avoid double counting background traffic.

The estimated background AM and PM peak hour turning movements at the key intersections are provided in **Appendix B**.

Wider Road Network

It is reasonable to expect that declared arterial roads, subject to this transport assessment, will experience traffic growth without the implementation of the EoA PSP.

A growth rate of 1% per year has been applied to Hopkins Highway/Mortlake Road and Princes Highway over 26 years (between the existing year 2025 and the ultimate year 2051). This assumption aligns with other Transport Assessments prepared for comparable PSPs, including the Shepparton South East PSP.

This annual growth rate represents a 26% increase in the ultimate scenario compared to the 2025 conditions.

7.6 ULTIMATE TRAFFIC VOLUMES

The resultant daily traffic volumes in the ultimate scenario, comprising estimated existing, background and PSP-generated traffic, are shown in **Figure 21** for the local

road network abutting the PSP area and **Figure 22** for the wider road network, including state-managed arterial roads

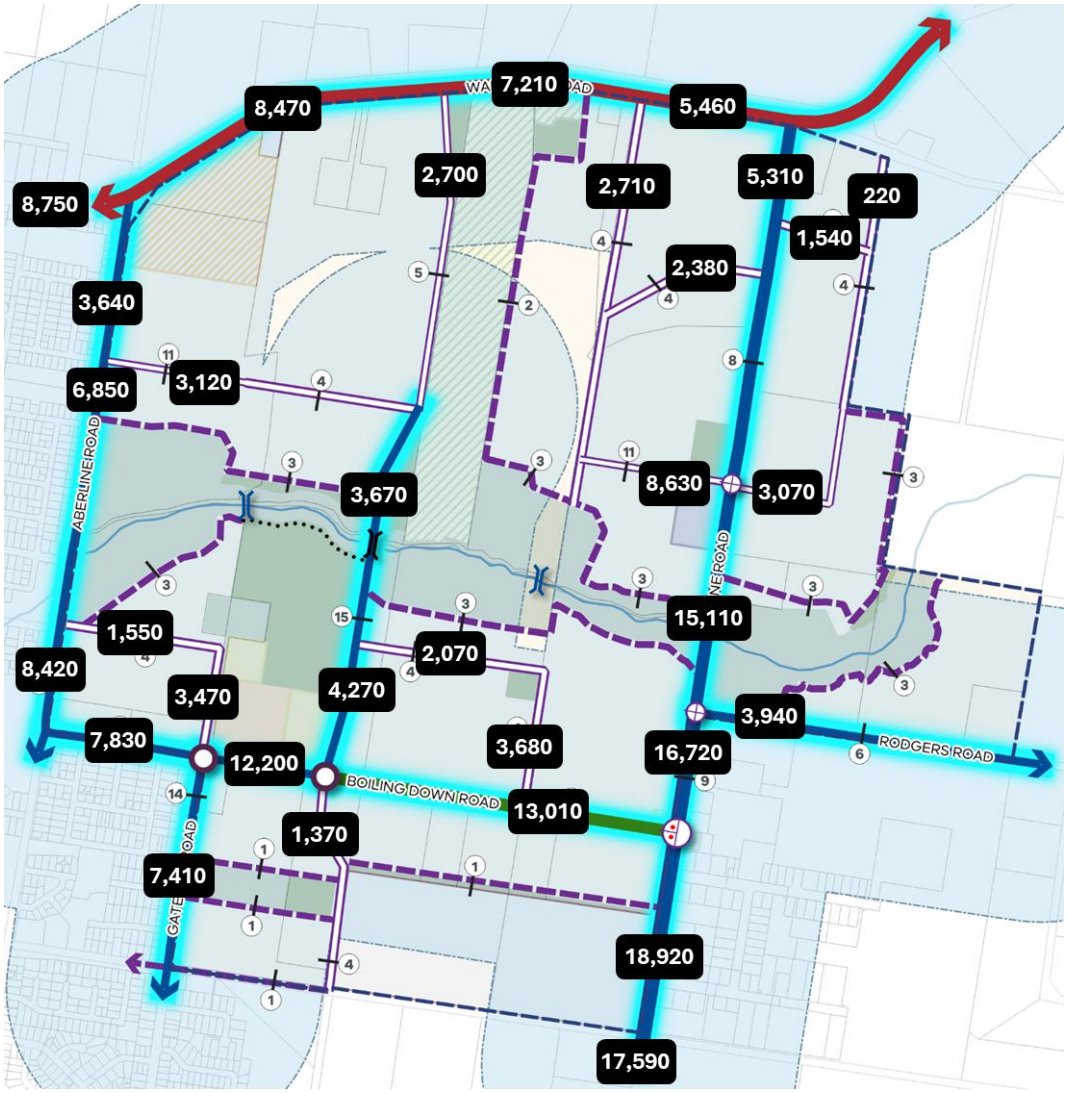


FIGURE 21: LOCAL ROAD NETWORK ULTIMATE DAILY TRAFFIC VOLUMES (EXISTING + BACKGROUND + PSP)

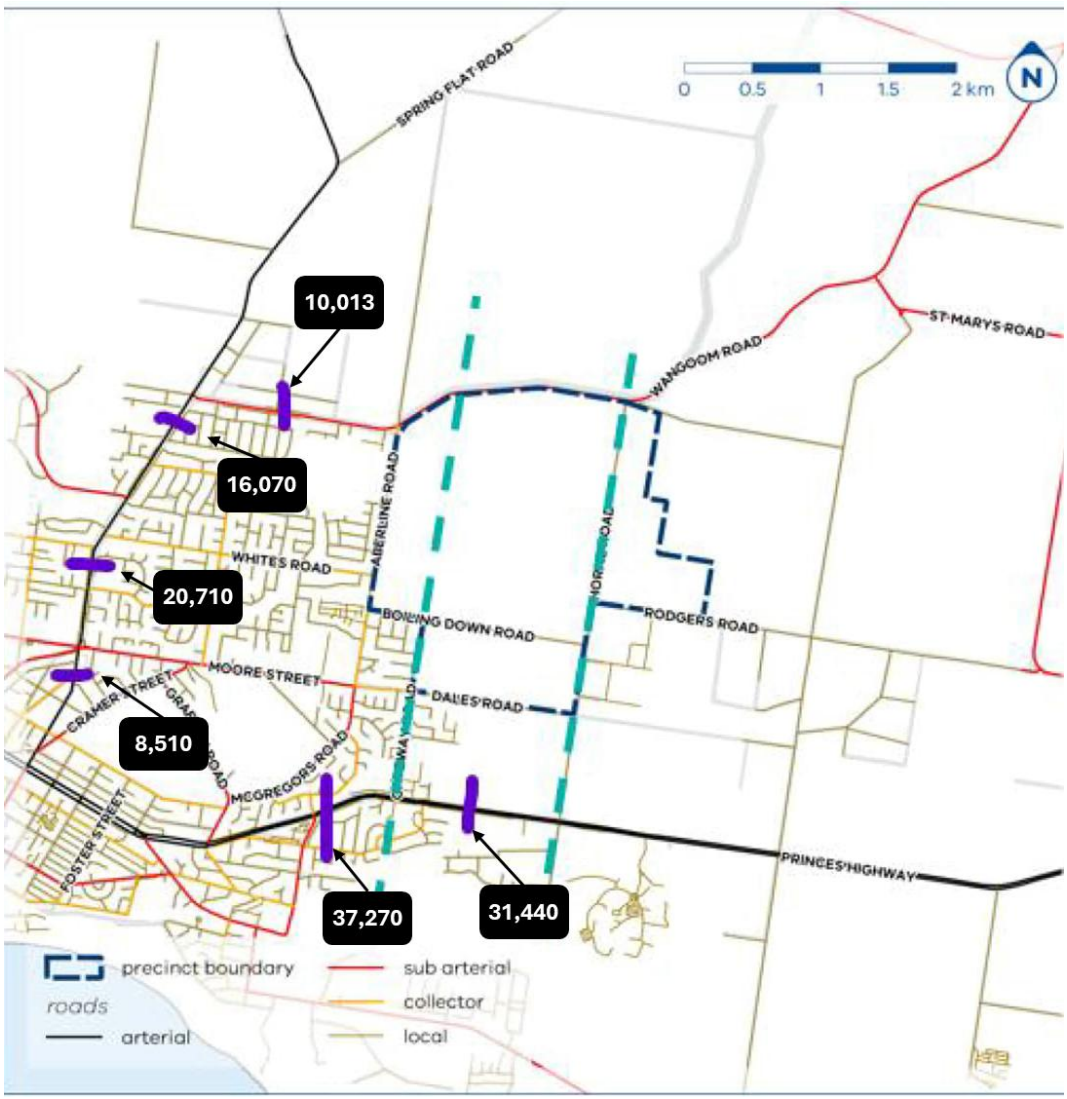


FIGURE 22: WIDER ROAD NETWORK ULTIMATE DAILY TRAFFIC VOLUMES (EXISTING + BACKGROUND + PSP)

The estimated AM and PM peak hour turning movements at the key intersections under the ultimate conditions are included in **Appendix C**.

8 TRANSPORT ASSESSMENT

8.1 INTERNAL ROAD NETWORK

An assessment of the anticipated maximum daily traffic within the PSP's internal road network was undertaken to confirm whether adequate access is proposed in the draft Movement Network Plan and if new access or modifications would be required.

The results of this analysis are provided in **Table 9**. The proposed classifications in this table align with the Draft Movement Network Plan. Daily traffic thresholds used for this analysis are based on the VPA PSP Guideline – *PSP Note – Our Roads: Connecting People* (August 2011), which are broadly consistent with the Design of Roads and Neighbourhood Streets objectives of the Victoria Planning Provisions (Clause 56.06-8).

It is noted that this assessment follows a coarse road network (i.e. higher-level local

streets, excluding low-level local streets assumed in the traffic model as indicated in Figure 21) as shown in the draft Movement Network Plan provided by the VPA. With the introduction of a fine-grained road network as part of the subdivision process, traffic volumes on individual roads are expected to decrease, since vehicle movements are dispersed more evenly across the network.

TABLE 9: INTERNAL ROAD NETWORK CAPACITY ANALYSIS RESULTS

ROAD / ZONE CONNECTIONS	SECTIONS	PROPOSED CLASSIFICATION	TARGET DAILY TRAFFIC (VPD)	ANTICIPATED ULTIMATE DAILY TRAFFIC (VPD)	WITHIN TARGET VOLUME?
N-S Connector Street	At the Russells Creek bridge	Connector Street	3,000-7,000	3,670	Yes
	North of Boiling Down Road	Connector Street	3,000-7,000	4,270	Yes
Zone A Connections	To Aberline Road	Access Street Level 2	2,000-3,000	3,120	**No**
	To Wangoom Road	Access Street Level 2	3,000-7,000	2,710	Yes
Zone B1 Connections	To Horne Road	Access Street Level 2	2,000-3,000	2,970	Yes
	To Wangoom Road	Access Street Level 2	2,000-3,000	2,380	Yes
Zone B2 Connections	To Horne Road	Access Street Level 2	2,000-3,000	8,630	**No**
Zone C Connections	To Horne Road (Northern)	Access Street Level 2	2,000-3,000	1,540	Yes
	To Horne Road (Southern)	Access Street Level 2	2,000-3,000	3,070	**No**
	To Wangoom Road	Access Street Level 2	2,000-3,000	220	Yes
Zone D1 Connection	To Aberline Road	Access Street Level 2	2,000-3,000	1,550	Yes
	To Boiling Down Road	Access Street Level 2	2,000-3,000	3,470	**No**
Zone E Connections	To Boiling Down Road	Access Street Level 2	2,000-3,000	3.680	**No**
	To N/S Connector	Access Street Level 2	2,000-3,000	2,070	Yes
N-S Access Street in Zone G/H	South of Boiling Down Road	Access Street Level 2	2,000-3,000	1,370	Yes

It is acknowledged that the target daily traffic ranges associated with road classifications serve as a guideline. The above results indicate that the draft Movement Network Plan would generally provide adequate access and higher-order road connections to traffic zones with a few exceptions. The anticipated maximum daily traffic for some midblock sections of the internal road network will exceed the target

volume. These sections are discussed below with associated modifications recommended:

- Zone A Access Street to Aberline Road – The expected daily traffic could exceed the maximum allowable traffic by 120 vehicles per day (vpd), which is considered negligible and does not trigger an upgrade, particularly given the course network assumed for the PSP.
- Zone B2 Access Street to Horne Road – The expected daily traffic would be significantly higher than the maximum allowable traffic. Transport modelling assumed that the NAC would be accessed via this access street.

  It is recommended that a direct left-in/left-out access to the NAC be facilitated via Horne Road to the satisfaction of the responsible road authority at the time of planning and delivery of the NAC.
- Zone C Access Street (Southern) to Horne Road – The expected daily traffic would be significantly higher than the maximum allowable traffic. This is unlikely to trigger the need to upgrade its hierarchy, as a northern connection to this zone is proposed via Horne Road, which is estimated to provide plenty of residual capacity.
- Zone D1 Access Street to Boiling Down Road – The expected daily traffic could exceed the maximum allowable traffic by approximately 500 vpd, resulting from assumed vehicle access to the government school and civic and sports precinct via this road. This is unlikely to trigger the need to upgrade its hierarchy, as another connection to this zone is proposed via Aberline Road, which is estimated to provide plenty of residual capacity.
- Zone E Access Street to Boiling Down Road – The expected daily traffic could be expected to exceed the maximum allowable traffic by approximately 700 vpd. This is unlikely to trigger the need to upgrade its hierarchy, as the fine-grained road network in this zone would spread traffic across multiple access points.

Further to the above, broader urban planning strategies, including Local Area Traffic Management measures, walking and cycling initiatives, and accessible public transport networks, are encouraged to mitigate traffic generation rates within the EoA PSP. The implementation and ongoing management of these strategies will be the responsibility of the Council, guided by its policy frameworks and regulatory practices.

Overall, the modelling assessment confirms that the PSP's draft internal road network will effectively accommodate the anticipated ultimate daily traffic volumes, with one key recommendation: the provision of a direct left-in/left-out access to the NAC via Horne Road.

8.2 LOCAL ROAD NETWORK

The results of a midblock capacity assessment comparing the daily volumes on roads bordering the EoA PSP against the maximum target volumes for connector streets and theoretical traffic capacity for Council arterial or access control roads are summarised in **Table 10**.

The proposed classifications in this table align with the Draft Movement Network Plan. Daily traffic targets used for this analysis are based on the VPA PSP Guideline – *PSP Note – Our Roads: Connecting People* (August 2011), which are broadly consistent with the Design of Roads and Neighbourhood Streets objectives of the Victoria Planning Provisions (Clause 56.06-8).

TABLE 10: EXTERNAL ROAD NETWORK CAPACITY ANALYSIS RESULTS

ROAD	SECTION	PROPOSED CLASSIFICATION	TARGET DAILY TRAFFIC / THEORETICAL CAPACITY	ANTICIPATED DAILY TRAFFIC VOLUME (VPD)				
				EXISTING	BACKGROUND	EOA PSP	ULTIMATE / POST-DEVELOPMENT	WITHIN TARGET VOLUME / CAPACITY?
Aberline Road	South of Wangoom Road	Connector Street	3,000-7,000*	1,850	110	1,680	3,640	Yes
	At Russells Creek, North of Whites Road	Connector Street	3,000-7,000*	1,850	1,370	3,630	6,850	Yes
	Whites Road to Boiling Down Road	Connector Street	3,000-7,000*	3,480	1,300	3,640	8,420	**No**
Wangoom Road	Aberline Road to Horne Road	Council Arterial (two-lane, undivided)	18,000**[1]	1,540	820	6,110	8,470	Yes
Horne Road	South of Wangoom Road	Council Arterial (two-Lane, undivided)	18,000**[1]	1,280	910	3,120	5,310	Yes
	At Russells Creek, North of Rodgers Road	Council Arterial (two-Lane, undivided)	18,000**[1]	1,280	910	12,920	15,110	Yes
	Rodgers Road to Boiling Down Road	Council Arterial (two-lane, divided)	20,000**[2]	2,090	650	13,980	16,720	Yes
	Boiling Down Road to Dales Road	Council Arterial (two-lane, divided)	20,000**[2]	2,550	4,360	12,010	18,920	Yes
	South of Dales Road	Council Arterial (two-lane, undivided)	18,000**[1]	2,550	4,360	10,680	17,590	Yes
Boiling Down Road	Aberline Road to Gateway Road	Connector Street	3,000-7,000*	2,550	1,080	4,200	7,830	**No**
	Gateway Road to N/S Connector Street	Connector Street	3,000-7,000*	2,660	700	8,840	12,200	**No**
	N/S Connector Street to Horne Road	Connector Boulevard	7,000-12,000*	2,660	700	9,650	13,010	**No**
Gateway Road	Boiling Down Road to Dales Road	Connector Street	3,000-7,000*	1,740	380	5,290	7,410	**No**
Rodgers Road	Horne Road to end of EoA PSP	Connector Street	3,000-7,000*	1,000	580	2,360	3,940	Yes

* TARGET DAILY TRAFFIC THRESHOLDS ** THEORETICAL DAILY TRAFFIC CAPACITY
1 – 900 VEHICLES PER HOUR PER DIRECTION FROM SUPERSEDED AUSTROADS GUIDE TO TRAFFIC MANAGEMENT PART 3 (2017). DAILY TRAFFIC CAPACITY = 900 VEHICLES PER HOUR PER DIRECTION X 2 DIRECTIONS X 10 CONVERSION FACTOR FOR PEAK HOUR TO DAILY TRAFFIC = 18,000 VEHICLES PER DAY (TWO-WAY)
2 – 1000 VEHICLES PER HOUR PER DIRECTION FROM SUPERSEDED AUSTROADS GUIDE TO TRAFFIC MANAGEMENT PART 3 (2017). DAILY TRAFFIC CAPACITY = 900 VEHICLES PER HOUR PER DIRECTION X 2 DIRECTIONS X 10 CONVERSION FACTOR FOR PEAK HOUR TO DAILY TRAFFIC = 20,000 VEHICLES PER DAY (TWO-WAY)

The key findings and recommendations concerning the external road network are outlined below:

8.2.1 Aberline Road

Aberline Road is forecast to carry between 3,640 and 8,420 vpd adjacent to the EoA PSP. Within the short segment between Whites Road and Boiling Down Road, traffic volumes are expected to exceed the maximum target of 7,000 vpd specified for roads classified as connector streets. It is important to note that this target relates to an amenity-based threshold, rather than traffic carrying capacity, and is primarily intended to guide road classification and manage local character and liveability outcomes. In practice, road authorities consider a broader range of factors, such as traffic safety, network function, surrounding land uses, and parking, when determining whether upgrades are required.

In line with its connector street function, Aberline Road is generally able to accommodate direct property access, consistent with the existing access arrangements on the western side. This arrangement remains appropriate for the section between Wangoom Road and Whites Road, where projected volumes remain within the amenity threshold.

However, for the section of Aberline Road between Whites Road and Boiling Down Road, where traffic volumes are projected to exceed the amenity-based threshold, measures are recommended to protect local amenity and enhance road safety outcomes:

- Prohibit direct vehicle access to abutting properties on the eastern side of Aberline Road, noting that only four existing properties on the western side currently rely on direct access; and
- Require that future subdivision layouts adjacent to this section of Aberline Road provide access via internal loop roads or service roads, to the satisfaction of the relevant road authority.

Subject to these measures being implemented, the effect of traffic volumes exceeding the amenity-based target will be minimised, and the proposed hierarchy will perform satisfactorily within its intended function.

The following cross-section is recommended for Aberline Road adjacent to the PSP:

- Retain the existing carriageway, including western kerb, traffic lanes, and parking provision.
- Provide up to 3m wide nature strip on the eastern (PSP) side, subject to landscaping and servicing requirements.
- Deliver a 3m wide shared path on the east side at 0.5m offset from the future property boundaries.

Implementing the above cross-section will require widening of the existing road reserve on the PSP side.

Aberline Road has been identified as a Strategic Cycling Corridor (SCC) route. SCC framework seeks to provide continuous, safe, and direct cycling connections between key destinations. While the desired treatment for SCCs is typically a mode-separated

bicycle facility, in the context of Aberline Road, a 3m shared path is considered appropriate and supportable for the following reasons:

- The provision of a 3m shared path exceeds the standard IDM requirement for a Connector Street Level 1.
- In regional settings, where commuter cyclists are typically lower than in metropolitan locations, the delivery of fully separated bicycle facilities is less common. A high-quality shared path is therefore an efficient and proportionate response to the expected level of demand.
- A 3m shared path provides a balanced outcome without requiring additional land take from the PSP area.

The proposed cross-sections of Aberline Road developed by the VPA, shown in **Figure 23**, will provide adequate provision to accommodate daily traffic and active travel users and align with the above transport recommendations.

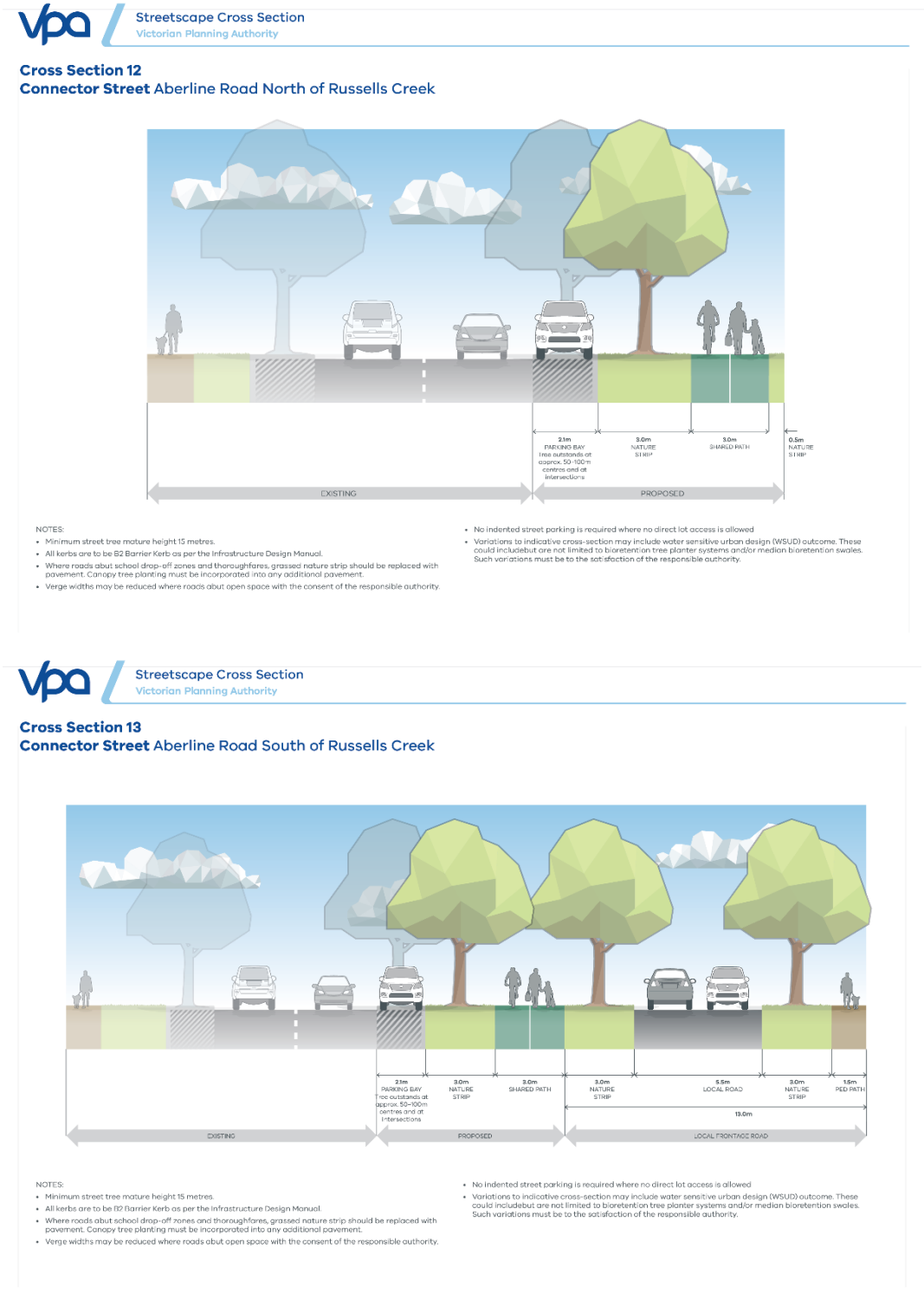


FIGURE 23: ABERLINE ROAD – PROPOSED CROSS-SECTIONS

8.2.2 Wangoom Road

Wangoom Road is projected to carry up to 8,470 vpd adjacent to the EoA PSP in the ultimate scenario. The existing layout of Wangoom Road, comprising a single lane in each direction with shoulders and limited access, has a theoretical traffic volume capacity of 18,000 vpd.

To protect the function and safety of Wangoom Road, it is recommended that no direct property access be permitted from the EoA PSP frontage. Instead, all vehicle access

should be provided via a limited number of local road intersections, designed and delivered by developers to the satisfaction of the relevant road authority. The draft Movement Network Plan identifies a small number of such connections, including one intersection serving Zone A, one serving Zones B1/B2, and a potential access point to the proposed non-government school. This controlled access arrangement will support satisfactory traffic engineering outcomes by preserving through-traffic efficiency, enhancing safety, and ensuring the long-term performance of the corridor.

With such access control in place, the existing cross-section of Wangoom Road will maintain a theoretical capacity of 18,000 vpd. Accordingly, the traffic generated by the EoA PSP will not, on its own, justify the duplication or any upgrades of Wangoom Road.

On the above basis, Wangoom Road will provide substantial residual capacity following full PSP development. Should future traffic growth or strategic planning eventually necessitate carriageway duplication, this could be accommodated on the northern side of the corridor, where a wide road reserve is available.

It is recommended that the posted speed limit be reduced to 60 km/h between Aberline Road and Horne Road, consistent with the existing speed environment to the west (between Mortlake Road and Aberline Road).

The typical cross-section of Wangoom Road should incorporate active transport facilities on the PSP side. It is recommended that a 3m shared path, supplemented by on-road cycle lanes, be provided adjacent to the PSP boundary to align with the function of an SCC route.

The 3m shared path offers a high-quality facility that is both efficient and proportionate to the expected level of demand in this regional context. In parallel, the provision of on-road cycle lanes accommodates more confident and experienced cyclists who may prefer to travel at higher speeds within the carriageway.

It is also relevant to consider the strategic and locational context of this corridor. Situated on the fringe of a regional city, Wangoom Road does not immediately connect to high-demand destinations typically associated with metropolitan SCC routes. In such settings, the delivery of a fully separated bicycle facility is not common practice, nor is it considered justified due to the additional land required.

8.2.3 Horne Road

Horne Road is forecast to carry between 5,310 and 18,920 vpd adjacent to the EoA PSP. This volume is within the theoretical capacity of 18,000–20,000 vpd applicable to its ultimate arterial (Council-managed) classification as discussed below.

Wangoom Road to Rodgers Road

The existing layout of Horne Road, comprising a single lane in each direction with shoulders and limited access, has a theoretical traffic volume capacity of 18,000 vpd.

Consistent with the approach applied to Wangoom Road, all vehicle access from the EoA PSP frontage should occur via a limited number of local road intersections, designed and delivered by developers to the satisfaction of the relevant road authority. The draft Movement Network Plan identifies key connections, including one intersection serving Zone B1, one serving Zone B2/NAC and two serving Zone C (refer

to **Section 8.1**). This controlled access arrangement will support safe and efficient operation of Horne Road. The PSP should also require that future subdivision layouts adjacent to this section of Horne Road provide access via internal loop roads, to the satisfaction of the relevant road authority.

With the above access control in place, the existing cross-section of Horne Road north of Rodgers Road will maintain a theoretical daily capacity of 18,000 vpd post the development of the PSP. On this basis, traffic generated by the EoA PSP will not, in itself, justify upgrading this section to a four-lane arterial. Other considerations, such as road safety, active transport needs, and adjacent access requirements, are also not expected to warrant duplication as part of the PSP.

A 3m shared path is recommended on both sides of the road to match the function of Horne Road as an SCC route. As discussed in **Sections 8.2.1** and **8.2.2**, the 3m shared path offers a high-quality facility that is both efficient and proportionate to the expected level of demand in this regional context.

The proposed cross-section of Horne Road between Aberline Road and Rodgers Road, developed by the VPA, is shown in **Figure 24**. This cross-section appropriately reflects the above transport recommendations.

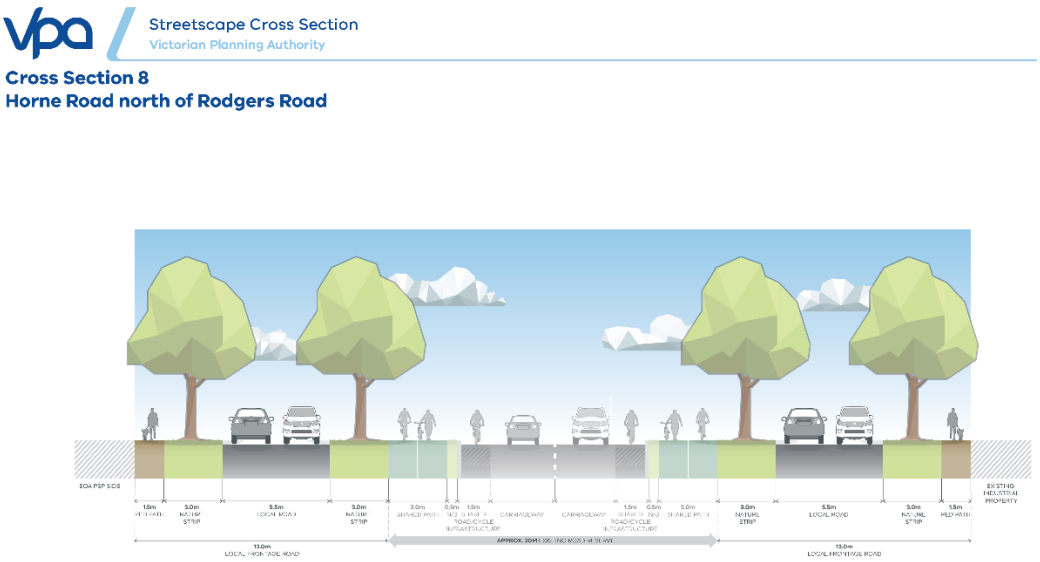


FIGURE 24: HORNE ROAD – PROPOSED CROSS-SECTION FROM ABERLINE ROAD TO RODGERS ROAD

Rodgers Road to Dales Road

The existing layout in this section provides a theoretical daily capacity of approximately 20,000 vpd. This capacity is sufficient to accommodate PSP-generated traffic, and upgrading to four lanes will not be triggered. The existing carriageway can mostly be retained with access control implemented on the PSP side.

Consistent with the northern section of Horne Road, no direct access from the PSP frontage should be permitted in this section, and all access, if required, should occur via local road intersections to the satisfaction of the relevant road authority. The PSP should also require that future subdivision layouts adjacent to this section of Horne Road provide access via internal loop roads, to the satisfaction of the relevant road authority.

Currently, industrial properties along the eastern side have direct driveway access to Horne Road. As traffic volumes increase, this arrangement will constrain road capacity and raise safety concerns. To mitigate these issues, the following access management treatments are recommended for consideration by the responsible road authority:

- Provide a centre median and alter existing access points to left-in/left-out only;
- Incorporate U-turn facilities for light vehicles at nearby signalised intersections;
- Replace existing parking lane with left-turn lane for safe and convenient access to industrial properties; and
- Accommodate right-in/right-out movements for heavy vehicles via internal industrial precinct roads as indicated in **Figure 25**.

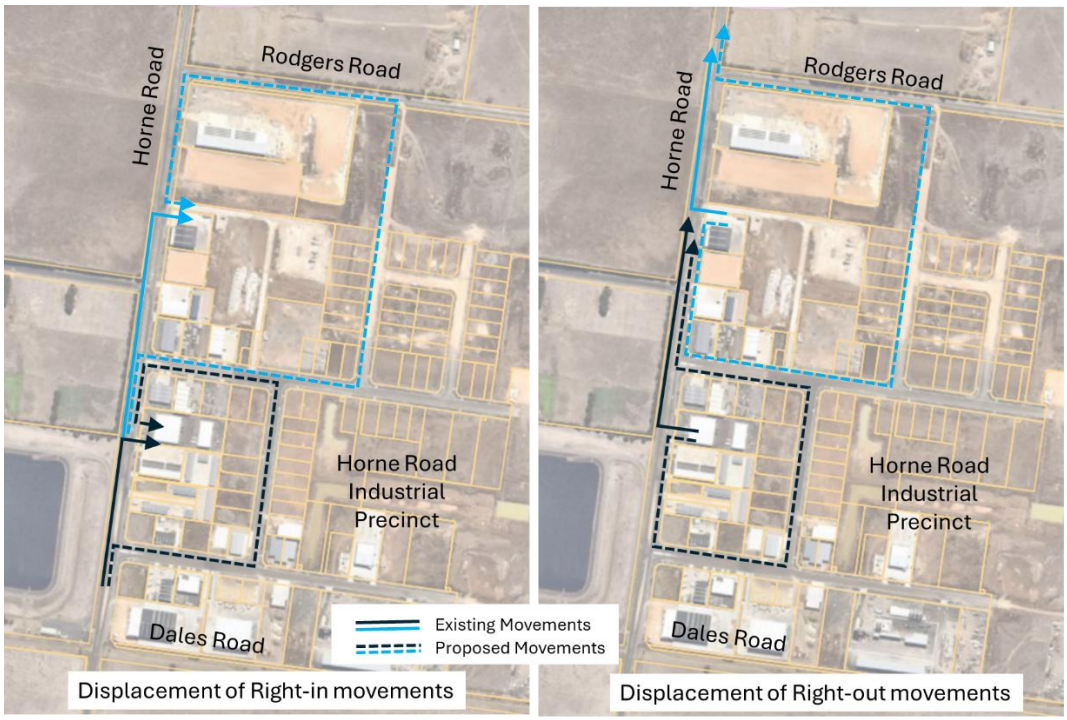


FIGURE 25: PROPOSED CHANGES TO RIGHT TURNS MOVEMENTS TO/FROM INDUSTRIAL LOTS ABUTTING HORNE ROAD

The above treatments are likely to be triggered in the long term, upon the development of Zones B2, C and F.

A 3m shared path should be included on the PSP side within the ultimate road reserve.

The proposed cross-section of Horne Road between Rodgers Road and Dales Road, developed by the VPA, is shown in **Figure 26**. This cross-section appropriately reflects the above transport recommendations.

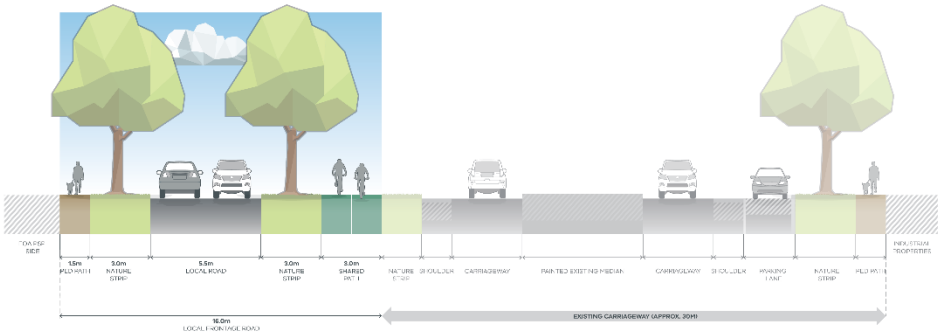


FIGURE 26: HORNE ROAD – PROPOSED CROSS-SECTION FROM RODGERS ROAD TO DALES ROAD

8.2.4 Boiling Down Road

Aberline Road to N-S Connector

Boiling Down Road is estimated to carry 7,830 to 12,200 vpd, which exceeds the maximum amenity threshold of 7,000 vpd for its proposed Connector Street classification.

It is important to note that the 7,000 vpd threshold is an amenity-based target rather than a measure of road capacity. The threshold is intended to help guide road classifications and manage outcomes such as residential character and local safety. In practice, road authorities also consider factors such as road safety, overall network function, adjacent land uses, and parking activity when determining whether upgrades are necessary.

From a traffic performance perspective, the theoretical capacity of a Connector Street is generally around twice the amenity threshold (~14,000 vpd[1]), after accounting for movements associated with direct property access and parking activity. On this basis, the forecast daily traffic volumes for Boiling Down Road are expected to remain within its theoretical operating capacity.

To manage amenity impacts and protect safety outcomes, the following measures are recommended in this section of Boiling Down Road while maintaining its proposed hierarchy of Connector Street:

- Prohibit direct property access, specifically between Gateway Road and N-S Connector

[1] 900 vehicles per hour per direction from superseded Austroads Guide to Traffic Management Part 3 (2017). Parking friction of 0.86 and access friction of 0.9 sourced from Highway Capacity Manual (USA). Daily traffic capacity = 900 vehicles per hour per direction x 2 directions x 10 conversion factor for peak hour to daily traffic x 0.86 x 0.9 = ~14,000 vehicles per day (two-way)

- Limit local access street intersections to the satisfaction of the responsible road authority, considering:
    - Two Level 2 Access Street connections identified in the draft Movement Network Plan would provide sufficient local access to Zone D1.
    - Adequate local access would be provided to Zone G via Gateway Road and Level 2 Access Street along its eastern boundary.
- Require future residential subdivision layouts to provide access via internal loop roads, to the satisfaction of the relevant road authority.
- Consider the provision of a northern service road abutting the school and community precinct. A service road could also be considered on the south side between Gateway Road and N-S Connector.

The intersection treatments at Boiling Down Road / Gateway Road and Boiling Down Road / N-S Connector Street are discussed in more detail under **Section 8.4**.

Subject to these measures being implemented, the impacts of traffic volumes exceeding the amenity-based threshold will be effectively managed, and Boiling Down Road will continue to perform satisfactorily within its intended Connector Street function.

The existing residential developments adjacent to Boiling Down Road, particularly between Aberline Road and Gateway Road, and site-specific constraints on the north side, could present challenges in achieving the standard PSP cross-section. The following cross-section is recommended in this section of Boiling Down Road:

- Retain the existing carriageway, including southern kerb, traffic lanes, parking provision, and shoulders.
    - Consideration could be given to removing existing parking on the north side between Aberline Road and Gateway Road, to the satisfaction of the responsible road authority, due to no direct residential frontage.
- Provide up to 3m wide nature strip on the PSP sides, subject to landscaping and servicing requirements.
- Deliver a 3m wide shared path on the northern side at 0.5m offset from the future property boundaries:
    - This provision exceeds the standard IDM requirement for a Connector Street Level 1.
    - The facility will deliver high-quality walking and cycling infrastructure, creating safe and convenient active transport links existing population to the west and the proposed government school, civic facilities, and Sports Precinct to the east.
- Provide a 1.5m wide pedestrian path on the southern side between Gateway Road and the N–S Connector.

Implementation of the above cross-section will require widening of the existing road reserve on the PSP side between Aberline Road and Gateway Road.

The proposed cross-section developed by the VPA, as shown in **Figure 27**, appropriately responds to the above transport recommendations.

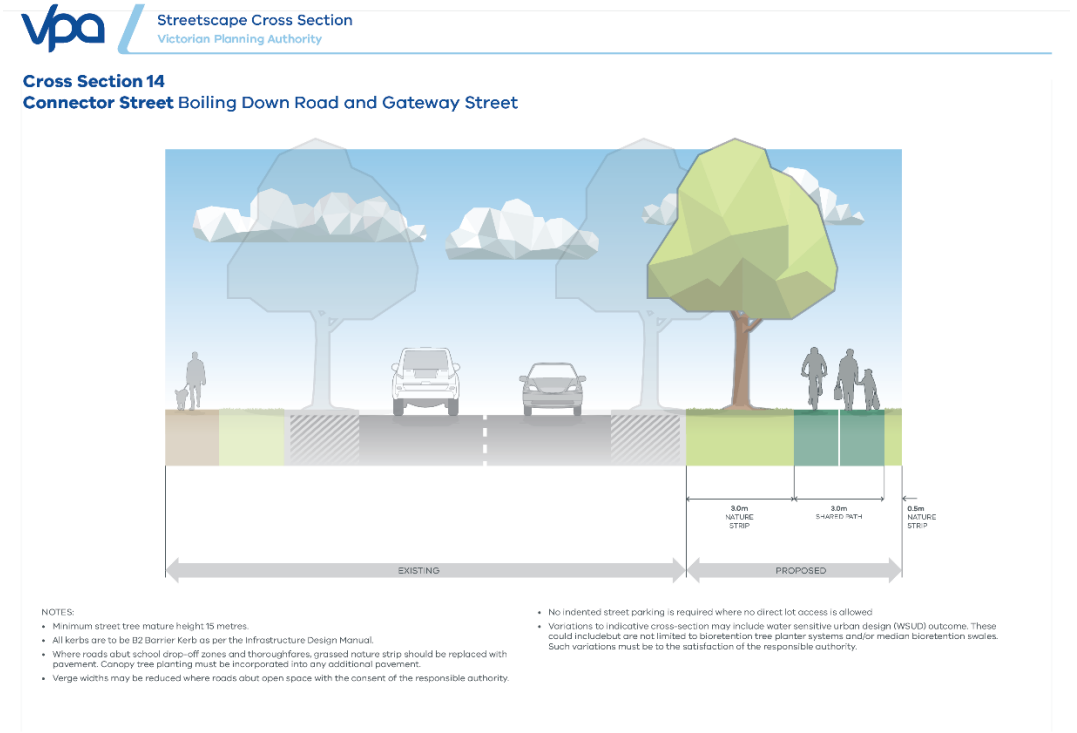


FIGURE 27: BOILING DOWN ROAD – PROPOSED CROSS-SECTION ADJACENT TO GATEWAY ROAD

N-S Connector to Horne Road

This section of Boiling Down Road is estimated to carry approximately 13,000 vpd, which exceeds the maximum amenity threshold of 12,000 vpd for its proposed Boulevard Connector Street classification.

From a traffic performance perspective, the theoretical capacity of a Boulevard Connector Street is quite similar, albeit slightly higher than that of a Connector Street. Theoretical midblock daily capacity for a Boulevard Connector Street is estimated to be in the order of 15,500 vpd, after accounting for parking activity and movements associated with direct property access. On this basis, the forecast daily traffic volumes for Boiling Down Road are expected to remain within its theoretical operating capacity.

The following measures are recommended in this section of Boiling Down Road while maintaining its proposed hierarchy of Boulevard Connector Street to manage amenity impacts and protect safety outcomes:

- Prohibit direct property access
- Require future residential subdivision layouts to provide access via internal loop, service road or access street intersections to the satisfaction of the relevant road authority.
- Permit the provision of access street intersections with right-turn lanes on Boiling Down Road to the satisfaction of the road authority.

Subject to these measures being implemented, the impacts of traffic volumes exceeding the amenity-based threshold will be effectively managed, and Boiling Down Road will continue to perform satisfactorily within its intended Boulevard Connector Street function.

The following cross-section is recommended in this section of Boiling Down Road:

- Widen the existing carriageway to provide at least 3m wide centre median to accommodate right turn lanes where required
- Provide up to 3m wide nature strip on the PSP sides, subject to landscaping and servicing requirements.
- Deliver a 3m wide shared path on the northern side at 0.5m offset from the future property boundaries:
  - This provision exceeds the standard IDM requirement for a Connector Street Level 1.
  - The facility will deliver high-quality walking and cycling infrastructure, creating safe and convenient active transport links between the proposed government school, civic facilities, and Sports Precinct to the west and Horne Road shared path to the east.
- Provide a 1.5m wide pedestrian path on the southern side between Gateway Road and the N–S Connector.

Implementation of the above cross-section will require widening of the existing road reserve on the PSP side. The proposed cross-section developed by the VPA, as shown in **Figure 28**, appropriately responds to the above transport recommendations.

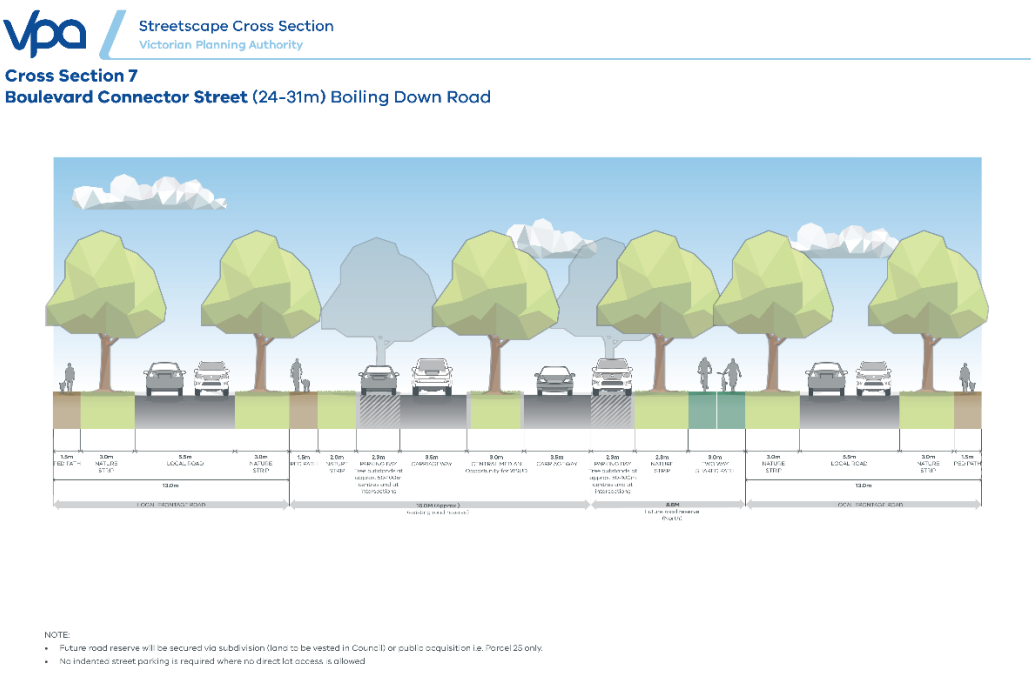


FIGURE 28: BOILING DOWN ROAD – PROPOSED CROSS-SECTION FROM N-S CONNECTOR TO HORNE ROAD

8.2.5 Gateway Road

Gateway Road is expected to carry a maximum daily traffic volume of approximately 7,410 vehicles adjacent to the EoA PSP. This is slightly above the amenity threshold of 7,000 vpd typically applied to a Connector Street. Despite this, the proposed classification of Gateway Road as a Connector is considered appropriate for the

following reasons:

- Sufficient Traffic Capacity: The theoretical capacity of a Connector Street is generally around twice the amenity threshold (i.e. ~14,000 vpd). This capacity allowance takes into account driveway activity, on-street parking, and turning movements at side streets and property accesses. The forecast traffic volume of 7,410 vpd is well within this capacity.
- Fine-Grained Local Network: The subdivision layout will deliver a permeable local street network, dispersing local traffic.

Direct property access to Gateway Road is supported along the PSP frontage, consistent with the existing access arrangements on the western side of the road.

The following cross-section is recommended for Gateway Road adjacent to the PSP:

- Retain the existing carriageway, including western kerb, traffic lanes, and parking provision.
- Provide up to 3m wide nature strip on the eastern (PSP) side, subject to landscaping and servicing requirements. A 3m width is generally considered sufficient for street trees and utilities.
- Deliver a 3m wide shared path on the eastern side at 0.5m offset from the future property boundaries.
    - This provision exceeds the standard IDM requirement for a Connector Street Level 1 and the existing 2.5m shared path currently provided along Gateway Road to the south.
    - The shared path will deliver purpose-built infrastructure to support walking and cycling demand and establish safe, convenient connections between Gateway Plaza to the south and the proposed government school, civic facilities, and Sports Precinct to the north.

Implementing the above cross-section will require widening of the existing road reserve on the PSP side. The proposed cross-section of Gateway Road is shown in **Figure 27**, which adequately responds to the above transport recommendations.

8.2.6 Rodgers Road

Rodgers Road is expected to operate within its target daily volume of 7,000 vehicles per day adjacent to the PSP area. On this basis, the proposed road hierarchy classification of Connector Street is considered appropriate.

Direct property access along the PSP frontage is supported for this classification. To complement this, it is recommended that the posted speed limit adjacent to the PSP be reduced to 50 km/h, ensuring a safer environment for all road users, particularly in the context of increased local traffic and active transport activity generated by the PSP.

Rodgers Road should be upgraded to meet the PSP's typical cross-section for a Connector Street Level 1. This would include delivery of a 3m wide shared path on the PSP side, providing purpose-built infrastructure to accommodate walking and cycling demand. The shared path will also enable continuous active transport connections to the proposed facilities along Horne Road and integrate with the broader movement network.

Summary

Based on the above considerations, the proposed road network hierarchy identified in the draft Movement Network Plan is considered appropriate and will deliver satisfactory transport and road safety outcomes, provided the recommended measures in this section are implemented.

8.3 STATE-MANAGED ARTERIAL NETWORK

A midblock capacity assessment comparing the daily volumes on Hopkins Highway/Mortlake Road and Princes Highway against the theoretical traffic capacity is summarised in **Table 11**.

This assessment indicates that ultimate traffic volumes on both Mortlake Road and Princes Highway are generally expected to remain within their theoretical midblock capacities. The only exception is Mortlake Road between Whites Road and Moore Street, where volumes may exceed theoretical capacity under full development of the EoA PSP. While duplication of this section may be required in the long term to accommodate broader network growth, any upgrades are not expected to be triggered by traffic generated from the PSP, as there is currently significant residual capacity available.

It should also be noted that the midblock capacity assessment has been based on ultimate traffic volumes. Typically, DCP-funded upgrades are designed for interim conditions. However, in this case, analysis of ultimate volumes is considered appropriate, as no arterial road duplication projects are currently planned by the road authorities.

On this basis, there is no justification for including a duplication of Mortlake Road in the DCP, nor for assigning any cost apportionment for such an upgrade to the PSP.

TABLE 11: STATE-MANAGED ARTERIAL NETWORK CAPACITY ANALYSIS RESULTS

ROAD	SECTION	EXISTING CLASSIFICATION	THEORETICAL CAPACITY (VPD)	ANTICIPATED DAILY TRAFFIC VOLUME (VPD)				
				EXISTING	BACKGROUND	EOA PSP	ULTIMATE / POST-DEVELOPMENT	WITHIN CAPACITY?
Princes Highway	West of Gateway Road	Primary Arterial (4-lane divided)	40,000[1]	22,690	5,900	8,680	37,270	Yes
	Gateway Road to Horne Road	Primary Arterial (4-lane divided)	40,000[1]	19,380	5,040	7,020	31,440	Yes
Hopkins Highway / Mortlake Road	North of Wangoom Road	Primary Arterial (2-lane undivided)	18,000[2]	5,040	1,440	1,190	7,670	Yes
	Wangoom Road to Whites Road	Primary Arterial (2-Lane, undivided)	18,000[2]	10,150	2,640	3,280	16,070	Yes
	Whites Road to Moore Street	Primary Arterial (2-lane undivided)	18,000[2]	13,450	3,500	3,760	20,710	**No**
	South of Moore Street	Primary Arterial (2-lane undivided)	18,000[2]	4,660	1,390	2,460	8,510	Yes

1 – 1,000 VEHICLES PER HOUR PER DIRECTION FROM SUPERSEDED AUSTROADS GUIDE TO TRAFFIC MANAGEMENT PART 3 (2017). DAILY TRAFFIC CAPACITY = 1000 VEHICLES PER HOUR PER DIRECTION X 2 DIRECTIONS X 2 LANES X 10 CONVERSION FACTOR FOR PEAK HOUR TO DAILY TRAFFIC = 40,000 VEHICLES PER DAY (TWO-WAY)
2 – 900 VEHICLES PER HOUR PER DIRECTION FROM SUPERSEDED AUSTROADS GUIDE TO TRAFFIC MANAGEMENT PART 3 (2017). DAILY TRAFFIC CAPACITY = 900 VEHICLES PER HOUR PER DIRECTION X 2 DIRECTIONS X 10 CONVERSION FACTOR FOR PEAK HOUR TO DAILY TRAFFIC = 18,000 VEHICLES PER DAY (TWO-WAY)

8.4 INTERSECTIONS

The key intersections bordering and within the EoA PSP area along high-order local roads, i.e. Horne Road, Wangoom Road and Boiling Down Road, have been assessed to determine the upgrade requirements and indicative layouts for the estimated ultimate traffic volumes during the AM and PM peak hours. The purpose of this assessment is to inform the Development Contributions Plan (DCP) and/or to guide Council with delivery.

It is worth noting that the intersection assessment is based on ultimate volumes, whereas DCP intersections are typically designed for interim conditions; however, in this instance, the analysis and design for ultimate volumes is appropriate because there are no arterial road duplication projects planned by the road authorities.

The traffic controls for the following key intersections have been assessed, taking into account future traffic volumes, pedestrian activity, and the proposed hierarchy of links. The intersection layouts were informed by DTP *Guidance for Planning Road Networks in Growth Areas Handbook*, VPA *Benchmark Infrastructure Designs* and/or SIDRA intersection analysis.

- Horne Road / Boiling Down Road (IN-01)
- Boiling Down Road / N-S Connector Street (IN-02)
- Boiling Down Road / Gateway Road (IN-03)
- Boiling Down Road / Aberline Road (IN-04)
- Wangoom Road / Aberline Road (IN-05)
- Wangoom Road / Horne Road (IN-06)
- Horne Road / Rodgers Road (IN-07). Insufficient grounds for the inclusion of signalisation of this intersection into the DCP or a 100% cost apportionment to the DCP
- Wangoom Road and Mortlake Road (IN-08). While this intersection has no direct abuttal to the PSP area, DTP has requested that it be assessed based on ultimate traffic conditions to inform the potential inclusion in the DCP.

It is anticipated that access intersections will be assessed through the standard planning application process and delivered by developers to the satisfaction of the responsible road authority, provided there is a nexus between the intersection works and the traffic generation from their landholdings.

The ultimate peak hour traffic movements (existing + background + EoA PSP) at key intersections have been quantitatively analysed in SIDRA Intersection to determine whether upgrades are required. Where appropriate, indicative intersection layouts have been identified. Existing turning movement counts at the study intersections were estimated based on historical traffic counts where available. The purpose of the SIDRA analysis in this context was to test whether the existing or proposed intersection layouts are capable of accommodating the forecast traffic.

SIDRA is a computer-based modelling tool commonly used to assess intersection performance. A key performance metric is the Degree of Saturation (DoS), which represents the demand-to-capacity ratio of the most critical movement at each leg of

the intersection. Based on the DTP *Supplement to Austroads Guide to Traffic Management Part 3*, the following DoS thresholds apply to this testing (noting desirable values were used instead of maximum thresholds due to regional context and absence of existing turning movement volumes):

- Signalised intersections: Desirable DoS of 0.90
- Unsignalised intersections (including roundabouts): Desirable DoS of 0.80

Beyond the above DoS, queues and delays increase disproportionately.

Key findings from the SIDRA analysis outputs, included in **Appendix D**, include:

- Horne Road / Boiling Down Road (IN-01): This intersection of a Local Arterial / Access Control Road to Boulevard Connector Street requires an upgrade to traffic signals for the benefit of almost all zones of the PSP. There is sufficient ground for the inclusion of signalisation in the DCP.
- Boiling Down Road / N-S Connector Street (IN-02): This intersection of Boulevard Connector Street and Connector Street should be designed and delivered as a four-way roundabout, which aligns well with the proposed upgrade of Boiling Down Road. There is sufficient ground for the inclusion of this intersection delivery in the DCP.
- Boiling Down Road / Gateway Road (IN-03): The existing layout provides adequate capacity to accommodate PSP-generated traffic. No upgrades will, therefore, be required to achieve the target DoS 0.80. The northern leg is anticipated to be delivered as part of the development of the adjacent landholdings, which will gain access via this link.
- Boiling Down Road / Aberline Road (IN-04): The existing roundabout provides adequate capacity to accommodate PSP-generated traffic. No upgrades will, therefore, be required to achieve the target DoS 0.80.
- Wangoom Road / Aberline Road (IN-05): The existing layout provides adequate capacity to accommodate PSP-generated traffic. No upgrades will, therefore, be required to achieve the target DoS 0.80.
- Wangoom Road / Horne Road (IN-06): The existing layout provides adequate capacity to accommodate PSP-generated traffic. No upgrades will, therefore, be required to achieve the target DoS 0.80.
- Horne Road / Rodgers Road (IN-07): This intersection of a Local Arterial / Access Control Road and a Connector Street requires an upgrade to traffic signals. Given high background/external usage and Zone F's moderate development, there may not be sufficient ground for the inclusion of the signalisation into the DCP or a 100% cost apportionment to the DCP.
- Wangoom Road and Mortlake Road (IN-08): Refer to **Section 8.4.1**.

The recommended traffic controls and other relevant considerations at the above key intersections are shown in **Figure 29**.

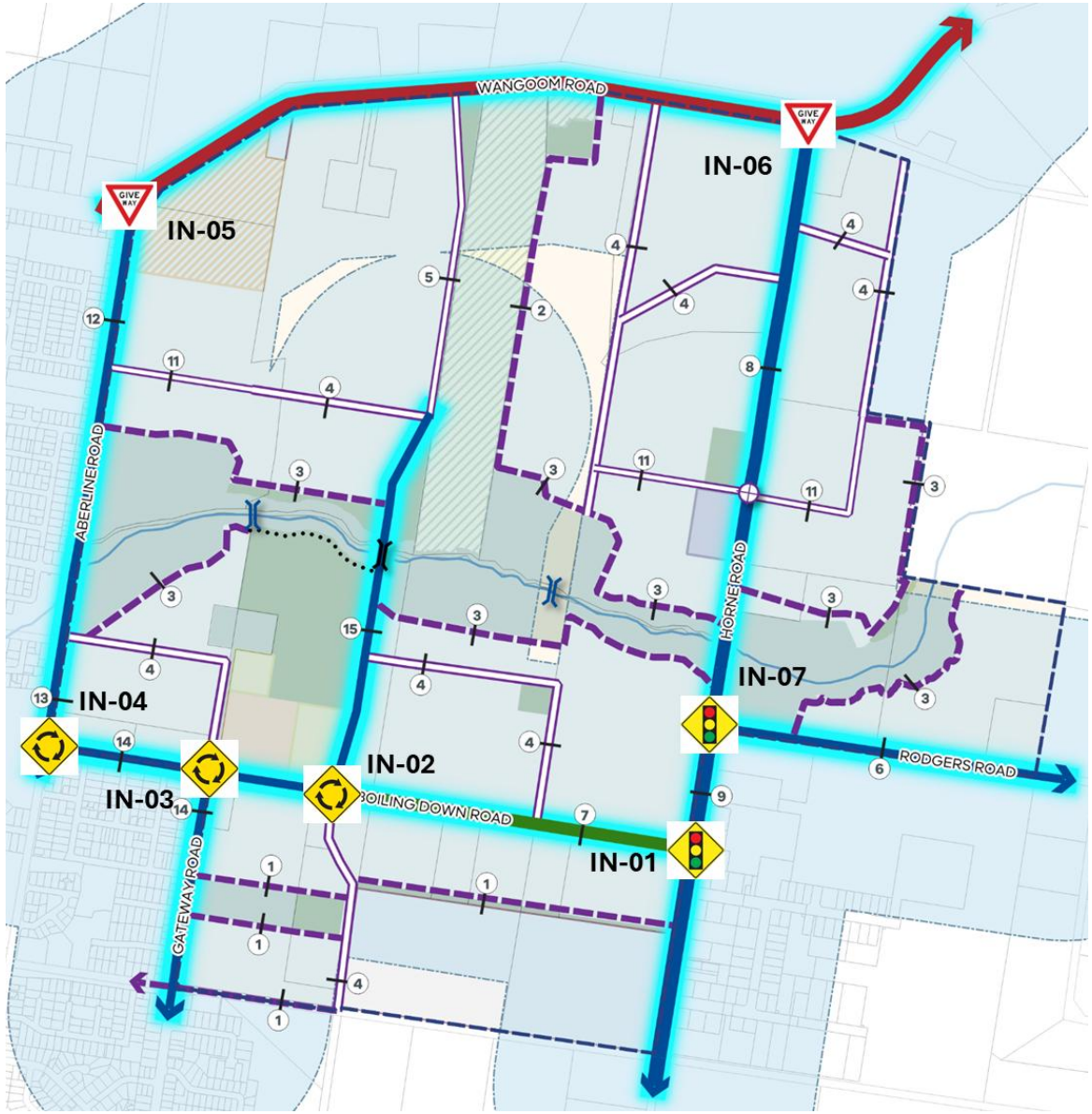


FIGURE 29: RECOMMENDED TRAFFIC CONTROL AT KEY INTERSECTIONS

The recommended ultimate layouts that would achieve acceptable performance for the study intersections are presented in **Table 12**. The turn lane lengths for the proposed signalised intersections have been guided by the design principles set out in the *Guidance for Planning Road Networks in Growth Areas handbook (Table 5-2)*, VPA *Benchmark Infrastructure Designs* or the estimated 95th percentile queues, whichever is greater.

TABLE 12: INDICATIVE ULTIMATE LAYOUTS AT STUDY INTERSECTIONS

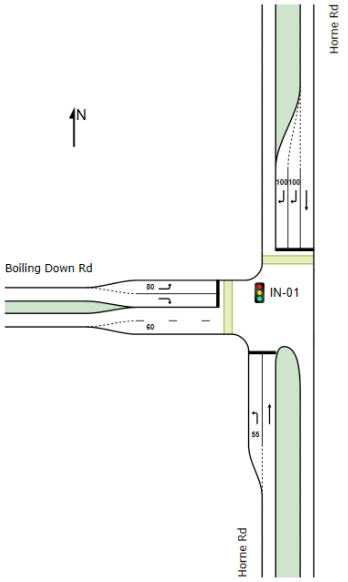
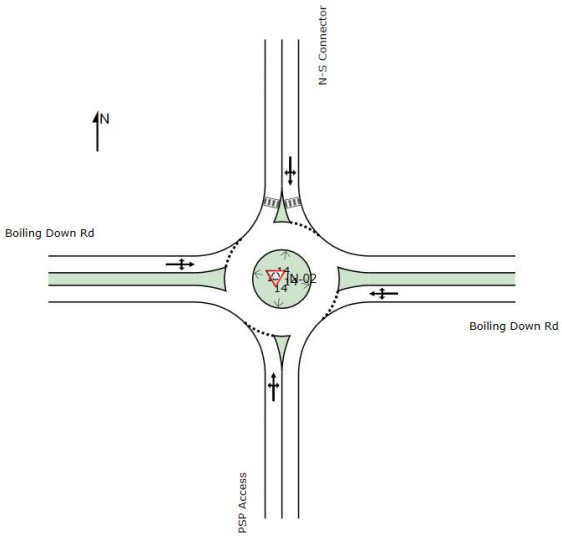
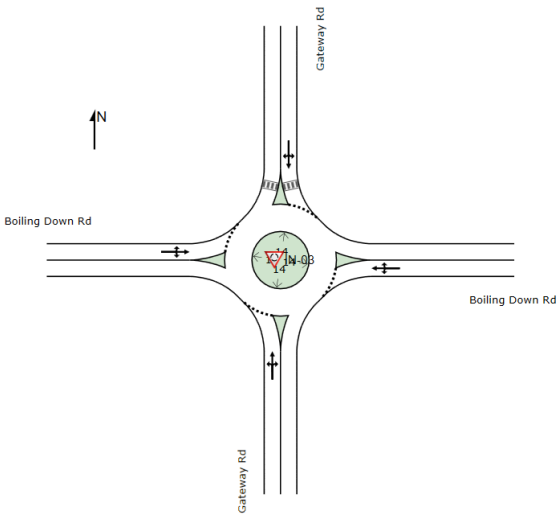
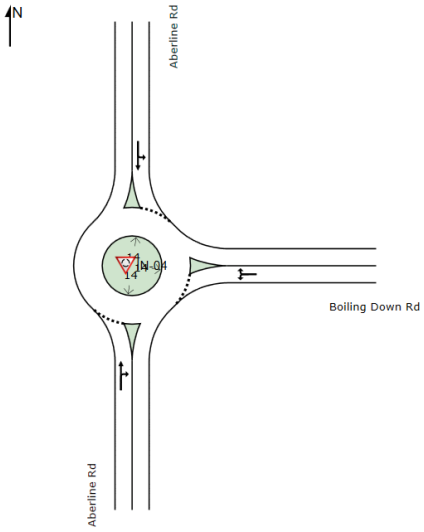
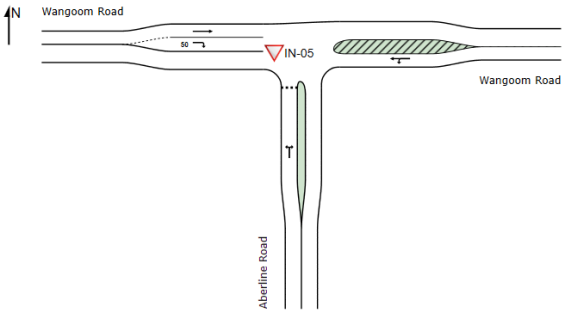
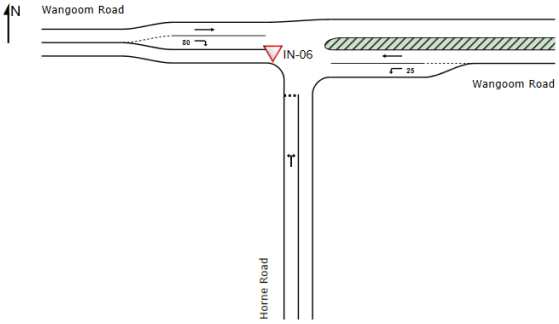
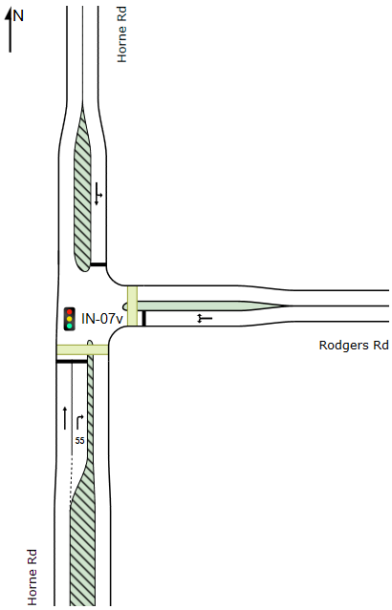
IN-01: Horne Road/Boiling Down Road (upgrades required) 	**IN-02: Boiling Down Road/N-S Connector Street** (new intersection) 
IN-03: Boiling Down Road/Gateway Road (existing layout plus northern leg) 	**IN-04: Boiling Down Road/Aberline Road** (existing layout) 

TABLE 12 CONTD: INDICATIVE ULTIMATE LAYOUTS AT STUDY INTERSECTIONS

IN-5: Wangoom Road/Aberline Road (existing layout) 	**IN-6: Wangoom Road/Horne Road** (existing layout) 
IN-7: Horne Road/Rodgers Road (upgrades required) 	

The following commentary is made in relation to the likely controls and layouts at the study intersections:

- IN-01: High right-turn traffic volumes from Horne Road onto Boiling Down Road are expected in the ultimate conditions, necessitating dual right-turn lanes.
- IN-02: The ultimate layout will be influenced by the proposed boulevard treatment along Boiling Down Road.
- IN-07: Signalisation will likely be required in the long term, particularly once development within Zone F commences and traffic demand increases.

8.4.1 Mortlake Road / Wangoom Road Intersection

Warrnambool Municipal Road Hierarchy Review and *Traffic Management Plan* (March 2017), commissioned by Council, identified this intersection as “approaching or operating over capacity and experiencing significant delays” based on stakeholder feedback. This study recommended signalisation of this intersection in the longer term to support growth in North East Warrnambool, with responsibility noted as DTP/Council.

AM and PM peak hour traffic volumes at this intersection have been estimated for the background (i.e. existing traffic plus background growth, excluding PSP-related traffic) and ultimate (comprising full development of the EoA PSP) scenarios. These estimates were derived using observed directional splits from available traffic count data, supplemented with reasonable assumptions regarding turning movement distributions based on surrounding trip attractions.

The resulting traffic volumes for background and ultimate scenarios, presented in **Figure 30** and **Figure 31**, were assessed using SIDRA Intersection 9.1 to test intersection performance and determine whether upgrades would be required.

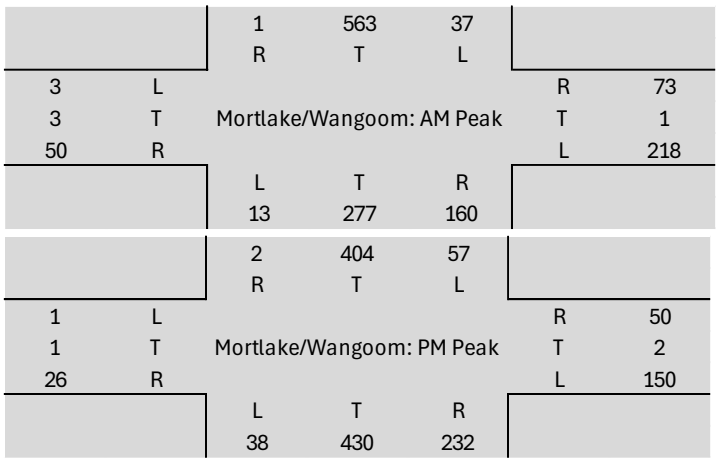


FIGURE 30: ESTIMATED BACKGROUND TRAFFIC VOLUMES AT MORTLAKE ROAD/WANGOOM ROAD INTERSECTION

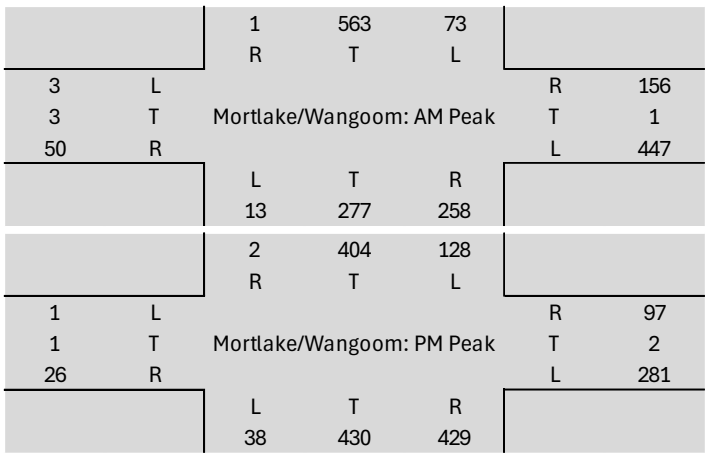


FIGURE 31: ESTIMATED ULTIMATE TRAFFIC VOLUMES AT MORTLAKE ROAD/WANGOOM ROAD INTERSECTION

SIDRA analysis outputs, included in **Appendix D**, indicate that the Wangoom Road approach to this intersection would operate with a DoS of 1.086 (i.e. over capacity) during the AM peak hour under the background traffic scenario. This performance deficiency would therefore trigger the need for signalisation irrespective of PSP development. The addition of PSP-generated traffic would further exacerbate delays during both AM and PM peak hours, but it does not fundamentally change the requirement for signalisation, which is already warranted under background conditions.

On this basis, the need for signalisation arises independently of the PSP, and there is therefore no direct nexus to include this intersection upgrade in the DCP or apportion

the cost of signalisation to the EoA PSP.

8.5 PUBLIC TRANSPORT NETWORK

The draft Movement Network Plan identifies a network of bus-capable roads within and adjacent to the EoA PSP and demonstrates how these networks will integrate with existing transport services in Warrnambool to deliver a connected and integrated network.

All roads bordering the EoA PSP, e.g. Wangoom Road, Horne Road, Gateway Road, Boiling Down Road, Aberline Road and Rodgers Road, can accommodate bus routes. The north-south connector within the PSP will be designed to be capable of carrying bus movements.

Existing Warrnambool bus services, including Routes 2 and 3, operate along Aberline Road and Whites Road on the southwestern boundary of the PSP. These services provide direct connections to the CBD, Warrnambool Railway Station, schools, and other key destinations.

The PSP network allows for seamless extensions of these existing routes into the PSP area, with opportunities to expand coverage to the north and east. For example:

- A future service on Horne Road could serve the proposed NAC and adjoining high to medium-density residential areas.
- A future service along Boiling Down Road and/or the internal north–south connector could directly connect the Civic and Sports Precinct to surrounding neighbourhoods and the wider Warrnambool bus network.

A north-south connector within the PSP will be designed to accommodate bus movements. However, as this connector transitions to a Local Access Street Level 2 in the north, a bus route extension to Wangoom Road is not currently proposed. The bushfire setback in this location may provide an opportunity for future investigation of an upgrade to the Local Access Street Level 2 to make it bus-capable if required. It is therefore recommended that the draft Movement Network Plan be updated to identify this street as a 'Potential upgrade for bus-capable route' to ensure flexibility for future network planning.

The proposed road layout has been planned to ensure that the majority of dwellings are within 400m walking distance of a potential bus stop, consistent with Public Transport Victoria guidelines. This maximises accessibility to public transport from all parts of the PSP.

While the implementation of new bus services and the improvement of existing routes are matters for public transport operators and the DTP, the draft Movement Network Plan will provide numerous opportunities to operate bus routes within and surrounding the PSP area.

8.6 BICYCLE AND PEDESTRIAN NETWORK

The PSP area is bordered by SCC routes identified by DTP, such as Aberline Road, Wangoom Road and Horne Road, as discussed in **Section 4.5**. In addition, Council has identified an SCC route along Russells Creek. The SCC routes support the needs of commuter trips (to work or education), which include essential trips, such as stations,

shops or schools. SCC routes generally support longer trips and integrate with the broader active transport network.

The recommended bicycle network and infrastructure provision within and surrounding the PSP is shown in **Figure 32**.

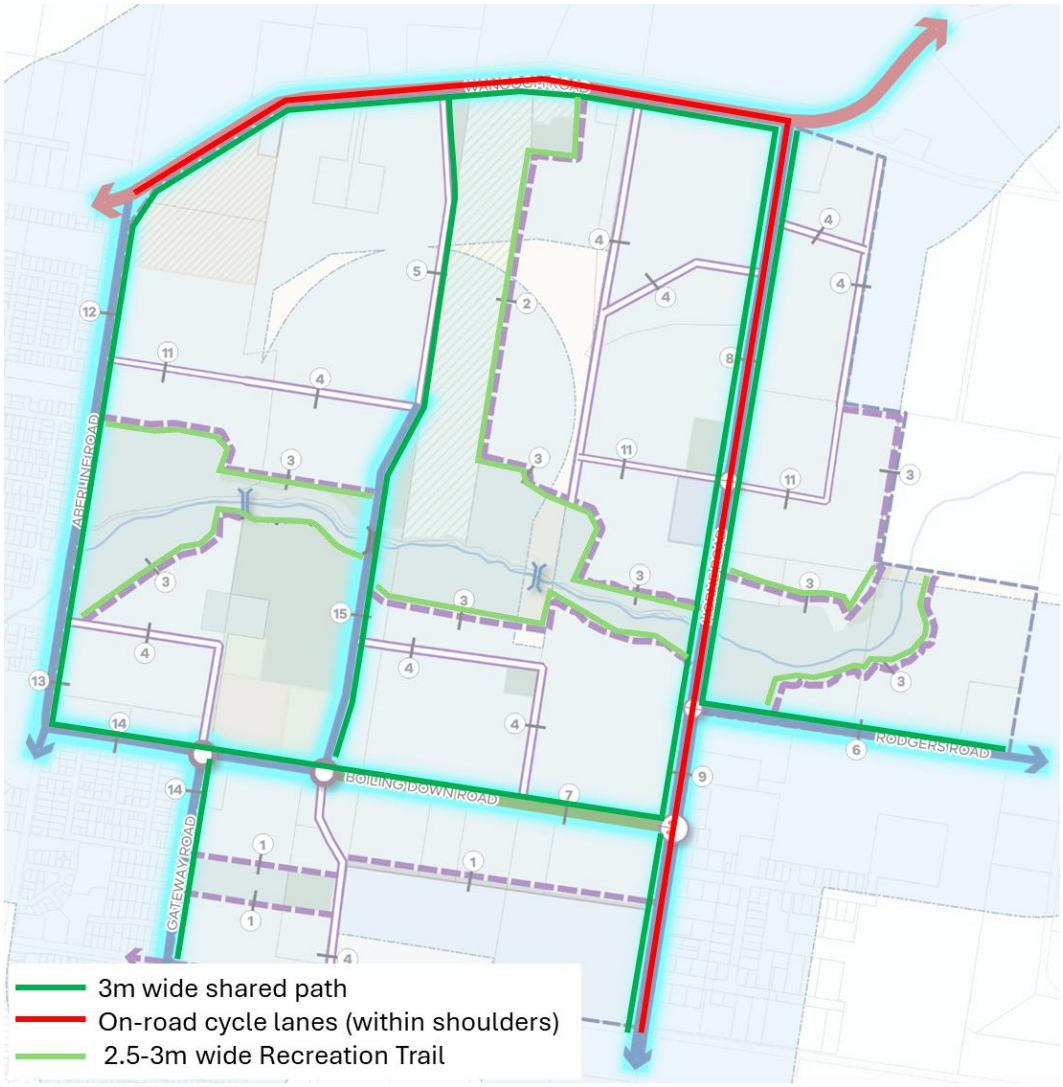


FIGURE 32: RECOMMENDED BICYCLE NETWORK

The following bicycle treatments are considered adequate to support the SCC routes:

- Aberline Road: a 3m shared path on the eastern side;
- Wangoom Road: a 3m shared path on the southern side supporting all ages and abilities users and on-road cycle lanes within shoulders supporting more confident and experienced cyclists (e.g. for purposes of fitness/training cycling);
- Horne Road (Rodgers Road to Wangoom Road): a 3m shared path on both sides supporting all ages and abilities users and on-road cycle lanes within shoulders supporting more confident and experienced cyclists; and
- Horne Road (Rodgers Road to Dales Road): a 3m shared path bicycle facility on the western side supporting all ages and abilities users and on-road cycle lanes within shoulders supporting more confident and experienced users; and

- Russells Creek: a 2.5-3m wide recreation trail / shared path along Russells Creek within the EoA PSP area, pending further design feasibility investigation during the planning and delivery of this facility. This path is to be included in the cross-section for the Russells Creek & Drainage Reserve Perimeter Roads.

As discussed in **Section 8.2**, the SCC framework seeks to provide continuous, safe, and direct cycling connections between key destinations. While the desired treatment for SCCs is typically a mode-separated bicycle facility, in regional settings, where commuter cyclists are typically fewer in number than in metropolitan locations, the delivery of fully separated bicycle facilities is less common. A high-quality shared path is therefore an efficient and proportionate response to the expected level of demand, leading to a balanced outcome without requiring additional land take from the PSP area.

A 3m shared path is also recommended on the following perimeter roads to extend the bicycle network adjacent to the PSP area and provide connections to external destinations:

- Boiling Down Road on the north side between Aberline Road and Horne Road. This facility will enable convenient access to the proposed government school, civic and sports Precinct as well as the Horne Road industrial area at the eastern end.
- Gateway Road on the east side between Boiling Down Road and Dales Road. This facility will enable convenient access to commercial and retail destinations, such as Gateway Plaza and its surrounds.
- Rodgers Road on the north side between Horne Road and the EoA PSP boundary. This route will allow the future community to conveniently access shared path along Horne Road.
- N-S Connector on the east side between Wangoom Road and Boiling Down Road. This route will link the communities from the north to the government school and civic and sports precinct across Russells Creek.

Consistent with the IDM cross-sections, footpaths will need to be provided on both sides of connector streets and Council arterial roads (except for Wangoom Road, where a shared-use path is recommended on the south side only) within and surrounding the PSP area. Although not shown on the PSP plans, it is anticipated that all local access streets will also include footpaths on both sides of the road.

In addition to the active transport infrastructure, safer speed limits should be implemented within and adjacent to the EoA PSP as follows:

- Wangoom Road: speed limit reduced to 60km/h between Horne Road and Aberline Road
- Horne Road: speed limit reduced to 60km/h between Wangoom Road and Dales Road
- Aberline Road and Boiling Down Road: speed limit reduced to 50km/h adjacent to the PSP area
- Rodgers Road: speed limit reduced to 50km/h adjacent to the PSP area

8.7 FREIGHT

The proposed classification of Wangoom Road as a local arterial will readily support freight movements. Following the development of the EoA PSP, freight movements are anticipated to reduce on Boiling Down Road. It is recommended that Council develop a Local Area Traffic Management plan for the street network adjacent to Horne Road Industrial Precinct to ensure minimal freight movements.

8.8 STAGING

The draft Staging Plan indicates that the DCP would deliver three key transport projects in the short term (<10 years). This includes:

- IN-01: Horne Road/Boiling Down Road intersection
- IN-02: Boiling Down Road/N-S Connector
- BR-01: N-S Connector bridge connection across Russells Creek

These projects are anticipated to adequately accommodate traffic likely to be generated by Zones A, D1, D2, E and G, which are proposed to be developed in the short term.

9 PSP GUIDELINES ASSESSMENT

This section provides an assessment of the PSP against the targets outlined in VPA's *Precinct Structure Planning Guidelines: New Communities in Victoria (October 2021)*. These guidelines establish a framework for safe, accessible, and well-connected communities within greenfield Precincts. It is noted that many principles in this framework refer to Plan Melbourne 2017-2050 Principles, a State Government strategic vision. Some of these principles may not be applicable in a regional context.

Key features and targets of the PSP Guidelines related to integrated transport planning are discussed below, including:

- Movement and Place (Feature 5)
- Arterial road network (Target 5)
- Off-road bicycle paths (Target 6)
- Footpaths (Target 7)
- Pedestrian and cyclist crossings (Target 8)
- Access to public transport (Target 9)

9.1 MOVEMENT AND PLACE (FEATURE 5)

Although the Movement and Place Framework has not been explicitly applied to develop classifications for roads/streets within and bordering the PSP, the proposed infrastructure treatments and cross-sections indicate an aspirational outcome for each of the different modes, responding to varying land use and transport functions.

A high-level evaluation of these treatments has been undertaken to suggest the potential Movement and Place outcomes. The focus has been on strategically

classifying 'Movement' aspects of the roads, which recognise their function in facilitating the movement of people and goods, rather than focusing on the 'Place' aspects, which relate more to the quality of the public realm and streetscape amenity.

Key commentary includes the following:

- Council-managed arterial/access control roads, such as Wangoom Road, are designed for higher traffic volumes, supporting movements within a municipality, indicating an M4 classification.
    - To support their aspirational designation as an SCC, the most suitable and context-specific bicycle facilities (i.e., shared paths and on-road cycle lanes) are proposed, which align well with a C2/W3 classification.
    - Due to the higher movement classification, these two roads can readily accommodate support freight routes (indicating F3 classification) and bus movements (indicating B4 classification).
- All connector streets, such as Aberline Road, Boling Down Road, Gateway Road, N/S Connector, etc., are designed to support local traffic volumes predominantly, indicating M5 classification.
    - Moderate cycling classification (potentially C3) is suitable for these connectors due to the proposed provision of 3m shared paths.
    - There is a need to secure these aspirational classifications by reducing the number/severity of conflicts within roads (e.g. raised priority crossings).
- All M4 and M5 roads mentioned above will be municipal walking links, indicating W3 classification to support pedestrian movements to and around activity generators, such as activity centres, schools and bus stops.
- Higher bus classification (for example, B4) need to be assigned along the PSP's connector streets that will be made bus capable. This suggests that additional infrastructure may be necessary to provide stops if required.

9.2 ARTERIAL ROAD NETWORK (TARGET 5)

The following target was identified within the PSP Guidelines:

T5 The arterial road network should provide a 1.6km road grid with safe and efficient connections, adjusted where necessary to reflect local context.

The East of Aberline PSP's proposed arterial road network does not adhere to the 1.6km grid target. This target is identified as a guiding principle and not a strict requirement. Upgrading Horne Road and Wangoom Road to arterial roads would result in an arterial road network grid of approximately 3.2km with Mortlake Highway to the west and the Princes Highway to the south. Notably, Wangoom Road and Horne Road have been recommended as limited access 2-lane roads, which will support the functional requirements of through traffic within and around the precinct.

The guidelines allow for adaptation in a regional context. It is noted that land characteristics of the PSP's land pose environmental, topographical and land ownership constraints. The provision of road reserves within the PSP is limited due the presence of Russells Creek, Tozer Reserve, and crown land where roads may not be able to traverse.

The PSP's internal road network and its connections to existing and proposed local arterial road network aims to provide safe and efficient movement within and in the vicinity of the Precinct. The traffic model indicates that:

- Aberline Road, as a Connector Street, will operate within its amenity capacity north of Whites Road, while its amenity target volume will be exceeded between Whites Road and Boiling Down Road by 1,500 vpd; Aberline Road will meet its theoretical traffic capacity throughout. As discussed in **Section 8.2.1**, no direct lot access should be permitted in this section of Aberline Road to improve road safety outcomes and protect the role and function of this road.
- Boiling Down Road, as a Connector Street or Boulevard Connector Street, will generally exceed its amenity target volume. Boiling Down Road will meet its theoretical traffic capacity throughout. As discussed in **Section 8.2.4**, a few measures were recommended to protect residential amenity and improve road safety outcomes.

Subject to additional modelling, there may be capacity available along Wangoom Road and Horne Road to cater for the traffic exceeding the amenity thresholds, i.e. 1,500 to 2,000 along both Boiling Down Road and Aberline Road, respectively.

While a 1.6km arterial grid is not provided, the PSP's design allows for effective connections and access, demonstrating a practical application of the performance target in the context of the site.

9.3 OFF-ROAD BICYCLE PATHS (TARGET 6)

The following target was identified within the PSP Guidelines:

T6 Off-road bicycle paths should be provided on all connector streets and arterial roads, connecting where possible with the Principal Bicycle Network.

The East of Aberline PSP aims to provide off-road shared path facilities along all connector and local arterial roads. These facilities will be provided along:

- The east side of Aberline Road;
- The south side of Wangoom Road;
- Both sides of Horne Road between Rodgers Road and Wangoom Road;
- The west side of Horne Road between Rodgers Road and Dales Road;
- The north side of Boiling Down Road;
- The east side of Gateway Road;
- The north side of Rodgers Road.; and
- The east side of N-S Connector Street

During the subdivision and permit stage, the following should also be considered to ensure that the PSP meets the target:

- Safe Intersections, including considerations for signalised and priority crossings, and layouts that minimise conflict between cyclists and motorists;
- Appropriate traffic calming treatments along local streets to ensure that a safe a well-connected bicycle network is provided throughout the Precinct;

- Wayfinding and Signage ensuring that cyclists can easily navigate the network; and
- Adequate connections to the Principal Bicycle Network and SCC within greater Warrnambool.

9.4 FOOTPATHS (TARGET 7)

The following target was identified within the PSP Guidelines:

T7 All streets should have footpaths on both sides of the reservation.

Consistent with the VPA's standard cross-sections, footpaths will need to be provided on both sides of connector streets and local arterial roads (except for Wangoom Road, where a shared-use path is recommended on the south side only) within and surrounding the PSP area. The northern side of Wangoom Road is likely to remain undeveloped, not warranting the provision of a footpath at this location. This land is not within the PSP's boundary. It is anticipated that all local access streets will also include footpaths on both sides of the road.

9.5 PEDESTRIAN AND CYCLISTS CROSSING (TARGET 8)

The following target was identified within the PSP Guidelines:

T8 Pedestrian and cyclist crossings provided every 400-800m, where appropriate, along arterial roads, rail lines, waterways and any other accessibility barriers.

Pedestrian and cyclist crossings across Russells Creek are proposed to be provided at three locations within the PSP area, including at the N-S Connector Street.

It is anticipated that a signalised crossing will ultimately be provided across Horne Road at the NAC/Zone B2 access road, Rodgers Road and Boiling Down Road. The provision of underpasses along Russells Creek below Horne Road can be considered. The provision of an additional crossing across Horne Road can be investigated to fully comply with the target of providing crossings every 400-800m. These can be provided as mid-block shared use path signals or median refuges. These crossings should be strategically placed, considering the local and connector level road network and adjacent land uses, such as open spaces and key destinations. Given that no land uses, footpath or shared use paths are proposed on the northern side of Wangoom Road, crossings across Wangoom Road are not warranted.

The PSP's design should allow for cyclist crossings along all accessibility barriers, subject to the provision of additional crossings across Horne Road, with exact locations to be determined in the subdivision and detailed stages.

9.6 ACCESS TO PUBLIC TRANSPORT (TARGET 9)

The following target was identified within the PSP Guidelines:

T9 95% of dwellings should be located within either of the following walking distances (800m to train station, 600m to tram stop; or 400m to a future bus route or bus capable road).

All roads bordering the EoA PSP, e.g. Wangoom Road, Horne Road, Gateway Road, Boiling Down Road, and Aberline Road, can accommodate bus routes. All connector roads within the PSP will be designed to be capable of carrying bus movements.

Subject to the exact location of bus routes and bus stops, it is anticipated that this target will be met. Notwithstanding this, the VPA's *Precinct Structure Planning Guidelines: New Communities in Victoria (October 2021)* allows for adaptation of this target to be made at regional settings. The adaptations should support safe, accessible and well-connected communities to allow pedestrians and cyclists to utilise active transport.

10 SUMMARY AND RECOMMENDATIONS

An integrated Transport Assessment of the proposed EoA PSP has been undertaken using transport planning principles and outputs from the spreadsheet traffic model. Information presented in this report documents the existing conditions and assessment of the ultimate land use and resultant traffic demands for the PSP. The proposed draft Movement Network Plan, comprising the hierarchy of roads bordering and within the PSP, have been assessed against anticipated traffic demands.

Some of the key findings and recommendations of the report are:

- The EoA PSP area will comprise residential development with an indicative yield of 4,227 lots. Other key non-residential uses proposed in the Draft Place-Based Plan include a Neighbourhood Activity Centre, one government school, one non-government school (potential) and a civic and sport use Precinct.
- The PSP area will be accessed via the existing road network adjacent to and through the site (Aberline Road, Wangoom Road, Horne Road, Boiling Down Road, Gateway Road and Rodgers Road).
- A spreadsheet-based traffic model was developed to assess future traffic volumes in the EoA PSP, incorporating assumed/estimated existing traffic data, background traffic from nearby developments, and estimated trip generation from residential use.
- A traffic generation rate of 9 vehicle trips per day per lot (with 10% of trips occurring during the AM and PM peak hours) was adopted for the residential component. The application of these rates results in the PSP area generating 38,044 vehicle trips per day, inclusive of 3,804 vehicle trips per hour during the AM and PM peak hours.
- Internal trip generation would be significant, with non-residential uses playing a key role in reducing external travel demand. Based on the estimated traffic likely to be attracted to major non-residential uses within the PSP area, it was assumed that 22% of residential trips (equivalent to 8,369 daily trips, including 837 trips in the AM and PM peak hours) will be internal to the PSP area.
- 78% of the PSP-generated traffic (29,674 daily traffic, including 2,967 trips in the AM and PM peak hours) will be external trips. Most external trips will be attracted to existing/future uses within Warrnambool. A small percentage of external trips will be destined to regional destinations surrounding Warrnambool.
- The traffic modelling reflected the full development of the PSP and two nearby approved developments – Horne Road Industrial Precinct and Northern Edge Residential Estate.

- No annual growth rate has been applied to through traffic in the existing local road network to avoid double counting background traffic.
- An annual growth rate of 1% per year for 26 years has been applied to through traffic on Hopkins Highway/Mortlake Road and the Princes Highway to capture background traffic growth.
- The daily traffic assessment for the internal road network confirms that the indicative internal road network will effectively accommodate the anticipated ultimate daily traffic volumes, with one key recommendation:
  - Construct a direct left-in/left-out access to the NAC via Horne Road (to be delivered as part of the NAC development)
- The midblock daily traffic assessment for the full development of the EoA PSP confirms that the proposed hierarchies in the Draft Movement Network Plan will function effectively following the recommended changes:

  Aberline Road
  - Developments fronting Aberline Road to upgrade it in accordance with the proposed cross-section.
  - Prohibit direct residential access between Whites Road and Boiling Down Road.
  - Facilitate access via internal loop roads to the satisfaction of the road authority and local access street intersections

  Wangoom Road
  - Prohibit direct residential access
  - Deliver local access street intersections (as part of land development projects) and internal loop roads to the satisfaction of the road authority

  Horne Road
  - Prohibit direct residential access
  - Deliver local access street intersections (as part of land development projects) and internal loop road to the satisfaction of the road authority
  - Consider altering direct access to industrial lots to a left-in/left-out arrangement to the satisfaction of the road authority

  Boiling Down Road (Aberline Road to N-S Connector)
  - Prohibit direct residential access.
  - Facilitate access via internal loop roads and local access street intersections to the satisfaction of the authority.
  - Consider provision of a service road fronting the proposed government school and community centre.

  Boiling Down Road (N-S Connector to Horne Road)
  - Developments fronting this section to upgrade Boiling Down Road in accordance with the proposed cross-section (a boulevard with a 3m-wide median).
  - Prohibit direct residential access
  - Facilitate access via internal loop roads or service roads and local access street intersections to the satisfaction of the road authority
  - Where a local access street intersection is proposed, a dedicated turning right-turn lane must be provided to the satisfaction of the road authority.

Gateway Road

- Permit direct residential access
- Developments fronting Gateway Road to upgrade the road in accordance with the proposed cross-section.

Rodgers Road

- Permit direct residential access
- Developments fronting Rodgers Road to upgrade the road in accordance with the proposed cross-section.

- Ultimate traffic on Mortlake Road and Princes Highway is expected to remain within theoretical capacity, with the exception of Mortlake Road between Whites Road and Moore Street, which may require duplication in the long term to support broader network growth.
  - This upgrade is not triggered by EoA PSP traffic and given that no duplication projects are planned by road authorities, there is no basis to include it in the DCP or assign any cost apportionment to the PSP.
- Recommendations from the intersection assessment include:
  - Horne Road / Boiling Down Road (IN-01): Upgrade to traffic signals through DCP.
  - Boiling Down Road / N-S Connector Street (IN-02): Construct a new four-way roundabout through DCP.
  - Boiling Down Road / Gateway Road (IN-03): No upgrades required to the existing roundabout layout. Development abutting this roundabout to construct the northern leg to the satisfaction of the road authority.
  - Boiling Down Road / Aberline Road (IN-04): No upgrades required to the existing roundabout layout.
  - Wangoom Road / Aberline Road (IN-05): No upgrades required to the existing layout.
  - Wangoom Road / Horne Road (IN-06): No upgrades required to the existing layout.
  - Horne Road / Rodgers Road (IN-07): Upgrade to traffic signals in the long term, upon the development of Zone F (to be delivered by land development projects) to the satisfaction of the road authority.
- Signalisation of the Mortlake Road / Wangoom Road intersection (IN-08) would be warranted under background conditions, with PSP traffic only exacerbating existing deficiencies. As the need arises independently of the PSP, there is no nexus to include this upgrade in the DCP or apportion costs to the PSP.
- The proposed road layout ensures a large majority of dwellings are within 400m of a potential bus stop, consistent with PTV guidelines.
- Existing Warrnambool bus routes can be extended into the precinct, with opportunities for new services along Horne Road, Boiling Down Road, and the internal N-S connector.
- A potential upgrade of the proposed Access Street Level 2 north of the N-S Connector to be bus-capable should be investigated by the road authority at the time of approval of land development proposals in the locality.

- The bicycle network is recommended to feature 3m shared-use paths along SCC routes (e.g., Aberline Road, Wangoom Road, Horne Road, Russells Creek).
    - While the desired treatment for SCCs is typically a mode-separated bicycle facility, in regional settings, where commuter cyclists are typically lower than in metropolitan locations, the delivery of fully separated bicycle facilities is less common.
    - A high-quality shared path in the local context presents an efficient and proportionate response to the expected level of demand, leading to a balanced outcome without requiring additional land take from the PSP area.
- Provision of additional 3m wide shared paths on Boiling Down Road, Gateway Road, Rodgers Road and the N-S Connector will further encourage walking and cycling trips within key destinations within the PSP as well as between the PSP and its surrounds.

Overall, the assessment indicates that the proposed draft Movement Network Plan will satisfy the overall transport requirements of the EoA PSP. It has adequate connections to the surrounding road network. The recommended upgrades to roads and intersections would ensure negligible transport impacts in the surrounding area.

APPENDIX A

PSP-GENERATED PEAK HOUR TRAFFIC VOLUMES

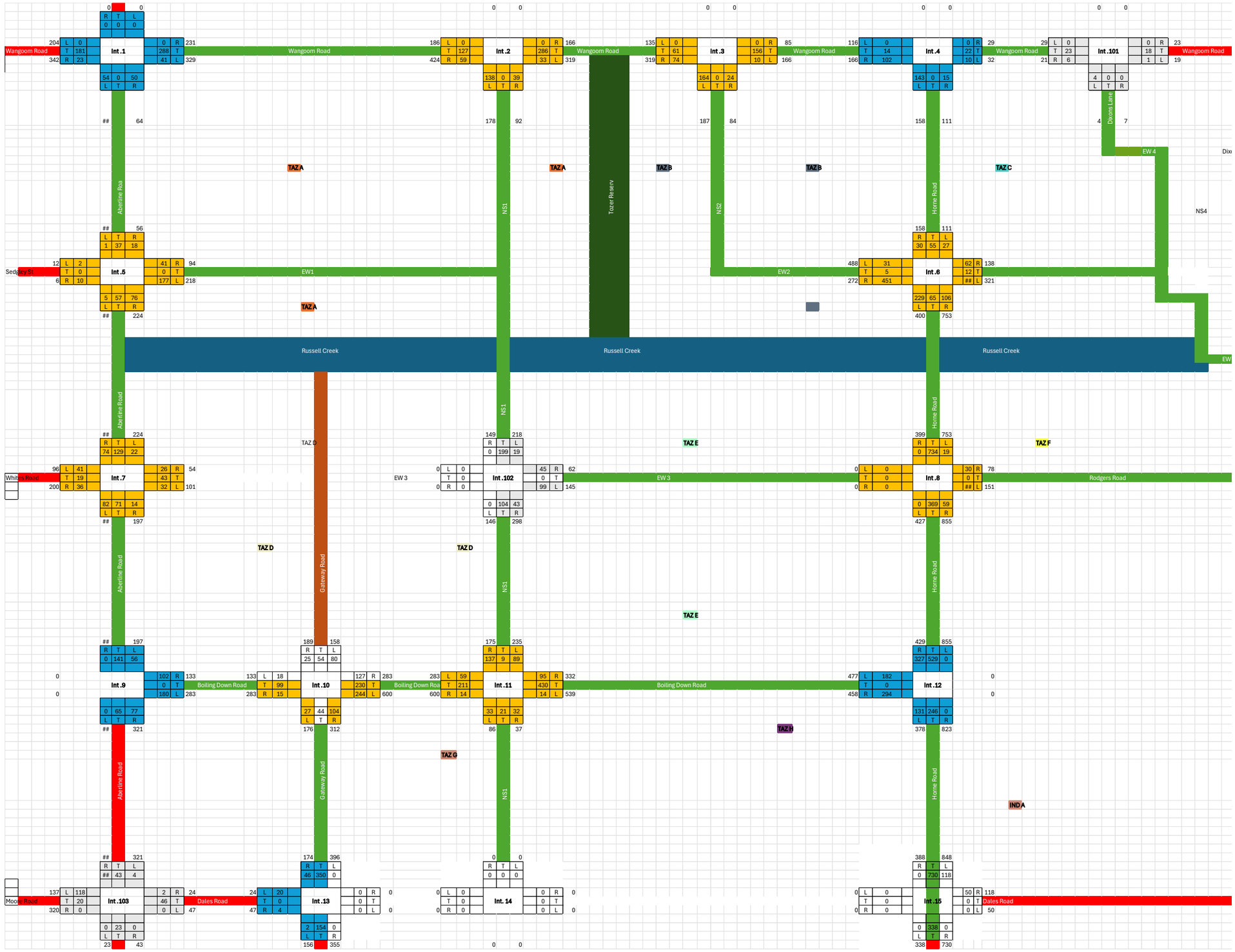


FIGURE A1: AM PEAK HOUR PSP-GENERATED TRAFFIC (LOCAL ROAD NETWORK)

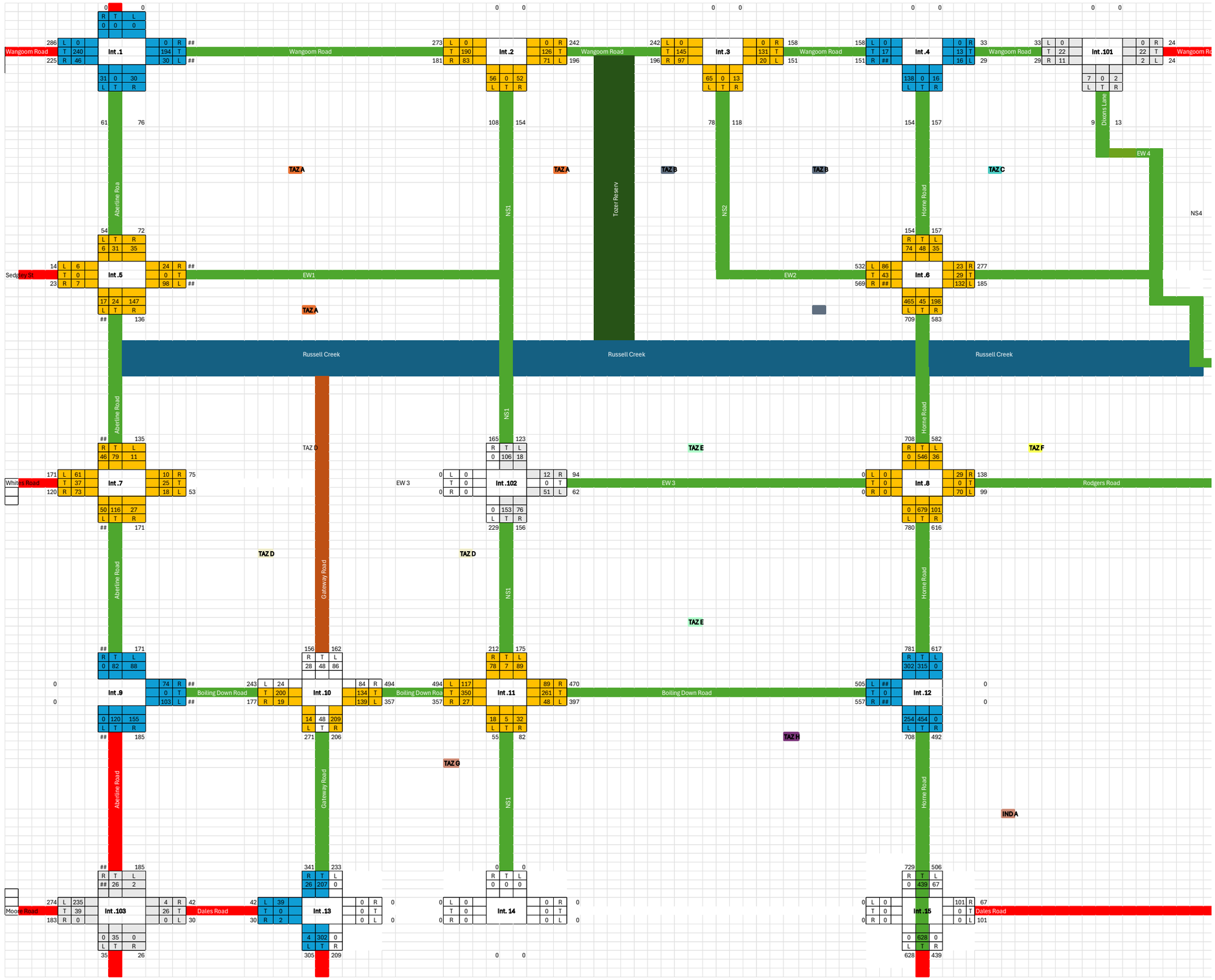


FIGURE A2: PM PEAK HOUR PSP-GENERATED TRAFFIC (LOCAL ROAD NETWORK)

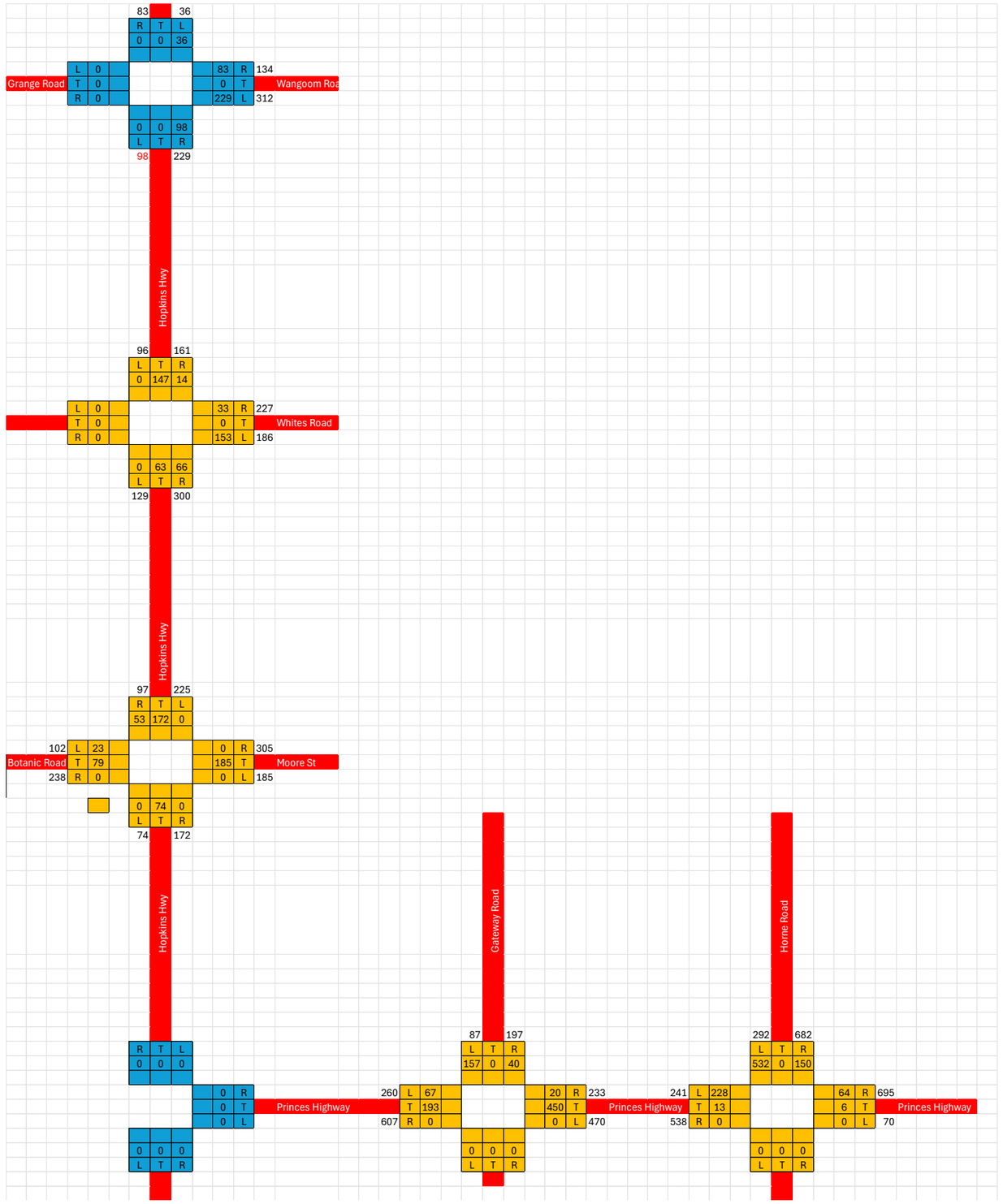


FIGURE A3: AM PEAK HOUR PSP-GENERATED TRAFFIC (DTP ROAD NETWORK)

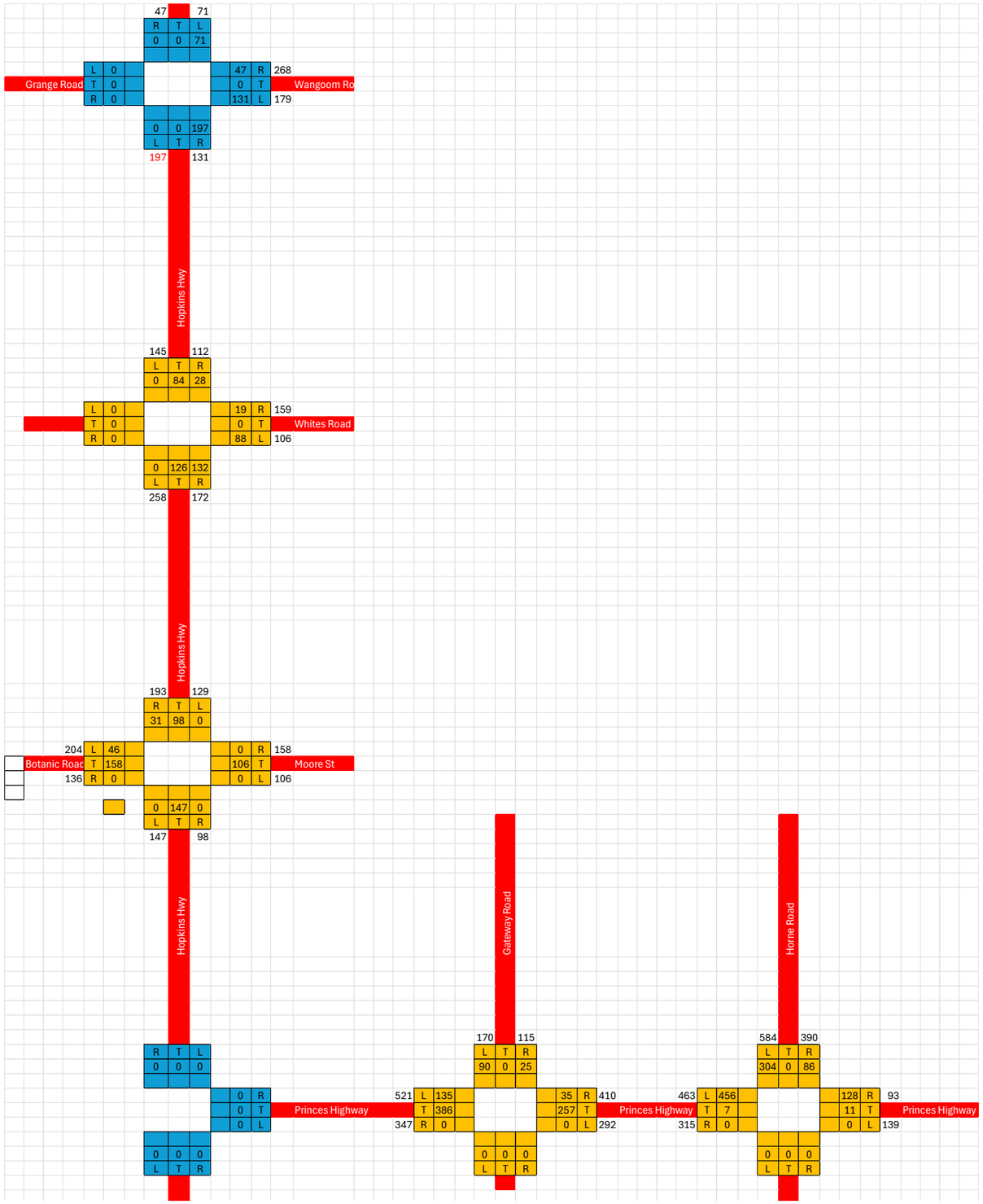


FIGURE A4: PM PEAK HOUR PSP-GENERATED TRAFFIC (DTP ROAD NETWORK)

APPENDIX B

BACKGROUND AM AND PM PEAK HOUR TRAFFIC VOLUMES

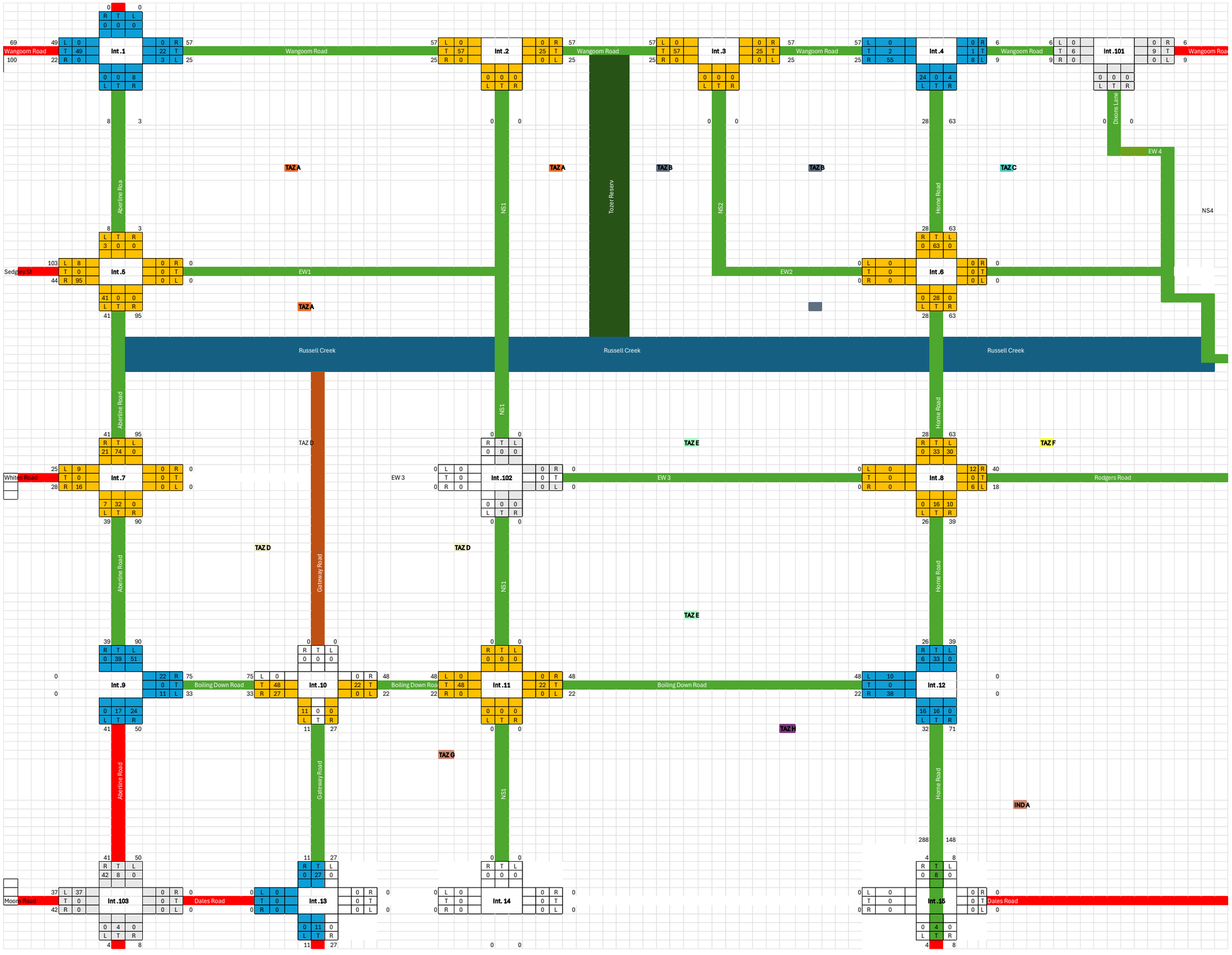


FIGURE B1: AM PEAK HOUR BACKGROUND TRAFFIC VOLUMES

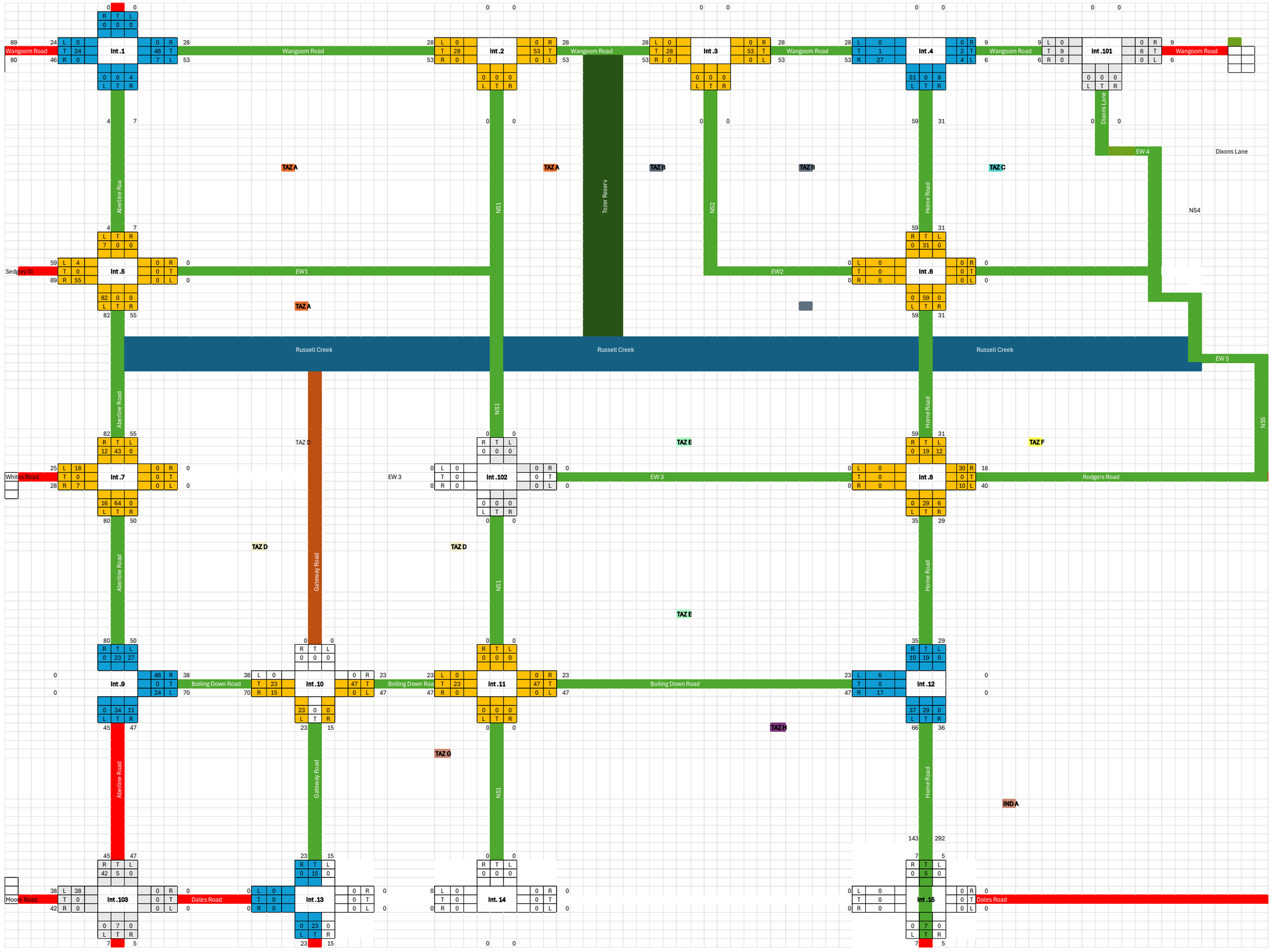


FIGURE B2: PM PEAK HOUR BACKGROUND TRAFFIC VOLUMES

APPENDIX C

BACKGROUND + PSP-GENERATED AM AND PM PEAK HOUR TRAFFIC VOLUMES

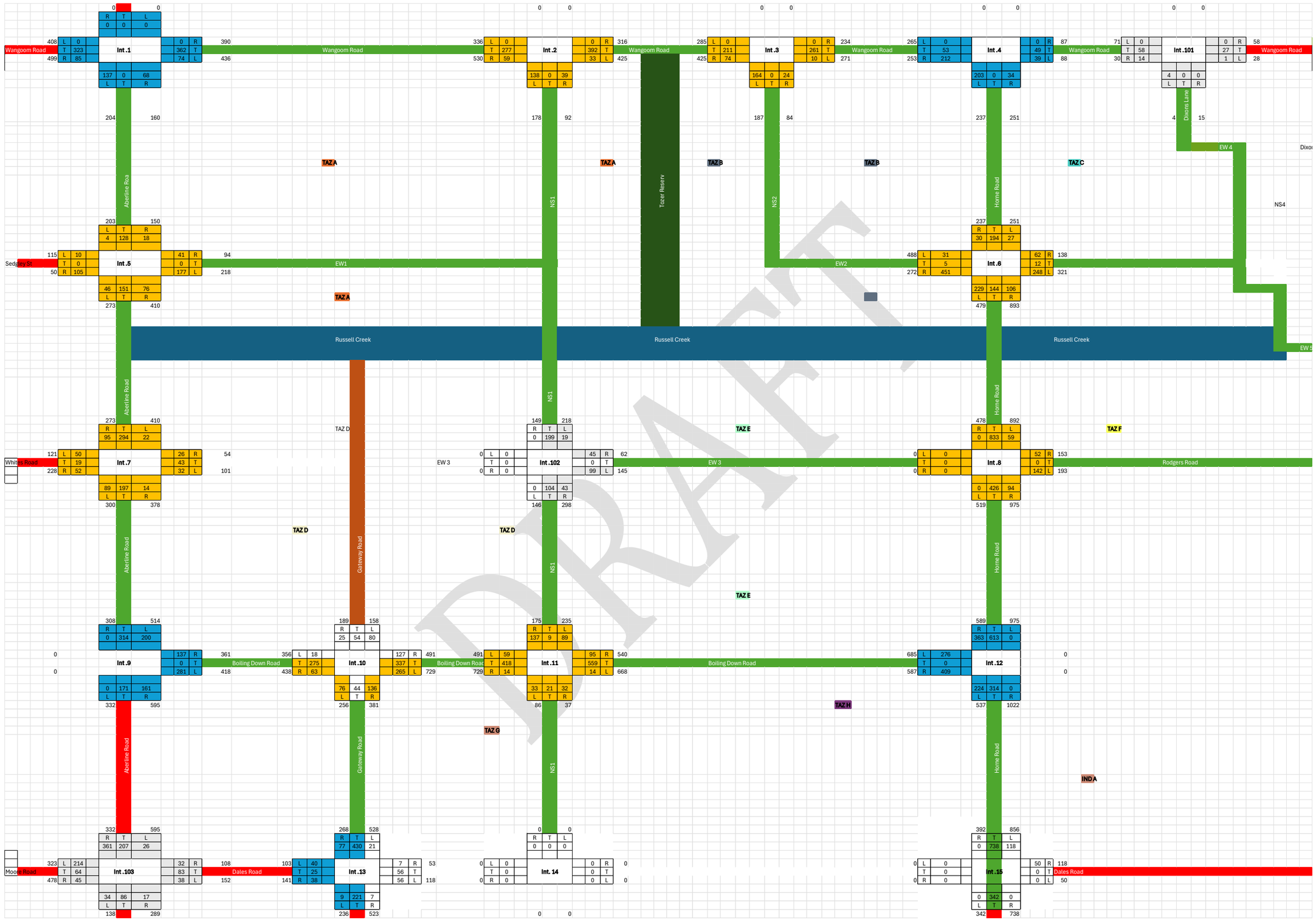


FIGURE C1: AM PEAK HOUR ULTIMATE TRAFFIC VOLUMES (LOCAL ROAD NETWORK)

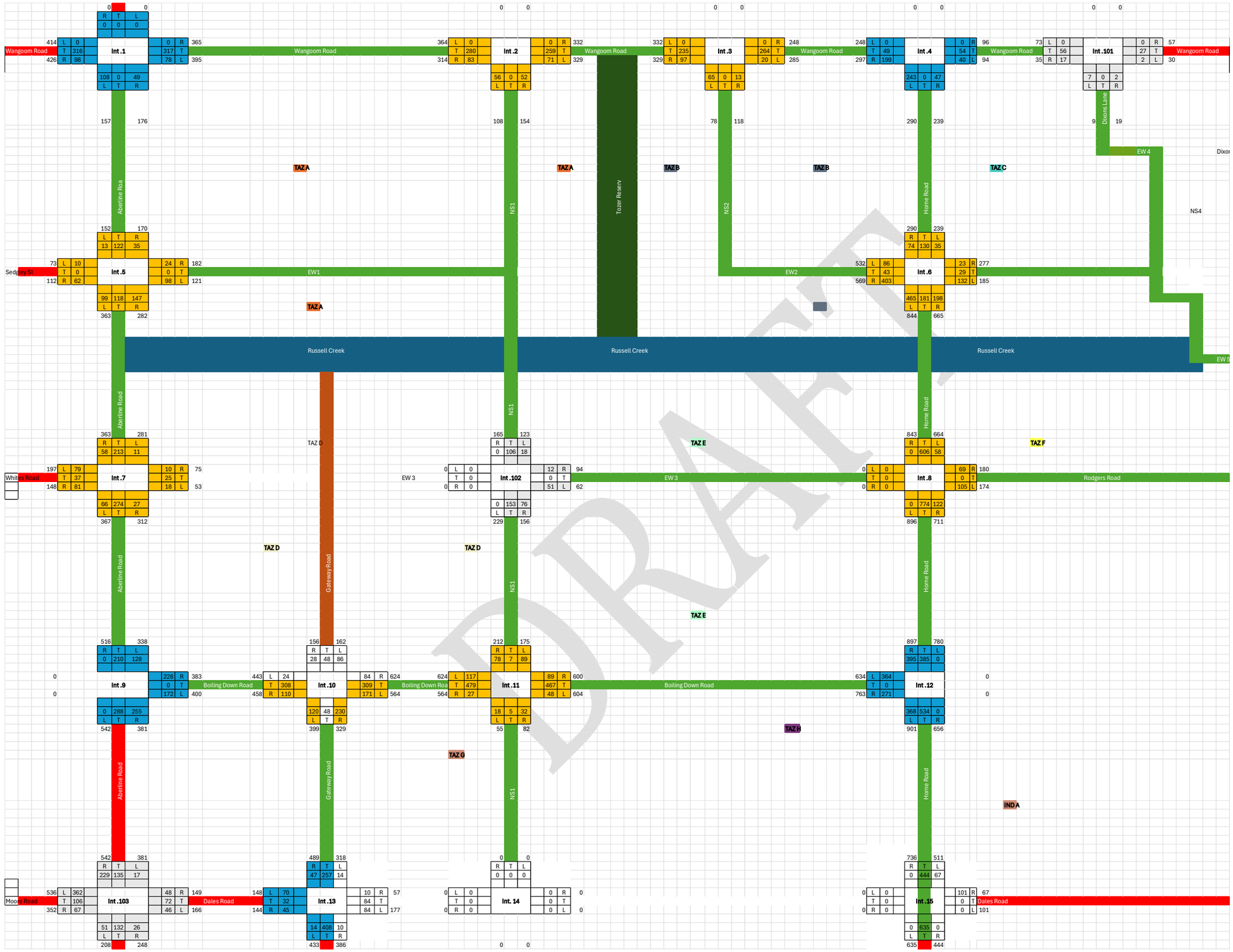


FIGURE C2: PM PEAK HOUR ULTIMATE TRAFFIC VOLUMES (LOCAL ROAD NETWORK)

APPENDIX D

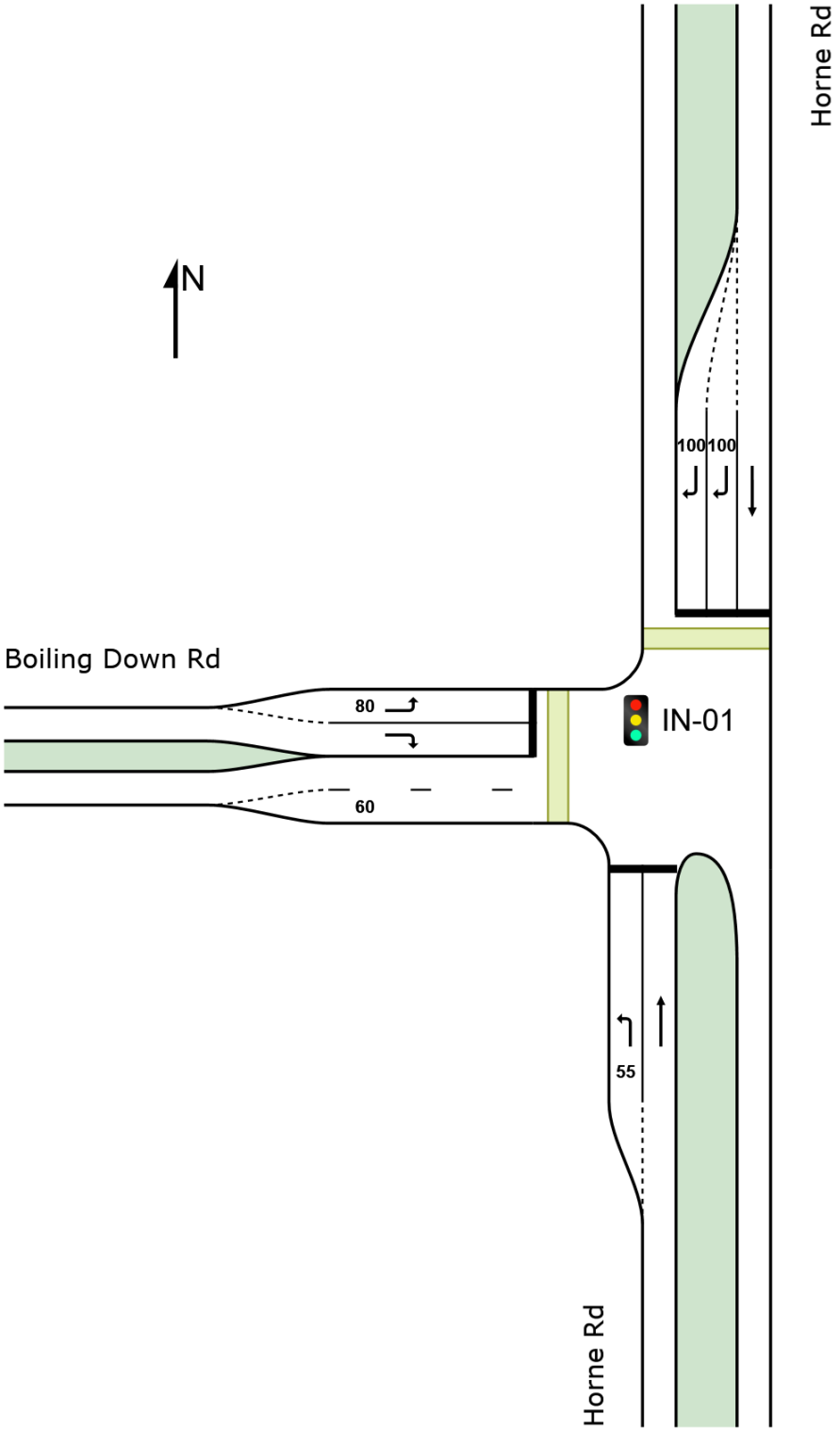
SIDRA ANALYSIS OUTPUTS

SITE LAYOUT

Site: IN-01 [IN-01 Horne Rd/Boiling Down Rd (Site Folder: Ultimate - AM)]

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-01 [IN-01 Horne Rd/Boiling Down Rd (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Horne Rd															
Lane 1	236	3.0	236	3.0	1409	0.167	100	10.5	LOS B	3.5	24.9	Short	55	0.0	NA
Lane 2	331	5.0	331	5.0	753[1]	0.439	100	27.4	LOS C	13.7	99.9	Full	500	0.0	0.0
Approach	566	4.2	566	4.2		0.439		20.4	LOS C	13.7	99.9				
North: Horne Rd															
Lane 1	645	5.0	645	5.0	728[1]	0.886	100	54.0	LOS D	39.7	290.1	Full	500	0.0	0.0
Lane 2	191	3.0	191	3.0	224	0.854	100	79.4	LOS E	12.3	88.3	Short	100	0.0	NA
Lane 3	191	3.0	191	3.0	224	0.854	100	69.9	LOS E	12.3	88.3	Short	100	0.0	NA
Approach	1027	4.3	1027	4.3		0.886		61.7	LOS E	39.7	290.1				
West: Boiling Down Rd															
Lane 1	291	3.0	291	3.0	879	0.331	100	31.5	LOS C	10.3	74.1	Short	80	0.0	NA
Lane 2	431	3.0	431	3.0	484[1]	0.889	100	66.8	LOS E	28.1	201.5	Full	500	0.0	0.0
Approach	721	3.0	721	3.0		0.889		52.6	LOS D	28.1	201.5				
All Vehicles	2315	3.8	2315	3.8		0.889		48.8	LOS D	39.7	290.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Approach Lane Flows (veh/h)

South: Horne Rd

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	236	-	236	3.0	1409	0.167	100	0.0	2
Lane 2	-	331	331	5.0	753[1]	0.439	100	NA	NA
Approach	236	331	566	4.2		0.439			

North: Horne Rd

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	645	-	645	5.0	728[1]	0.886	100	NA	NA
Lane 2	-	191	191	3.0	224	0.854	100	0.0	1
Lane 3	-	191	191	3.0	224	0.854	100	0.0	2

Approach	645	382	1027	4.3		0.886			
West: Boiling Down Rd									
Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	291	-	291	3.0	879	0.331	100	0.0	2
Lane 2	-	431	431	3.0	484[1]	0.889	100	NA	NA
Approach	291	431	721	3.0		0.889			
	Total	%HV	Deg.Satn (v/c)						
All Vehicles	2315	3.8	0.889						

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
West Exit: Boiling Down Rd Merge Type: **Priority**												
Exit Short Lane	1	60	0.0	191	194	3.05	2.03	427	1576	0.271	0.3	0.4
Merge Lane	2	-	100.0	Merge Lane is not Opposed				191	1800	0.106	0.0	0.0

Variable Demand Analysis

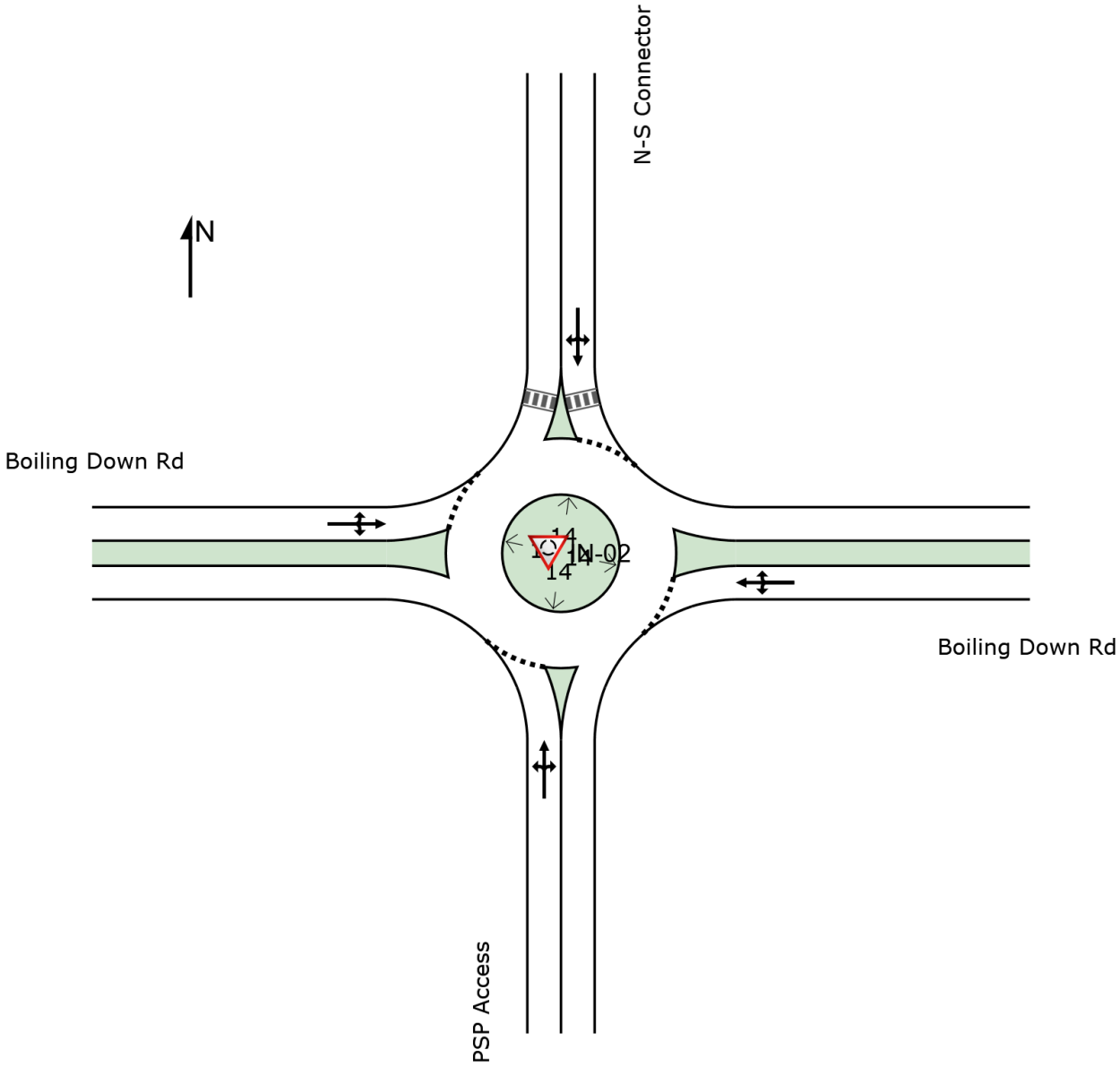
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
North: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
West: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-02 [IN-02 Boiling Down Rd / N-S1 (Site Folder: Ultimate - AM)]

Boiling Down Rd / N-S1
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-02 [IN-02 Boiling Down Rd / N-S1 (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Boiling Down Rd / N-S1
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: PSP Access															
Lane 1[d]	91	2.0	91	2.0	580	0.156	100	11.9	LOS B	1.0	7.0	Full	500	0.0	0.0
Approach	91	2.0	91	2.0		0.156		11.9	LOS B	1.0	7.0				
East: Boiling Down Rd															
Lane 1[d]	703	2.0	703	2.0	1189	0.591	100	6.5	LOS A	5.5	39.3	Full	500	0.0	0.0
Approach	703	2.0	703	2.0		0.591		6.5	LOS A	5.5	39.3				
North: N-S Connector															
Lane 1[d]	247	2.0	247	2.0	831	0.298	100	9.9	LOS A	1.8	13.0	Full	300	0.0	0.0
Approach	247	2.0	247	2.0		0.298		9.9	LOS A	1.8	13.0				
West: Boiling Down Rd															
Lane 1[d]	517	2.0	517	2.0	1198	0.431	100	5.6	LOS A	3.2	22.4	Full	400	0.0	0.0
Approach	517	2.0	517	2.0		0.431		5.6	LOS A	3.2	22.4				
All Vehicles	1558	2.0	1558	2.0		0.591		7.1	LOS A	5.5	39.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: PSP Access

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	35	22	34	91	2.0	580	0.156	100	NA	NA
Approach	35	22	34	91	2.0		0.156			

East: Boiling Down Rd

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	15	588	100	703	2.0	1189	0.591	100	NA	NA
Approach	15	588	100	703	2.0		0.591			

North: N-S Connector

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	94	9	144	247	2.0	831	0.298	100	NA	NA
Approach	94	9	144	247	2.0		0.298			
West: Boiling Down Rd										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	62	440	15	517	2.0	1198	0.431	100	NA	NA
Approach	62	440	15	517	2.0		0.431			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1558	2.0	0.591

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

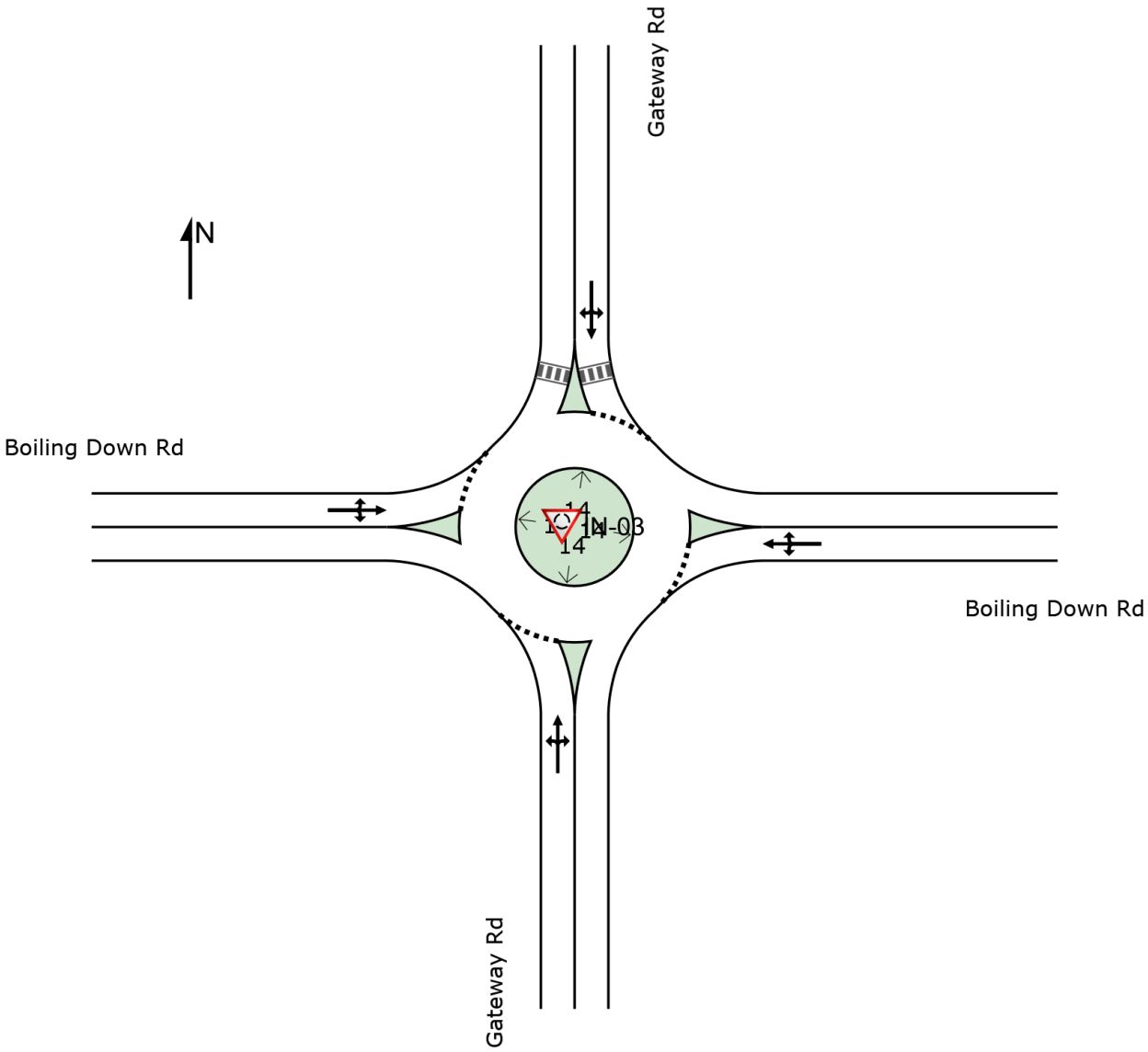
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: PSP Access				
Lane 1	0.0	0.0	0.0	0.0
East: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
North: N-S Connector				
Lane 1	0.0	0.0	0.0	0.0
West: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-03 [IN-03 Boiling Down Rd / Gateway Rd (Site Folder: Ultimate - AM)]

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-03 [IN-03 Boiling Down Rd / Gateway Rd (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Gateway Rd															
Lane 1[d]	269	2.0	269	2.0	806	0.334	100	10.0	LOS A	2.2	15.5	Full	500	0.0	0.0
Approach	269	2.0	269	2.0		0.334		10.0	LOS A	2.2	15.5				
East: Boiling Down Rd															
Lane 1[d]	767	2.0	767	2.0	1240	0.619	100	6.4	LOS A	5.8	41.6	Full	400	0.0	0.0
Approach	767	2.0	767	2.0		0.619		6.4	LOS A	5.8	41.6				
North: Gateway Rd															
Lane 1[d]	167	2.0	167	2.0	824	0.203	100	8.0	LOS A	1.2	8.4	Full	500	0.0	0.0
Approach	167	2.0	167	2.0		0.203		8.0	LOS A	1.2	8.4				
West: Boiling Down Rd															
Lane 1[d]	375	2.0	375	2.0	970	0.386	100	7.4	LOS A	2.6	18.2	Full	400	0.0	0.0
Approach	375	2.0	375	2.0		0.386		7.4	LOS A	2.6	18.2				
All Vehicles	1579	2.0	1579	2.0		0.619		7.4	LOS A	5.8	41.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Gateway Rd

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	80	46	143	269	2.0	806	0.334	100	NA	NA
Approach	80	46	143	269	2.0		0.334			

East: Boiling Down Rd

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	279	355	134	767	2.0	1240	0.619	100	NA	NA
Approach	279	355	134	767	2.0		0.619			

North: Gateway Rd

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	84	57	26	167	2.0	824	0.203	100	NA	NA
Approach	84	57	26	167	2.0		0.203			
West: Boiling Down Rd										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	19	289	66	375	2.0	970	0.386	100	NA	NA
Approach	19	289	66	375	2.0		0.386			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1579	2.0	0.619

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

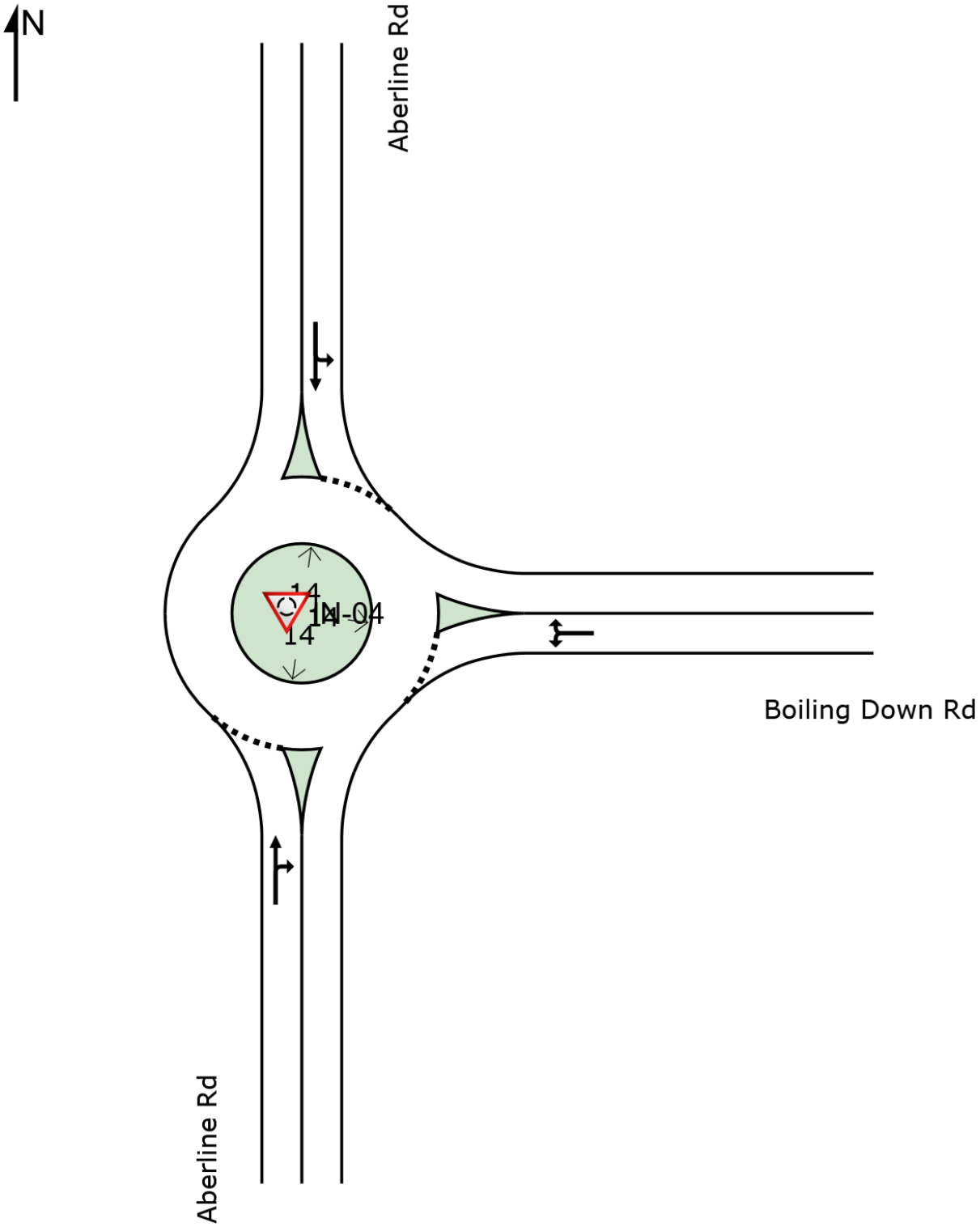
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Gateway Rd				
Lane 1	0.0	0.0	0.0	0.0
East: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
North: Gateway Rd				
Lane 1	0.0	0.0	0.0	0.0
West: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-04 [IN-04 Aberline Rd / Boiling Down Rd (Site Folder: Ultimate - AM)]

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-04 [IN-04 Aberline Rd / Boiling Down Rd (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Aberline Rd															
Lane 1[d]	349	2.0	349	2.0	1179	0.296	100	7.2	LOS A	2.0	14.2	Full	500	0.0	0.0
Approach	349	2.0	349	2.0		0.296		7.2	LOS A	2.0	14.2				
East: Boiling Down Rd															
Lane 1[d]	440	2.0	440	2.0	967	0.455	100	8.1	LOS A	3.3	23.2	Full	500	0.0	0.0
Approach	440	2.0	440	2.0		0.455		8.1	LOS A	3.3	23.2				
North: Aberline Rd															
Lane 1[d]	541	2.0	541	2.0	1182	0.458	100	5.6	LOS A	3.5	24.6	Full	500	0.0	0.0
Approach	541	2.0	541	2.0		0.458		5.6	LOS A	3.5	24.6				
All Vehicles	1331	2.0	1331	2.0		0.458		6.8	LOS A	3.5	24.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Aberline Rd

Mov. From S To Exit:	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	180	169	349	2.0	1179	0.296	100	NA	NA
Approach	180	169	349	2.0		0.296			

East: Boiling Down Rd

Mov. From E To Exit:	L2 S	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	296	144	440	2.0	967	0.455	100	NA	NA
Approach	296	144	440	2.0		0.455			

North: Aberline Rd

Mov. From N To Exit:	L2 E	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	211	331	541	2.0	1182	0.458	100	NA	NA

Approach	211	331	541	2.0	0.458

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1331	2.0	0.458

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

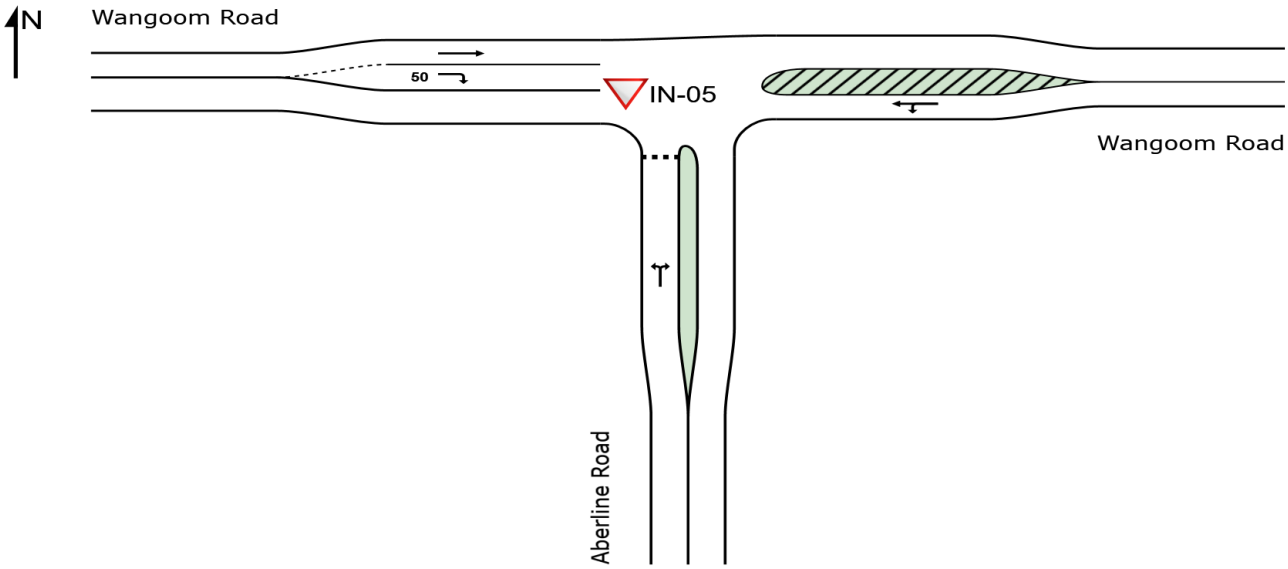
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Aberline Rd				
Lane 1	0.0	0.0	0.0	0.0
East: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
North: Aberline Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-05 [IN-05 Wangoom Road / Aberline Road (Site Folder: Ultimate - AM)]

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-05 [IN-05 Wangoom Road / Aberline Road (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Aberline Road															
Lane 1	216	3.0	216	3.0	664	0.325	100	10.8	LOS B	1.6	11.2	Full	500	0.0	0.0
Approach	216	3.0	216	3.0		0.325		10.8	LOS B	1.6	11.2				
East: Wangoom Road															
Lane 1	459	4.7	459	4.7	1876	0.245	100	1.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	459	4.7	459	4.7		0.245		1.0	NA	0.0	0.0				
West: Wangoom Road															
Lane 1	340	5.0	340	5.0	1889	0.180	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	89	3.0	89	3.0	1092	0.082	100	7.5	LOS A	0.3	2.5	Short	50	0.0	NA
Approach	429	4.6	429	4.6		0.180		1.6	NA	0.3	2.5				
All Vehicles	1104	4.3	1104	4.3		0.325		3.2	NA	1.6	11.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Aberline Road

Mov. From S To Exit:	L2 W	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	144	72	216	3.0	664	0.325	100	NA	NA
Approach	144	72	216	3.0		0.325			

East: Wangoom Road

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	78	381	459	4.7	1876	0.245	100	NA	NA
Approach	78	381	459	4.7		0.245			

West: Wangoom Road

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	340	-	340	5.0	1889	0.180	100	NA	NA
Lane 2	-	89	89	3.0	1092	0.082	100	0.0	1
Approach	340	89	429	4.6		0.180			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1104	4.3	0.325

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

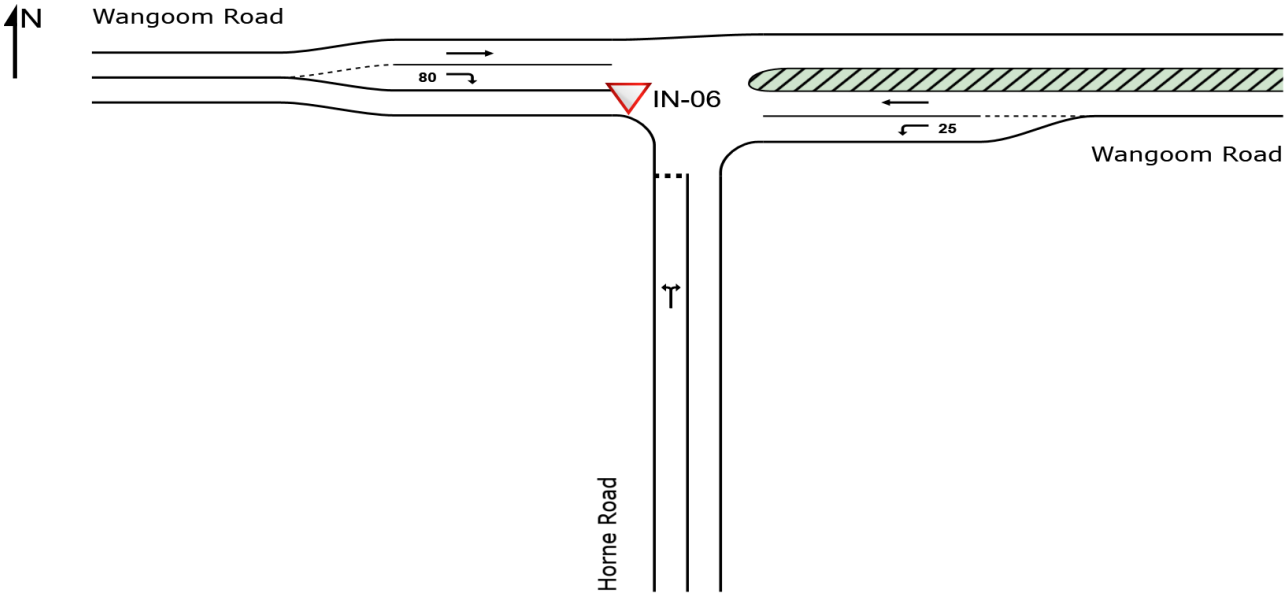
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Aberline Road				
Lane 1	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
West: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-06 [IN-06 Wangoom Rd/ Horne Road (Site Folder: Ultimate - AM)]

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Organisation: O'BRIEN TRAFFIC | Licence: PLUS / FLOATING | Created: Wednesday, 20 August 2025 3:47:38 PM
Project: C:\Users\ChiragSafi\OneDrive - O'Brien Traffic\02 General - Company Data\Document\Current Documents\26720 East of Aberline PSP \Documents\SIDRA\26720SIDRA REVISED FINAL (TO VPA).sip9

LANE SUMMARY

Site: IN-06 [IN-06 Wangoom Rd/ Horne Road (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Horne Road															
Lane 1	249	4.7	249	4.7	1105	0.226	100	6.3	LOS A	1.0	7.1	Full	500	0.0	0.0
Approach	249	4.7	249	4.7		0.226		6.3	LOS A	1.0	7.1				
East: Wangoom Road															
Lane 1	41	3.0	41	3.0	1828	0.022	100	5.6	LOS A	0.0	0.0	Short	25	0.0	NA
Lane 2	52	3.0	52	3.0	1913	0.027	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	93	3.0	93	3.0		0.027		2.5	NA	0.0	0.0				
West: Wangoom Road															
Lane 1	56	3.0	56	3.0	1913	0.029	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	223	5.0	223	5.0	1284	0.174	100	5.9	LOS A	0.8	5.7	Short	80	0.0	NA
Approach	279	4.6	279	4.6		0.174		4.8	NA	0.8	5.7				
All Vehicles	621	4.4	621	4.4		0.226		5.0	NA	1.0	7.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Horne Road

Mov. From S To Exit:	L2 W	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	214	36	249	4.7	1105	0.226	100	NA	NA
Approach	214	36	249	4.7		0.226			

East: Wangoom Road

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	41	-	41	3.0	1828	0.022	100	0.0	2
Lane 2	-	52	52	3.0	1913	0.027	100	NA	NA
Approach	41	52	93	3.0		0.027			

West: Wangoom Road

Mov.	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.

From W To Exit:	E	S			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	56	-	56	3.0	1913	0.029	100	NA	NA
Lane 2	-	223	223	5.0	1284	0.174	100	0.0	1
Approach	56	223	279	4.6		0.174			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	621	4.4	0.226

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate sec	Capacity veh/h	Deg. Satn veh/h	Min. Delay v/c	Merge Delay sec	sec

There are no Exit Short Lanes for Merge Analysis at this Site.

Variable Demand Analysis

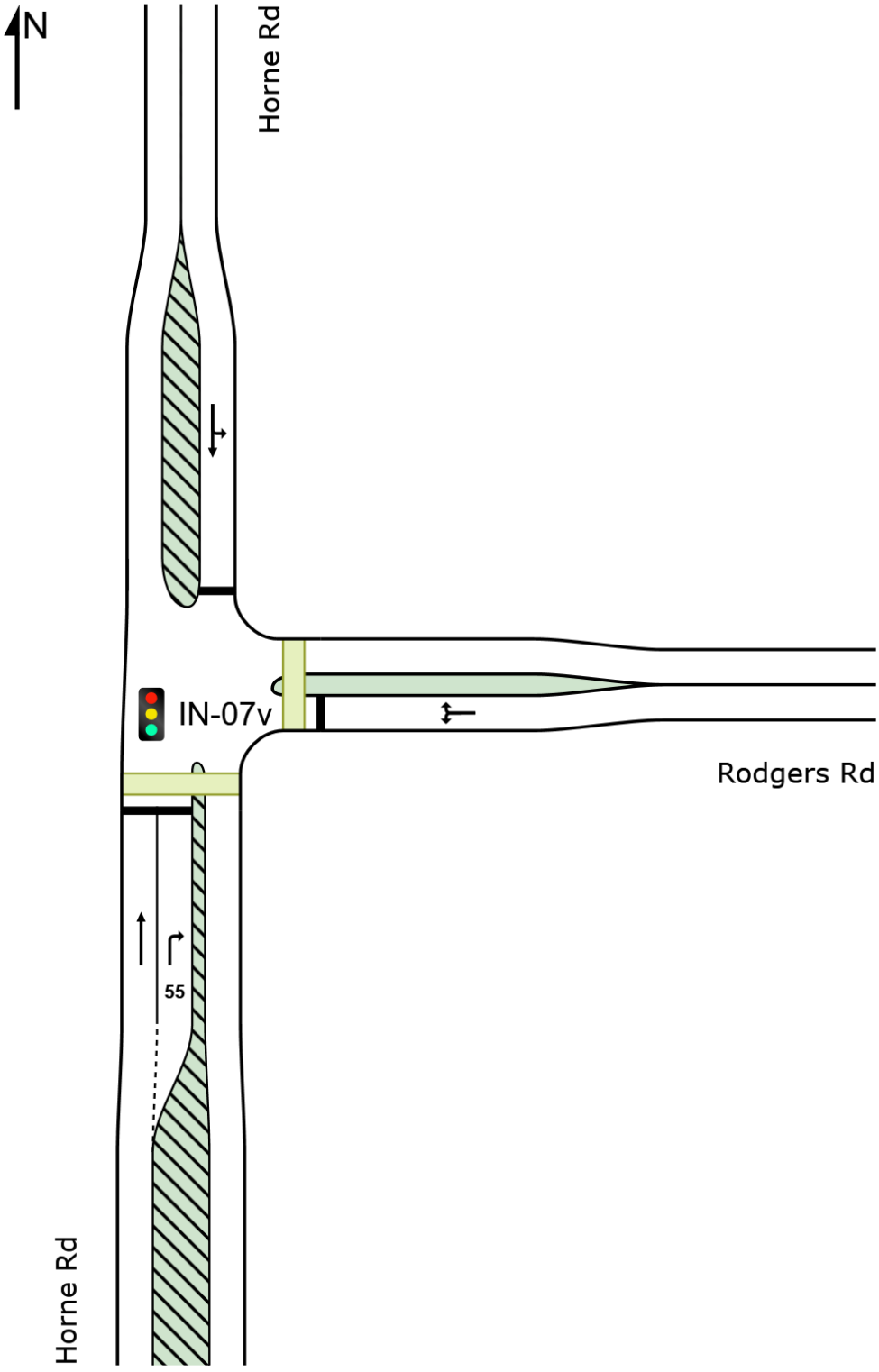
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Horne Road				
Lane 1	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-07v [IN-07 Horne Rd/Rodgers Rd (Site Folder: Ultimate - AM)]

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-07v [IN-07 Horne Rd/Rodgers Rd (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 85 seconds (Site Practical Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Horne Rd															
Lane 1	451	5.0	451	5.0	1355	0.332	100	4.7	LOS A	6.8	49.9	Full	500	0.0	0.0
Lane 2	99	2.0	99	2.0	129	0.766	100	53.1	LOS D	4.5	32.3	Short	55	0.0	NA
Approach	549	4.5	549	4.5		0.766		13.4	LOS B	6.8	49.9				
East: Rodgers Rd															
Lane 1	204	2.0	204	2.0	357	0.572	100	39.7	LOS D	7.9	56.2	Full	500	0.0	0.0
Approach	204	2.0	204	2.0		0.572		39.7	LOS D	7.9	56.2				
North: Horne Rd															
Lane 1	939	4.8	939	4.8	1086	0.864	100	23.3	LOS C	37.7	275.0	Full	500	0.0	0.0
Approach	939	4.8	939	4.8		0.864		23.3	LOS C	37.7	275.0				
All Vehicles	1693	4.4	1693	4.4		0.864		22.1	LOS C	37.7	275.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Horne Rd

Mov. From S To Exit:	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	451	-	451	5.0	1355	0.332	100	NA	NA
Lane 2	-	99	99	2.0	129	0.766	100	0.0	1
Approach	451	99	549	4.5		0.766			

East: Rodgers Rd

Mov. From E To Exit:	L2 S	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	149	55	204	2.0	357	0.572	100	NA	NA
Approach	149	55	204	2.0		0.572			

North: Horne Rd

Mov. From N To Exit:	L2 E	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	62	877	939	4.8	1086	0.864	100	NA	NA

Approach	62	877	939	4.8	0.864

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1693	4.4	0.864

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

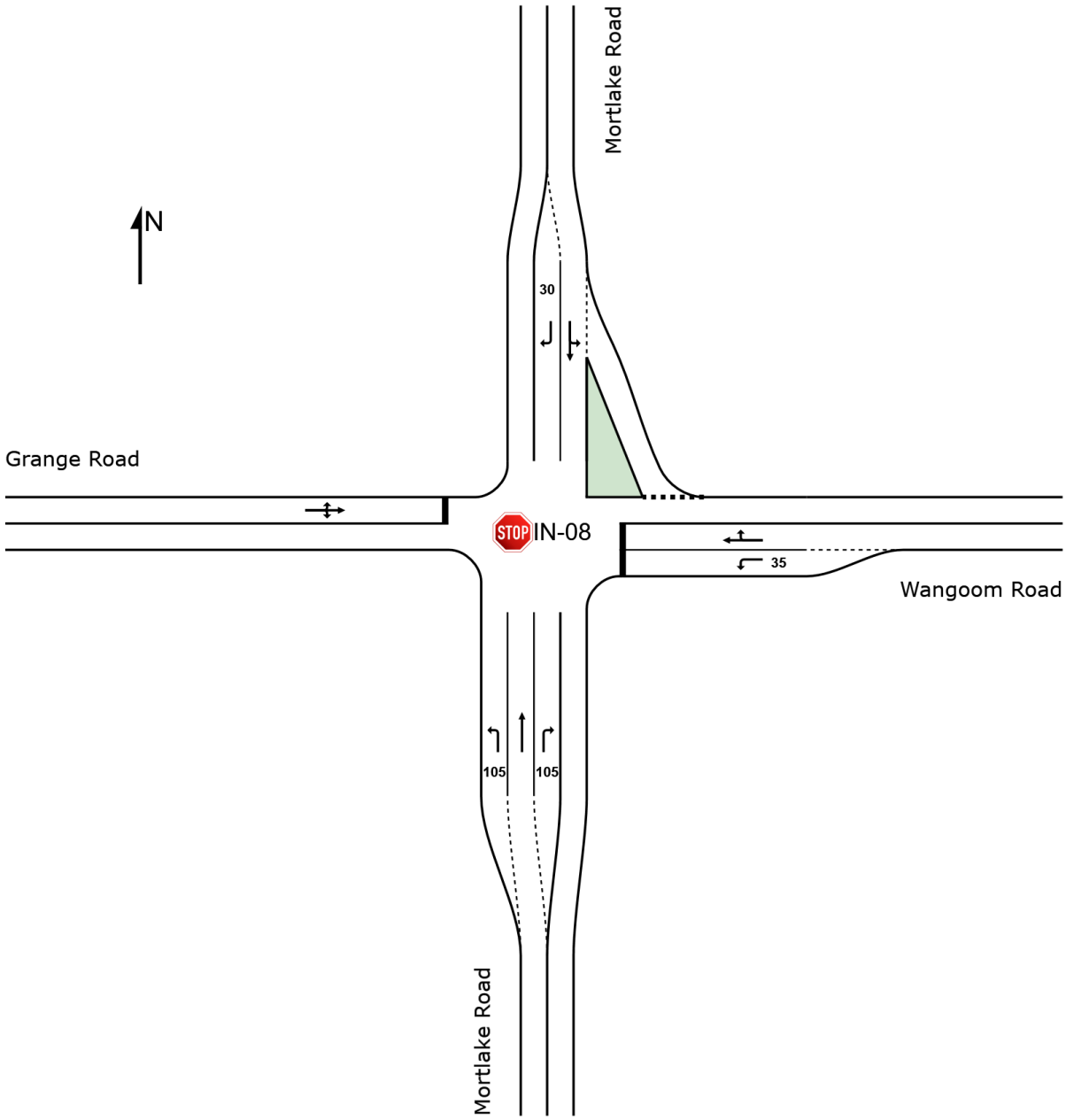
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
East: Rodgers Rd				
Lane 1	0.0	0.0	0.0	0.0
North: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-08 [IN-08 Wangoom Road / Mortake Road (Background) (Site Folder: Ultimate - AM)]

New Site
Site Category: (None)
Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-08 [IN-08 Wangoom Road / Mortake Road (Background) (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Mortlake Road															
Lane 1	14	0.0	14	0.0	1857	0.007	100	5.5	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	292	5.0	292	5.0	1889	0.154	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	168	5.0	168	5.0	888	0.190	100	8.7	LOS A	0.8	5.8	Short	105	0.0	NA
Approach	474	4.9	474	4.9		0.190		3.3	NA	0.8	5.8				
East: Wangoom Road															
Lane 1	229	5.0	229	5.0	512	0.448	100	16.1	LOS C	2.2	16.1	Short	35	0.0	NA
Lane 2	78	4.9	78	4.9	72	1.086	100	215.5	LOS F	8.9	64.7	Full	500	0.0	0.0
Approach	307	5.0	307	5.0		1.086		66.6	LOS F	8.9	64.7				
North: Mortlake Road															
Lane 1	632	5.0	632	5.0	1839	0.343	100	0.5	LOS A	0.3	2.5	Full	500	0.0	0.0
Lane 2	1	0.0	1	0.0	1049	0.001	100	6.6	LOS A	0.0	0.0	Short	30	0.0	NA
Approach	633	5.0	633	5.0		0.343		0.5	NA	0.3	2.5				
West: Grange Road															
Lane 1	59	0.0	59	0.0	54	1.095	100	260.7	LOS F	7.9	55.4	Full	500	0.0	0.0
Approach	59	0.0	59	0.0		1.095		260.7	LOS F	7.9	55.4				
All Vehicles	1473	4.7	1473	4.7		1.095		25.6	NA	8.9	64.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Mortlake Road

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	14	-	-	14	0.0	1857	0.007	100	0.0	2
Lane 2	-	292	-	292	5.0	1889	0.154	100	NA	NA
Lane 3	-	-	168	168	5.0	888	0.190	100	0.0	2
Approach	14	292	168	474	4.9		0.190			

East: Wangoom Road

Mov.	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.

From E To Exit:	S	W	N			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	229	-	-	229	5.0	512	0.448	100	0.0	2
Lane 2	-	1	77	78	4.9	72	1.086	100	NA	NA
Approach	229	1	77	307	5.0		1.086			
North: Mortlake Road										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	39	593	-	632	5.0	1839	0.343	100	NA	NA
Lane 2	-	-	1	1	0.0	1049	0.001	100	0.0	1
Approach	39	593	1	633	5.0		0.343			
West: Grange Road										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	3	3	53	59	0.0	54	1.095	100	NA	NA
Approach	3	3	53	59	0.0		1.095			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1473	4.7	1.095

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.												

Variable Demand Analysis

	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	3.1	154.4	NA
North: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Grange Road				
Lane 1	0.0	2.6	171.4	NA

LANE SUMMARY

Site: IN-08 [IN-08 Wangoom Road / Mortake Road (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Mortlake Road															
Lane 1	14	0.0	14	0.0	1857	0.007	100	5.5	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	292	5.0	292	5.0	1889	0.154	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	272	5.0	272	5.0	888	0.306	100	9.3	LOS A	1.5	11.1	Short	105	0.0	NA
Approach	577	4.9	577	4.9		0.306		4.5	NA	1.5	11.1				
East: Wangoom Road															
Lane 1	471	5.0	471	5.0	512	0.918	100	33.8	LOS D	13.2	96.7	Short	35	0.0	NA
Lane 2	165	5.0	165	5.0	52	3.189	100	2057.4	LOS F	73.3	534.8	Full	500	0.0	7.0
Approach	636	5.0	636	5.0		3.189		559.8	LOS F	73.3	534.8				
North: Mortlake Road															
Lane 1	669	5.0	669	5.0	1769	0.378	100	1.0	LOS A	0.7	5.3	Full	500	0.0	0.0
Lane 2	1	0.0	1	0.0	1049	0.001	100	6.6	LOS A	0.0	0.0	Short	30	0.0	NA
Approach	671	5.0	671	5.0		0.378		1.0	NA	0.7	5.3				
West: Grange Road															
Lane 1	59	0.0	59	0.0	22	2.741	100	1759.5	LOS F	26.0	181.8	Full	500	0.0	0.0
Approach	59	0.0	59	0.0		2.741		1759.5	LOS F	26.0	181.8				
All Vehicles	1942	4.8	1942	4.8		3.189		238.4	NA	73.3	534.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Mortlake Road

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	14	-	-	14	0.0	1857	0.007	100	0.0	2
Lane 2	-	292	-	292	5.0	1889	0.154	100	NA	NA
Lane 3	-	-	272	272	5.0	888	0.306	100	0.0	2
Approach	14	292	272	577	4.9		0.306			

East: Wangoom Road

Mov.	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.

From E To Exit:	S	W	N			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	471	-	-	471	5.0	512	0.918	100	67.9	2
Lane 2	-	1	164	165	5.0	52	3.189	100	NA	NA
Approach	471	1	164	636	5.0		3.189			
North: Mortlake Road										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	77	593	-	669	5.0	1769	0.378	100	NA	NA
Lane 2	-	-	1	1	0.0	1049	0.001	100	0.0	1
Approach	77	593	1	671	5.0		0.378			
West: Grange Road										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	3	3	53	59	0.0	22	2.741	100	NA	NA
Approach	3	3	53	59	0.0		2.741			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1942	4.8	3.189

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.												

Variable Demand Analysis

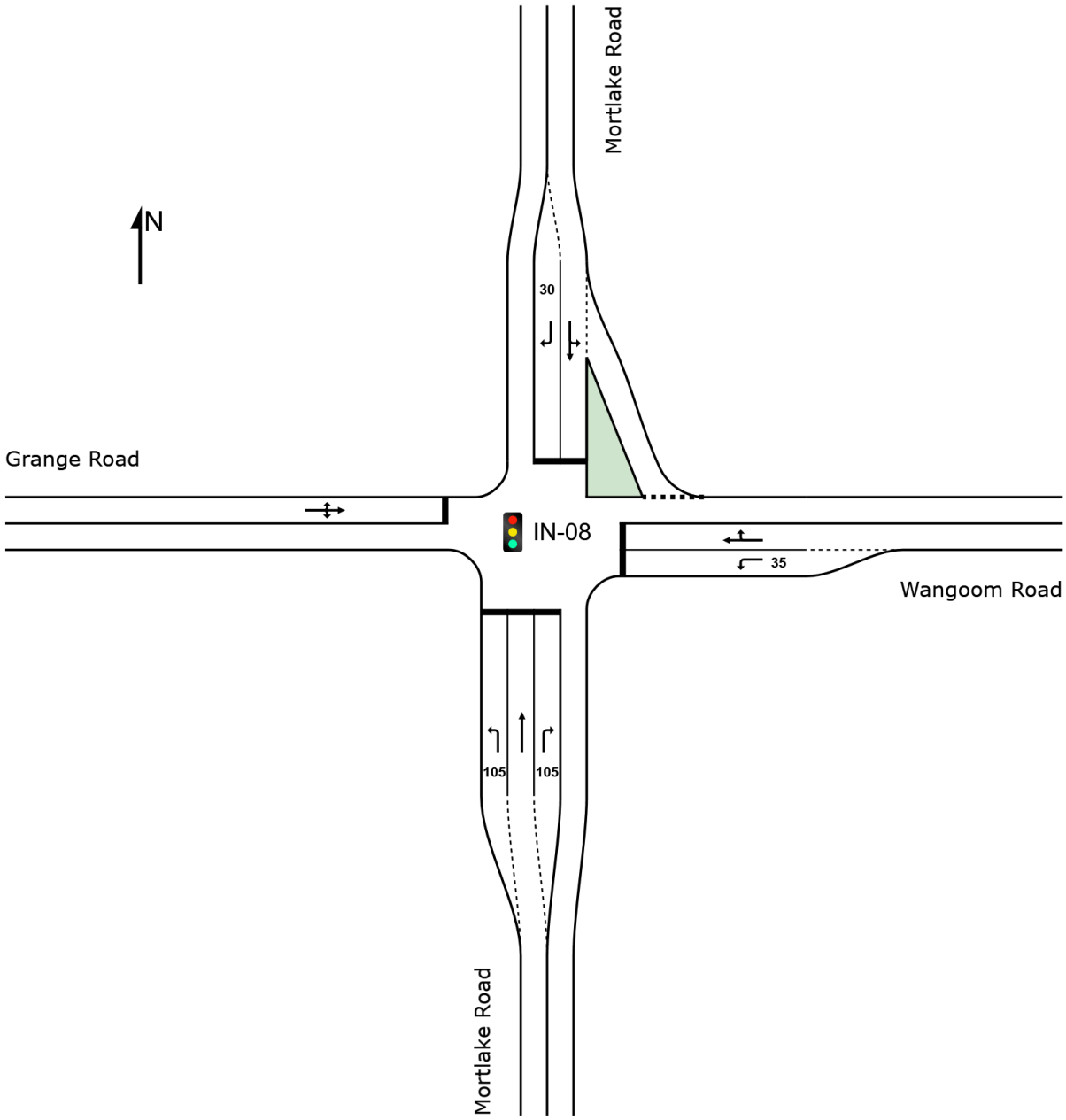
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	56.7	3940.3	NA
North: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Grange Road				
Lane 1	0.0	18.7	3133.3	NA

SITE LAYOUT

Site: IN-08 [IN-08 Wangoom Road / Mortake Road_Signalised (Site Folder: Ultimate - AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Organisation: O'BRIEN TRAFFIC | Licence: PLUS / FLOATING | Created: Wednesday, 20 August 2025 3:49:10 PM
Project: C:\Users\ChiragSafi\OneDrive - O'Brien Traffic\02 General - Company Data\Document\Current Documents\26720 East of Aberline PSP \Documents\SIDRA\26720SIDRA REVISED FINAL (TO VPA).sip9

LANE SUMMARY

Site: IN-08 [IN-08 Wangoom Road / Mortake Road_Signalised (Site Folder: Ultimate - AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Mortlake Road															
Lane 1	14	0.0	14	0.0	929	0.015	100	13.6	LOS B	0.2	1.4	Short	105	0.0	NA
Lane 2	292	5.0	292	5.0	944	0.309	100	9.6	LOS A	5.1	37.1	Full	500	0.0	0.0
Lane 3	272	5.0	272	5.0	329	0.826	100	37.2	LOS D	9.0	65.8	Short	105	0.0	NA
Approach	577	4.9	577	4.9		0.826		22.7	LOS C	9.0	65.8				
East: Wangoom Road															
Lane 1	471	5.0	471	5.0	640[1]	0.735	100	29.2	LOS C	12.8	93.8	Short	35	0.0	NA
Lane 2	165	5.0	165	5.0	200	0.827	100	44.4	LOS D	5.5	40.5	Full	500	0.0	0.0
Approach	636	5.0	636	5.0		0.827		33.1	LOS C	12.8	93.8				
North: Mortlake Road															
Lane 1	669	5.0	669	5.0	789[1]	0.848	100	32.9	LOS C	21.3	155.3	Full	500	0.0	0.0
Lane 2	1	0.0	1	0.0	186	0.006	100	39.3	LOS D	0.0	0.2	Short	30	0.0	NA
Approach	671	5.0	671	5.0		0.848		32.9	LOS C	21.3	155.3				
West: Grange Road															
Lane 1	59	0.0	59	0.0	127	0.463	100	37.4	LOS D	1.8	12.9	Full	500	0.0	0.0
Approach	59	0.0	59	0.0		0.463		37.4	LOS D	1.8	12.9				
All Vehicles	1942	4.8	1942	4.8		0.848		30.1	LOS C	21.3	155.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Approach Lane Flows (veh/h)

South: Mortlake Road

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	14	-	-	14	0.0	929	0.015	100	0.0	2
Lane 2	-	292	-	292	5.0	944	0.309	100	NA	NA
Lane 3	-	-	272	272	5.0	329	0.826	100	0.0	2
Approach	14	292	272	577	4.9		0.826			

East: Wangoom Road

Mov. From E	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

To Exit:	S	W	N			veh/h	v/c	%	%	No.
Lane 1	471	-	-	471	5.0	640[1]	0.735	100	98.1	2
Lane 2	-	1	164	165	5.0	200	0.827	100	NA	NA
Approach	471	1	164	636	5.0		0.827			

North: Mortlake Road

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	77	593	-	669	5.0	789[1]	0.848	100	NA	NA
Lane 2	-	-	1	1	0.0	186	0.006	100	0.0	1
Approach	77	593	1	671	5.0		0.848			

West: Grange Road

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	3	3	53	59	0.0	127	0.463	100	NA	NA
Approach	3	3	53	59	0.0		0.463			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1942	4.8	0.848

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.												

Variable Demand Analysis

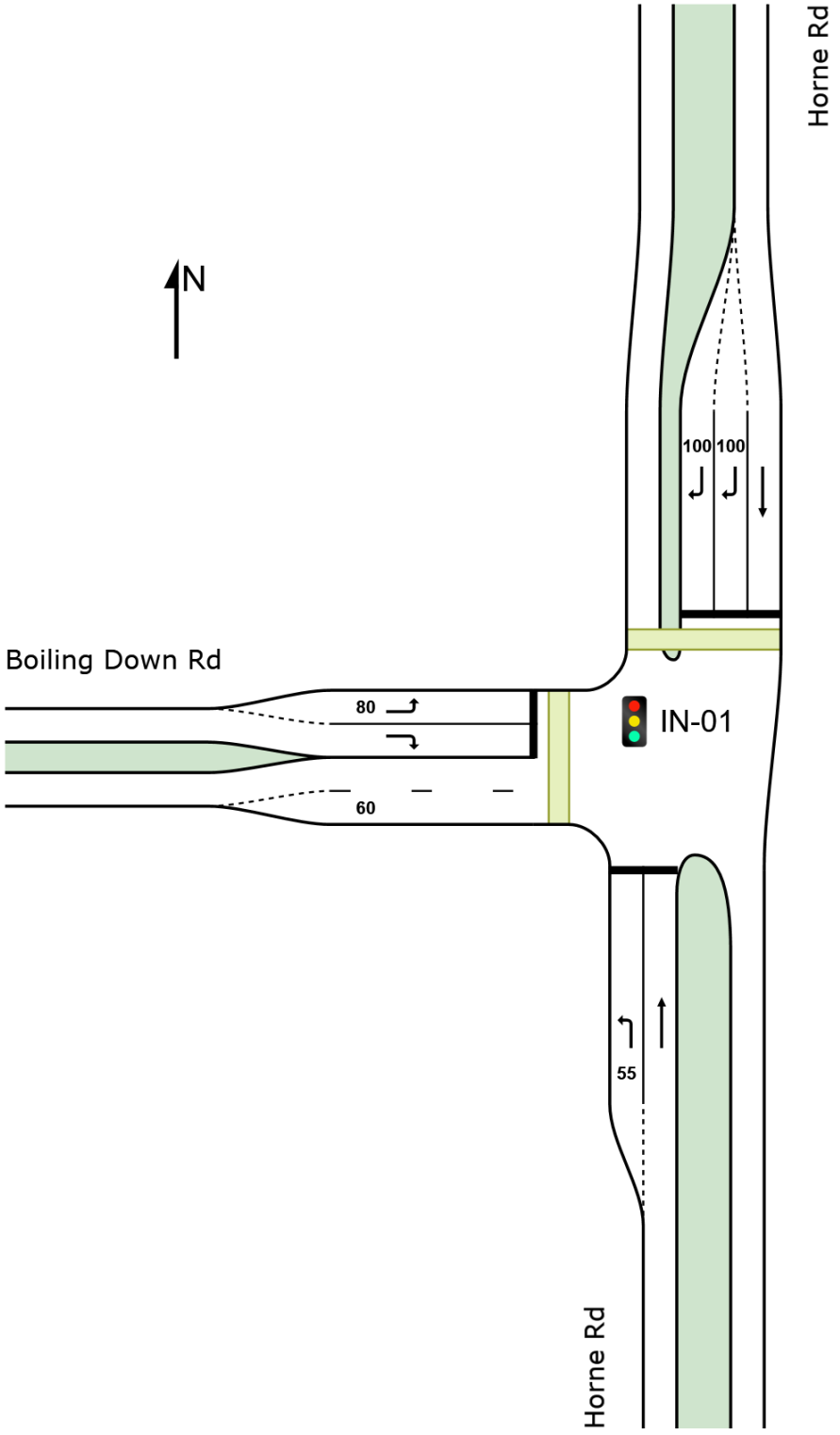
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
North: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Grange Road				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-01 [IN-01 Horne Rd/Boiling Down Rd (Site Folder: Ultimate - PM)]

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-01 [IN-01 Horne Rd/Boiling Down Rd (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site Practical Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Horne Rd															
Lane 1	387	3.0	387	3.0	1285	0.301	100	14.2	LOS B	5.2	37.6	Short	55	0.0	NA
Lane 2	562	5.0	562	5.0	658[1]	0.854	100	32.8	LOS C	22.3	162.5	Full	500	0.0	0.0
Approach	949	4.2	949	4.2		0.854		25.2	LOS C	22.3	162.5				
North: Horne Rd															
Lane 1	405	5.0	405	5.0	831	0.488	100	16.2	LOS B	10.6	77.6	Full	500	0.0	0.0
Lane 2	208	3.0	208	3.0	242	0.858	100	48.8	LOS D	8.8	63.0	Short	100	0.0	NA
Lane 3	208	3.0	208	3.0	242	0.858	100	48.2	LOS D	8.8	63.0	Short	100	0.0	NA
Approach	821	4.0	821	4.0		0.858		32.5	LOS C	10.6	77.6				
West: Boiling Down Rd															
Lane 1	383	3.0	383	3.0	727	0.527	100	24.2	LOS C	10.8	77.4	Short	80	0.0	NA
Lane 2	285	3.0	285	3.0	339	0.840	100	44.5	LOS D	11.7	84.0	Full	500	0.0	0.0
Approach	668	3.0	668	3.0		0.840		32.9	LOS C	11.7	84.0				
All Vehicles	2439	3.8	2439	3.8		0.858		29.8	LOS C	22.3	162.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Approach Lane Flows (veh/h)

South: Horne Rd

Mov. From S To Exit:	L2 W	T1 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	387	-	387	3.0	1285	0.301	100	0.0	2
Lane 2	-	562	562	5.0	658[1]	0.854	100	NA	NA
Approach	387	562	949	4.2		0.854			

North: Horne Rd

Mov. From N To Exit:	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	405	-	405	5.0	831	0.488	100	NA	NA
Lane 2	-	208	208	3.0	242	0.858	100	0.0	1
Lane 3	-	208	208	3.0	242	0.858	100	0.0	2

Approach	405	416	821	4.0		0.858			
West: Boiling Down Rd									
Mov. From W To Exit:	L2 N	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	383	-	383	3.0	727	0.527	100	2.0	2
Lane 2	-	285	285	3.0	339	0.840	100	NA	NA
Approach	383	285	668	3.0		0.840			
	Total	%HV	Deg.Satn (v/c)						
All Vehicles	2439	3.8	0.858						

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
West Exit: Boiling Down Rd Merge Type: **Priority**												
Exit Short Lane	1	60	0.0	208	211	3.05	2.03	595	1558	0.382	0.3	0.6
Merge Lane	2	-	100.0	Merge Lane is not Opposed				208	1800	0.115	0.0	0.0

Variable Demand Analysis

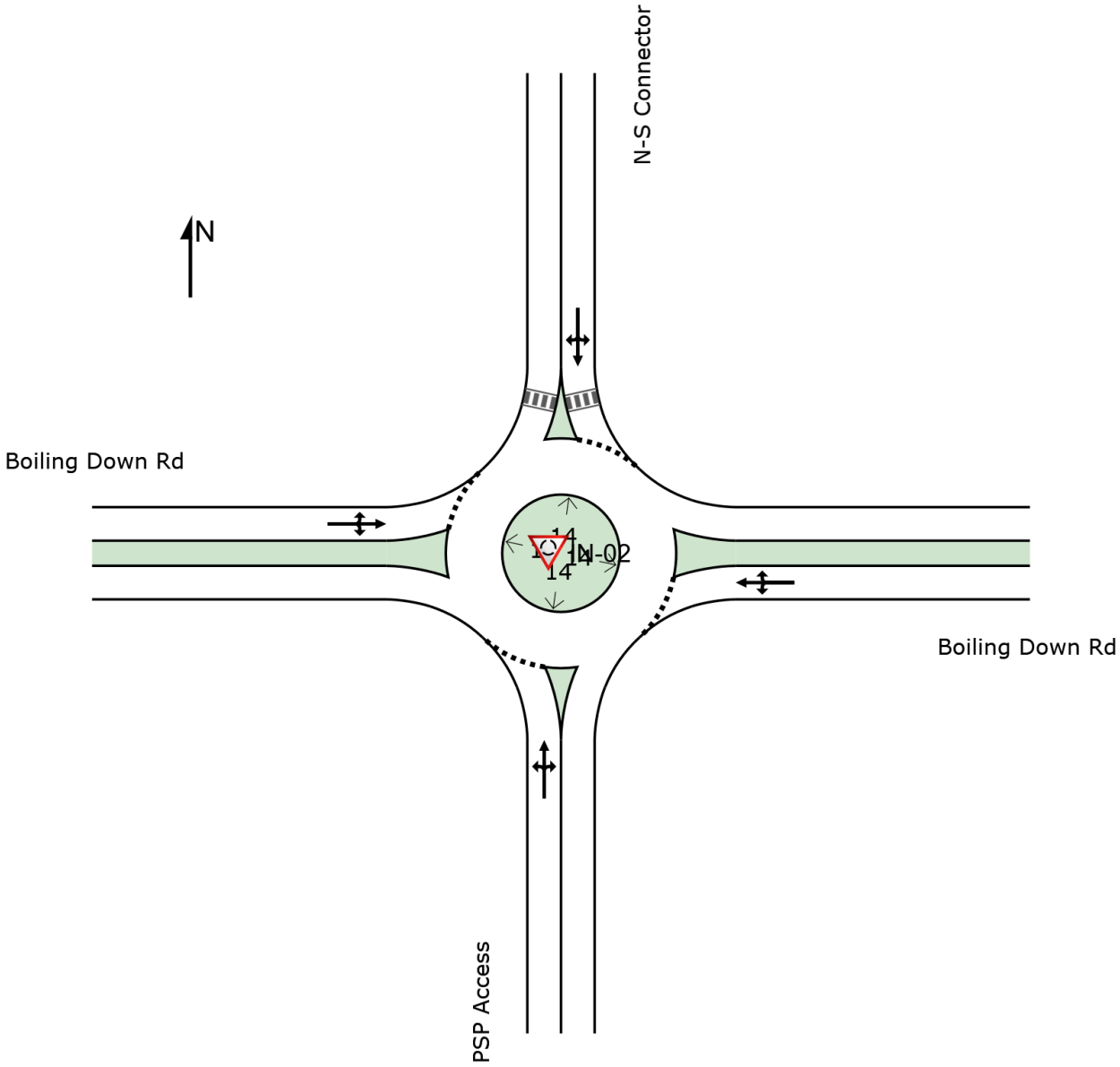
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
North: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
West: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-02 [IN-02 Boiling Down Rd / N-S1 (Site Folder: Ultimate - PM)]

Boiling Down Rd / N-S1
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-02 [IN-02 Boiling Down Rd / N-S1 (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Boiling Down Rd / N-S1
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: PSP Access															
Lane 1[d]	58	2.0	58	2.0	715	0.081	100	10.7	LOS B	0.5	3.3	Full	500	0.0	0.0
Approach	58	2.0	58	2.0		0.081		10.7	LOS B	0.5	3.3				
East: Boiling Down Rd															
Lane 1[d]	636	2.0	636	2.0	1273	0.499	100	5.9	LOS A	4.2	30.0	Full	500	0.0	0.0
Approach	636	2.0	636	2.0		0.499		5.9	LOS A	4.2	30.0				
North: N-S Connector															
Lane 1[d]	183	2.0	183	2.0	774	0.236	100	9.8	LOS A	1.4	10.2	Full	300	0.0	0.0
Approach	183	2.0	183	2.0		0.236		9.8	LOS A	1.4	10.2				
West: Boiling Down Rd															
Lane 1[d]	656	2.0	656	2.0	1258	0.521	100	5.6	LOS A	4.3	30.5	Full	400	0.0	0.0
Approach	656	2.0	656	2.0		0.521		5.6	LOS A	4.3	30.5				
All Vehicles	1533	2.0	1533	2.0		0.521		6.4	LOS A	4.3	30.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: PSP Access

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	19	5	34	58	2.0	715	0.081	100	NA	NA
Approach	19	5	34	58	2.0		0.081			

East: Boiling Down Rd

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	51	492	94	636	2.0	1273	0.499	100	NA	NA
Approach	51	492	94	636	2.0		0.499			

North: N-S Connector

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	94	7	82	183	2.0	774	0.236	100	NA	NA
Approach	94	7	82	183	2.0		0.236			
West: Boiling Down Rd										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	123	504	28	656	2.0	1258	0.521	100	NA	NA
Approach	123	504	28	656	2.0		0.521			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1533	2.0	0.521

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

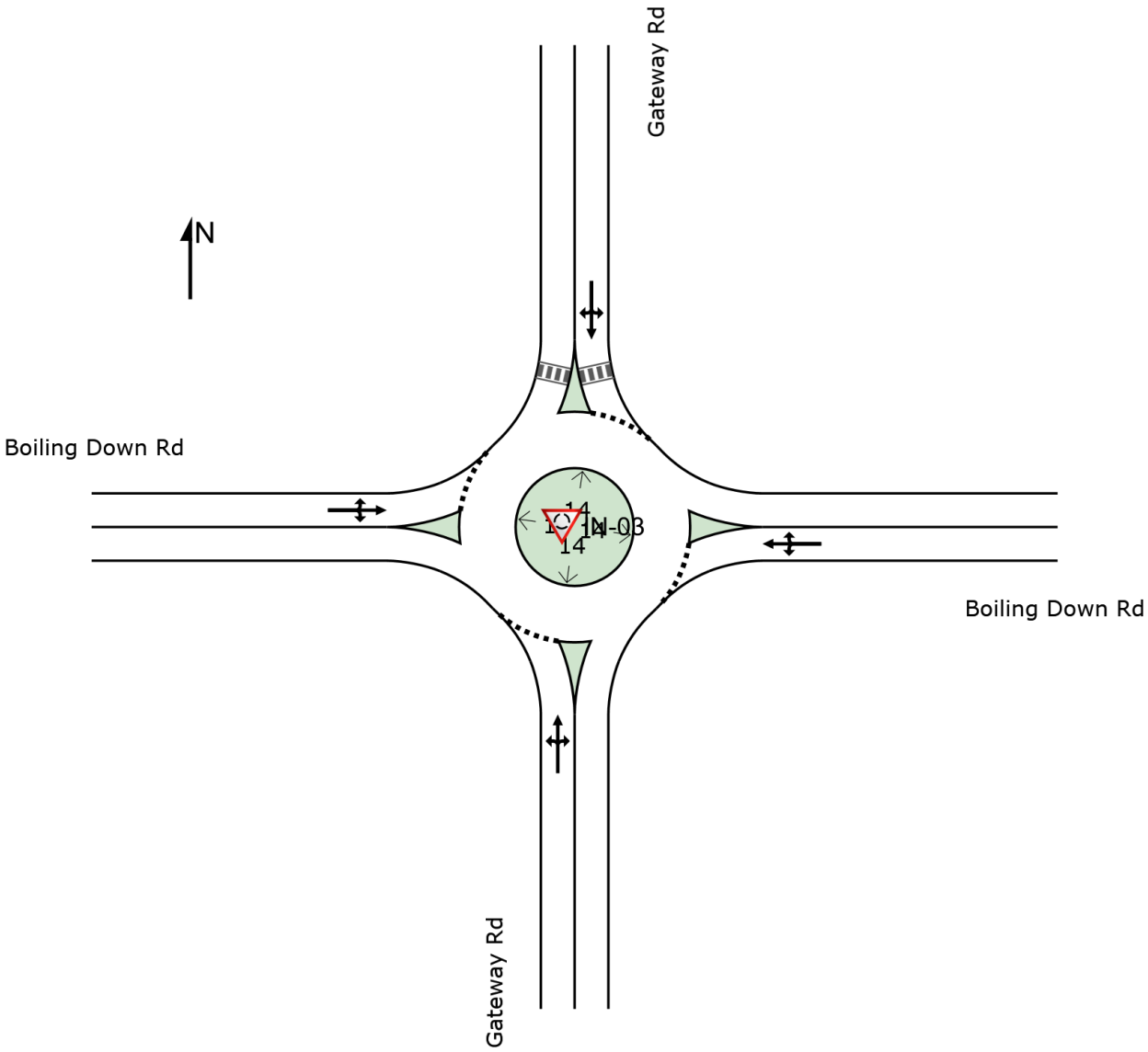
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: PSP Access				
Lane 1	0.0	0.0	0.0	0.0
East: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
North: N-S Connector				
Lane 1	0.0	0.0	0.0	0.0
West: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-03 [IN-03 Boiling Down Rd / Gateway Rd (Site Folder: Ultimate - PM)]

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-03 [IN-03 Boiling Down Rd / Gateway Rd (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Gateway Rd															
Lane 1[d]	419	2.0	419	2.0	863	0.485	100	10.4	LOS B	3.7	26.1	Full	500	0.0	0.0
Approach	419	2.0	419	2.0		0.485		10.4	LOS B	3.7	26.1				
East: Boiling Down Rd															
Lane 1[d]	594	2.0	594	2.0	1148	0.517	100	6.5	LOS A	4.1	29.5	Full	400	0.0	0.0
Approach	594	2.0	594	2.0		0.517		6.5	LOS A	4.1	29.5				
North: Gateway Rd															
Lane 1[d]	171	2.0	171	2.0	688	0.248	100	9.7	LOS A	1.6	11.0	Full	500	0.0	0.0
Approach	171	2.0	171	2.0		0.248		9.7	LOS A	1.6	11.0				
West: Boiling Down Rd															
Lane 1[d]	465	2.0	465	2.0	911	0.511	100	8.7	LOS A	4.0	28.4	Full	400	0.0	0.0
Approach	465	2.0	465	2.0		0.511		8.7	LOS A	4.0	28.4				
All Vehicles	1648	2.0	1648	2.0		0.517		8.5	LOS A	4.1	29.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Gateway Rd

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	126	51	242	419	2.0	863	0.485	100	NA	NA
Approach	126	51	242	419	2.0		0.485			

East: Boiling Down Rd

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	180	325	88	594	2.0	1148	0.517	100	NA	NA
Approach	180	325	88	594	2.0		0.517			

North: Gateway Rd

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	91	51	29	171	2.0	688	0.248	100	NA	NA
Approach	91	51	29	171	2.0		0.248			
West: Boiling Down Rd										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	25	324	116	465	2.0	911	0.511	100	NA	NA
Approach	25	324	116	465	2.0		0.511			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1648	2.0	0.517

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Gateway Rd				
Lane 1	0.0	0.0	0.0	0.0
East: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
North: Gateway Rd				
Lane 1	0.0	0.0	0.0	0.0
West: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-04 [IN-04 Aberline Rd / Boiling Down Rd (Site Folder: Ultimate - PM)]

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

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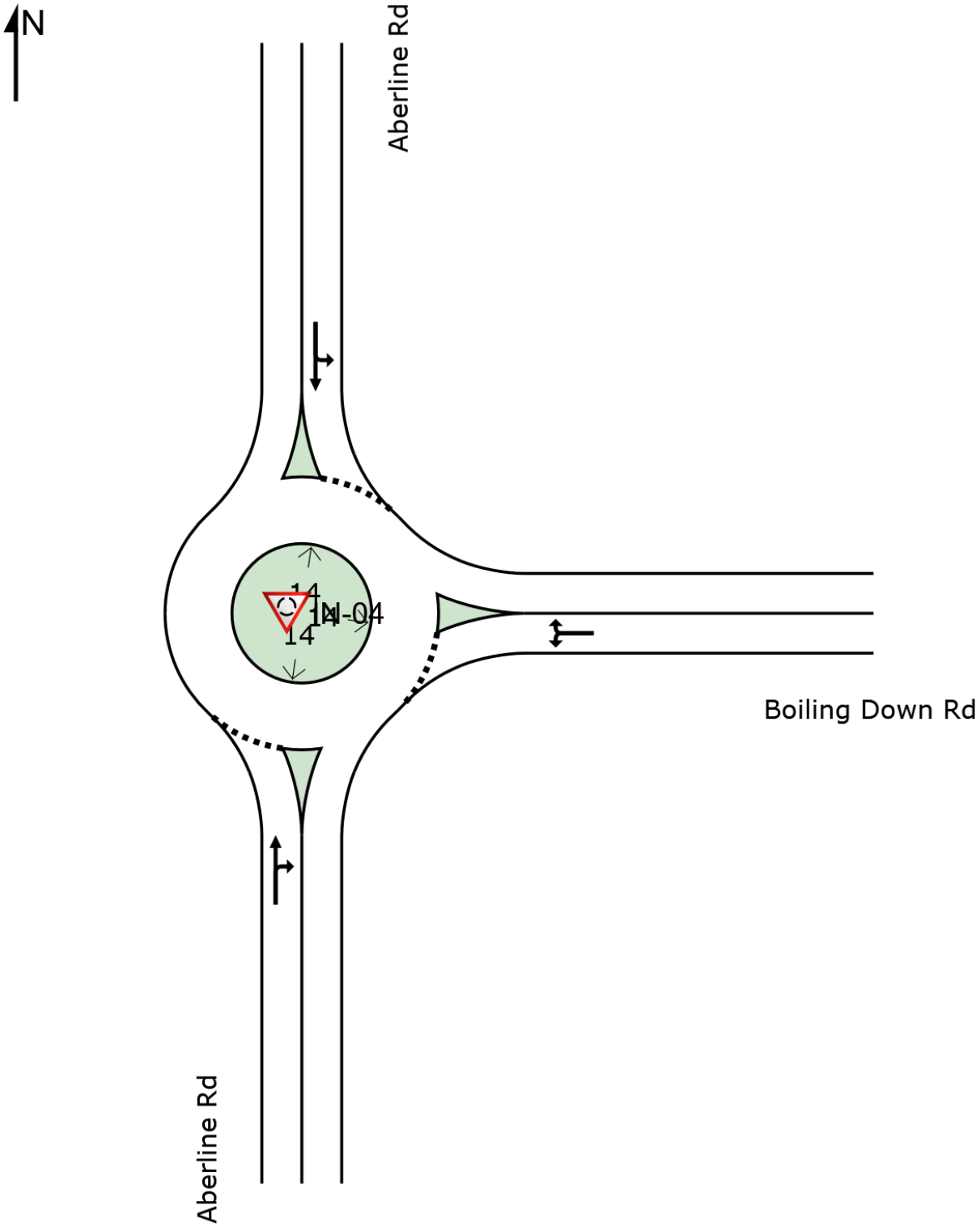

LANE SUMMARY

Site: IN-04 [IN-04 Aberline Rd / Boiling Down Rd (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Boiling Down Rd / Gateway Rd
Site Category: Proposed Design 1
Roundabout

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Aberline Rd															
Lane 1[d]	572	2.0	572	2.0	1084	0.527	100	8.2	LOS A	4.2	30.2	Full	500	0.0	0.0
Approach	572	2.0	572	2.0		0.527		8.2	LOS A	4.2	30.2				
East: Boiling Down Rd															
Lane 1[d]	421	2.0	421	2.0	1085	0.388	100	8.1	LOS A	2.7	19.4	Full	500	0.0	0.0
Approach	421	2.0	421	2.0		0.388		8.1	LOS A	2.7	19.4				
North: Aberline Rd															
Lane 1[d]	356	2.0	356	2.0	1013	0.351	100	6.2	LOS A	2.4	16.9	Full	500	0.0	0.0
Approach	356	2.0	356	2.0		0.351		6.2	LOS A	2.4	16.9				
All Vehicles	1348	2.0	1348	2.0		0.527		7.6	LOS A	4.2	30.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Aberline Rd

Mov. From S To Exit:	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	303	268	572	2.0	1084	0.527	100	NA	NA
Approach	303	268	572	2.0		0.527			

East: Boiling Down Rd

Mov. From E To Exit:	L2 S	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	181	240	421	2.0	1085	0.388	100	NA	NA
Approach	181	240	421	2.0		0.388			

North: Aberline Rd

Mov. From N To Exit:	L2 E	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	135	221	356	2.0	1013	0.351	100	NA	NA

Approach	135	221	356	2.0	0.351

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1348	2.0	0.527

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Aberline Rd				
Lane 1	0.0	0.0	0.0	0.0
East: Boiling Down Rd				
Lane 1	0.0	0.0	0.0	0.0
North: Aberline Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-05 [IN-05 Wangoom Road / Aberline Road (Site Folder: Ultimate - PM)]

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

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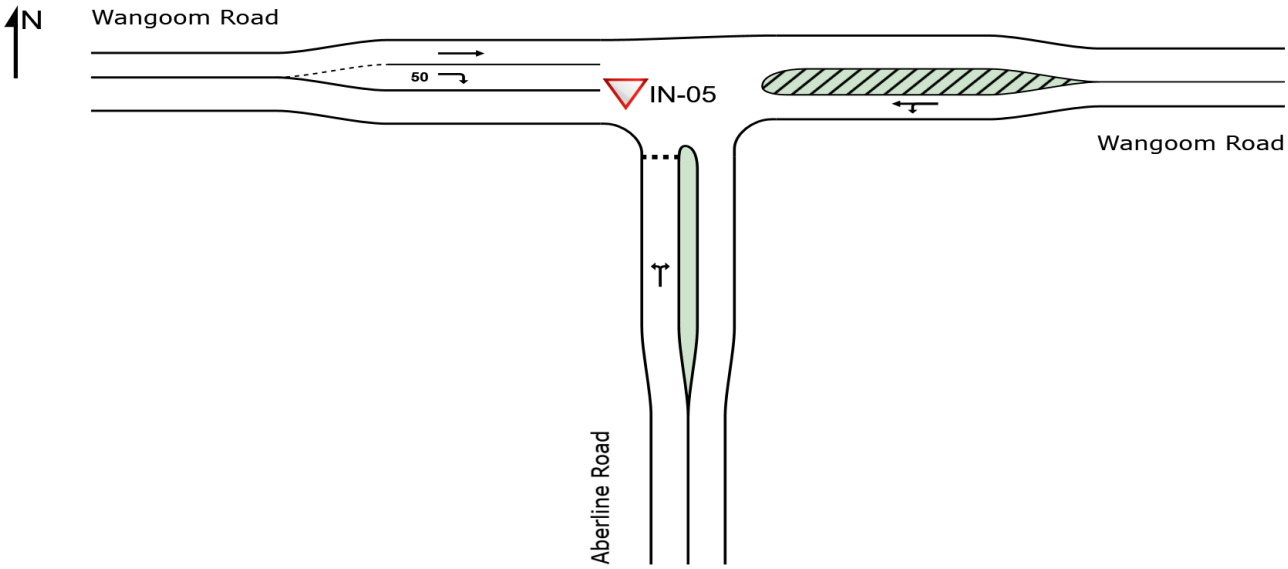


LANE SUMMARY

Site: IN-05 [IN-05 Wangoom Road / Aberline Road (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Aberline Road															
Lane 1	165	3.0	165	3.0	726	0.228	100	9.4	LOS A	0.9	6.6	Full	500	0.0	0.0
Approach	165	3.0	165	3.0		0.228		9.4	LOS A	0.9	6.6				
East: Wangoom Road															
Lane 1	416	4.6	416	4.6	1874	0.222	100	1.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	416	4.6	416	4.6		0.222		1.2	NA	0.0	0.0				
West: Wangoom Road															
Lane 1	333	5.0	333	5.0	1889	0.176	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	103	3.0	103	3.0	1153	0.089	100	7.2	LOS A	0.4	2.8	Short	50	0.0	NA
Approach	436	4.5	436	4.5		0.176		1.8	NA	0.4	2.8				
All Vehicles	1017	4.3	1017	4.3		0.228		2.7	NA	0.9	6.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Aberline Road

Mov. From S To Exit:	L2 W	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	114	52	165	3.0	726	0.228	100	NA	NA
Approach	114	52	165	3.0		0.228			

East: Wangoom Road

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	82	334	416	4.6	1874	0.222	100	NA	NA
Approach	82	334	416	4.6		0.222			

West: Wangoom Road

Mov. From W To Exit:	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	333	-	333	5.0	1889	0.176	100	NA	NA
Lane 2	-	103	103	3.0	1153	0.089	100	0.0	1
Approach	333	103	436	4.5		0.176			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1017	4.3	0.228

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec

There are no Exit Short Lanes for Merge Analysis at this Site.

Variable Demand Analysis

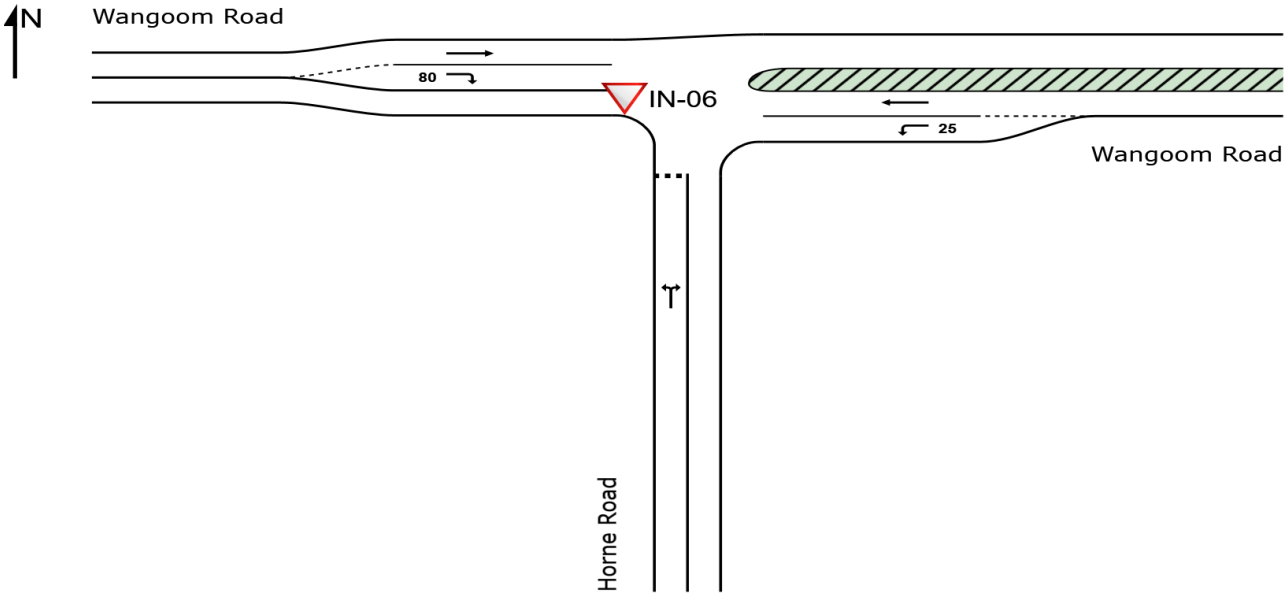
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Aberline Road				
Lane 1	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
West: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-06 [IN-06 Wangoom Rd/ Horne Road (Site Folder: Ultimate - PM)]

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Organisation: O'BRIEN TRAFFIC | Licence: PLUS / FLOATING | Created: Wednesday, 20 August 2025 3:50:49 PM
Project: C:\Users\ChiragSafi\OneDrive - O'Brien Traffic\02 General - Company Data\Document\Current Documents\26720 East of Aberline PSP \Documents\SIDRA\26720SIDRA REVISED FINAL (TO VPA).sip9

LANE SUMMARY

Site: IN-06 [IN-06 Wangoom Rd/ Horne Road (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 1
Give-Way (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Horne Road															
Lane 1	305	4.7	305	4.7	1092	0.280	100	6.4	LOS A	1.3	9.4	Full	500	0.0	0.0
Approach	305	4.7	305	4.7		0.280		6.4	LOS A	1.3	9.4				
East: Wangoom Road															
Lane 1	42	3.0	42	3.0	1828	0.023	100	5.6	LOS A	0.0	0.0	Short	25	0.0	NA
Lane 2	57	3.0	57	3.0	1913	0.030	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	99	3.0	99	3.0		0.030		2.4	NA	0.0	0.0				
West: Wangoom Road															
Lane 1	52	5.0	52	5.0	1889	0.027	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	209	3.0	209	3.0	1290	0.162	100	5.9	LOS A	0.7	5.2	Short	80	0.0	NA
Approach	261	3.4	261	3.4		0.162		4.8	NA	0.7	5.2				
All Vehicles	665	3.9	665	3.9		0.280		5.2	NA	1.3	9.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Horne Road

Mov. From S To Exit:	L2 W	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	256	49	305	4.7	1092	0.280	100	NA	NA
Approach	256	49	305	4.7		0.280			

East: Wangoom Road

Mov. From E To Exit:	L2 S	T1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	42	-	42	3.0	1828	0.023	100	0.0	2
Lane 2	-	57	57	3.0	1913	0.030	100	NA	NA
Approach	42	57	99	3.0		0.030			

West: Wangoom Road

Mov.	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.

From W To Exit:	E	S			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	52	-	52	5.0	1889	0.027	100	NA	NA
Lane 2	-	209	209	3.0	1290	0.162	100	0.0	1
Approach	52	209	261	3.4		0.162			
	Total	%HV	Deg.Satn (v/c)						
All Vehicles	665	3.9		0.280					

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate sec	Capacity veh/h	Deg. Satn veh/h	Min. Delay v/c	Merge Delay sec	sec
There are no Exit Short Lanes for Merge Analysis at this Site.												

Variable Demand Analysis

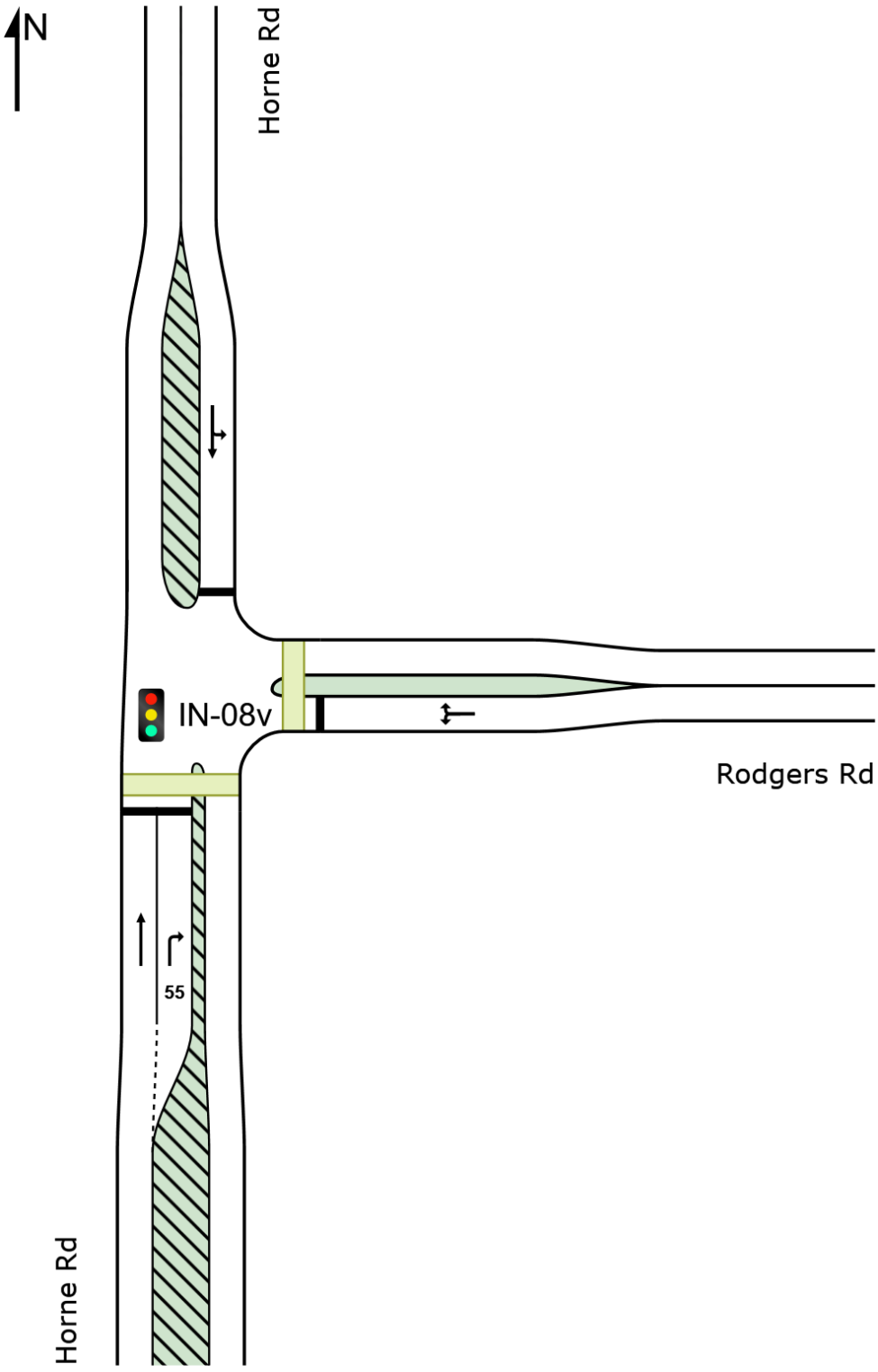
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Horne Road				
Lane 1	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-08v [IN-07 Horne Rd/Rodgers Rd (Site Folder: Ultimate - PM)]

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-08v [IN-07 Horne Rd/Rodgers Rd (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: Proposed Design 2
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 65 seconds (Site Practical Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Horne Rd															
Lane 1	815	5.0	815	5.0	1189[1]	0.685	100	9.2	LOS A	16.4	120.0	Full	500	0.0	0.0
Lane 2	128	2.0	128	2.0	169	0.760	100	42.7	LOS D	4.5	32.2	Short	55	0.0	NA
Approach	943	4.6	943	4.6		0.760		13.7	LOS B	16.4	120.0				
East: Rodgers Rd															
Lane 1	183	2.0	183	2.0	310	0.591	100	34.0	LOS C	5.7	40.4	Full	500	0.0	0.0
Approach	183	2.0	183	2.0		0.591		34.0	LOS C	5.7	40.4				
North: Horne Rd															
Lane 1	699	4.7	699	4.7	869	0.804	100	20.4	LOS C	21.3	155.2	Full	500	0.0	0.0
Approach	699	4.7	699	4.7		0.804		20.4	LOS C	21.3	155.2				
All Vehicles	1825	4.4	1825	4.4		0.804		18.3	LOS B	21.3	155.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Approach Lane Flows (veh/h)

South: Horne Rd

Mov. From S To Exit:	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	815	-	815	5.0	1189[1]	0.685	100	NA	NA
Lane 2	-	128	128	2.0	169	0.760	100	0.0	1
Approach	815	128	943	4.6		0.760			

East: Rodgers Rd

Mov. From E To Exit:	L2 S	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	111	73	183	2.0	310	0.591	100	NA	NA
Approach	111	73	183	2.0		0.591			

North: Horne Rd

Mov. From N To Exit:	L2 E	T1 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	61	638	699	4.7	869	0.804	100	NA	NA
Approach	61	638	699	4.7		0.804			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1825	4.4	0.804

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

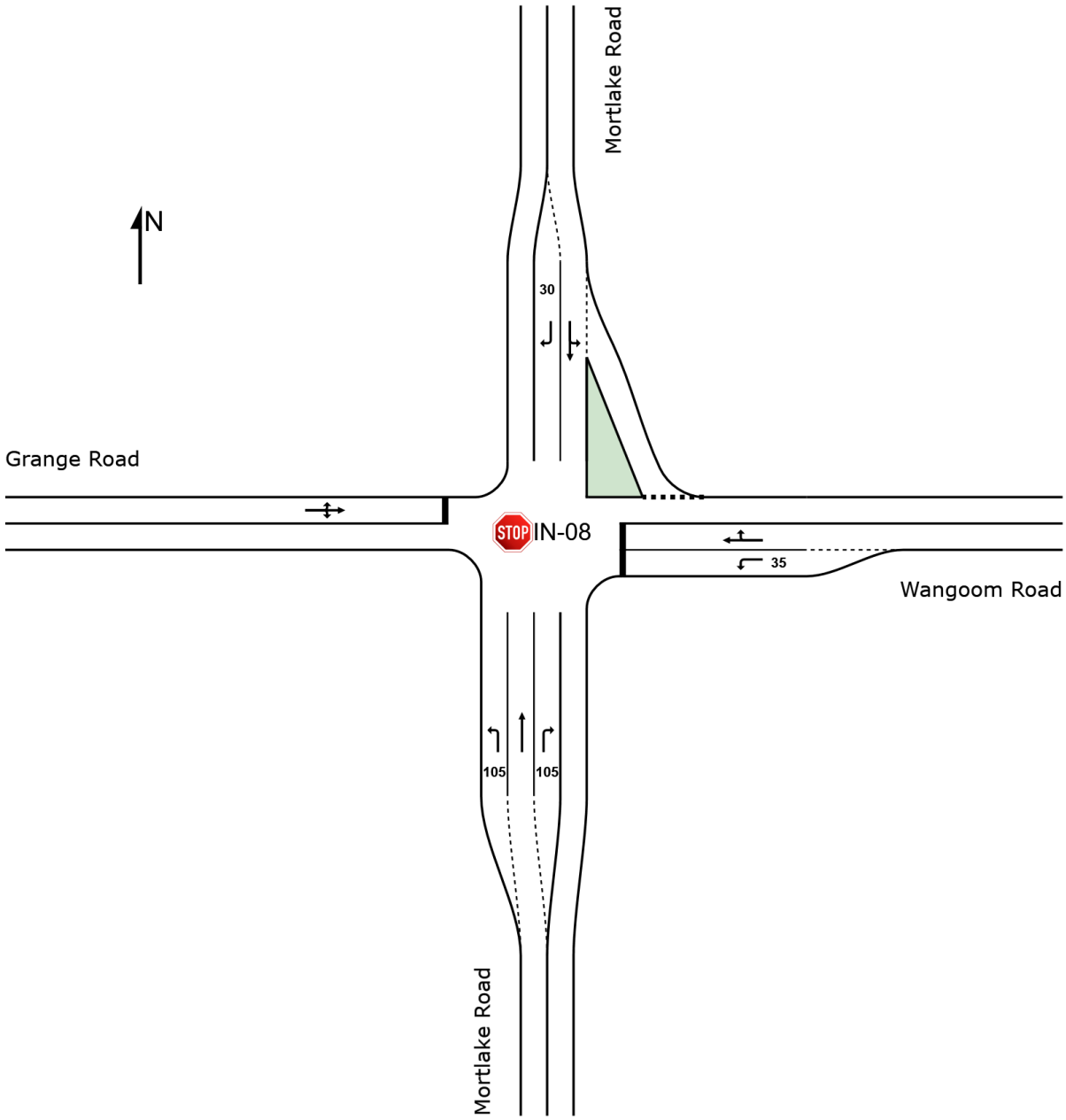
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
East: Rodgers Rd				
Lane 1	0.0	0.0	0.0	0.0
North: Horne Rd				
Lane 1	0.0	0.0	0.0	0.0

SITE LAYOUT

Site: IN-08 [IN-08 Wangoom Road / Mortake Road (Background) (Site Folder: Ultimate - PM)]

New Site
Site Category: (None)
Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: IN-08 [IN-08 Wangoom Road / Mortake Road (Background) (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Mortlake Road															
Lane 1	40	0.0	40	0.0	1857	0.022	100	5.5	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	453	5.0	453	5.0	1889	0.240	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	244	5.0	244	5.0	1119	0.218	100	7.6	LOS A	1.0	7.3	Short	105	0.0	NA
Approach	737	4.7	737	4.7		0.240		2.9	NA	1.0	7.3				
East: Wangoom Road															
Lane 1	158	5.0	158	5.0	682	0.231	100	11.6	LOS B	0.9	6.4	Short	35	0.0	NA
Lane 2	55	4.8	55	4.8	67	0.822	100	118.1	LOS F	3.3	23.8	Full	500	0.0	0.0
Approach	213	5.0	213	5.0		0.822		39.0	LOS E	3.3	23.8				
North: Mortlake Road															
Lane 1	485	5.0	485	5.0	1771	0.274	100	1.0	LOS A	0.5	3.7	Full	500	0.0	0.0
Lane 2	2	0.0	2	0.0	833	0.003	100	7.7	LOS A	0.0	0.1	Short	30	0.0	NA
Approach	487	5.0	487	5.0		0.274		1.0	NA	0.5	3.7				
West: Grange Road															
Lane 1	29	0.0	29	0.0	57	0.517	100	94.9	LOS F	1.7	11.7	Full	500	0.0	0.0
Approach	29	0.0	29	0.0		0.517		94.9	LOS F	1.7	11.7				
All Vehicles	1466	4.7	1466	4.7		0.822		9.3	NA	3.3	23.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: Mortlake Road

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	40	-	-	40	0.0	1857	0.022	100	0.0	2
Lane 2	-	453	-	453	5.0	1889	0.240	100	NA	NA
Lane 3	-	-	244	244	5.0	1119	0.218	100	0.0	2
Approach	40	453	244	737	4.7		0.240			

East: Wangoom Road

Mov.	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.

From E To Exit:	S	W	N			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	158	-	-	158	5.0	682	0.231	100	0.0	2
Lane 2	-	2	53	55	4.8	67	0.822	100	NA	NA
Approach	158	2	53	213	5.0		0.822			
North: Mortlake Road										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	60	425	-	485	5.0	1771	0.274	100	NA	NA
Lane 2	-	-	2	2	0.0	833	0.003	100	0.0	1
Approach	60	425	2	487	5.0		0.274			
West: Grange Road										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	1	27	29	0.0	57	0.517	100	NA	NA
Approach	1	1	27	29	0.0		0.517			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1466	4.7	0.822

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
East: Wangoom Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
North: Mortlake Road				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: Grange Road				
Lane 1	0.0	0.0	0.0	0.0

LANE SUMMARY

Site: IN-08 [IN-08 Wangoom Road / Mortake Road (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: RoadName															
Lane 1	40	0.0	40	0.0	1857	0.022	100	5.5	LOS A	0.0	0.0	Short	105	0.0	NA
Lane 2	453	5.0	453	5.0	1889	0.240	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 3	452	5.0	452	5.0	1119	0.403	100	8.4	LOS A	2.6	19.0	Short	105	0.0	NA
Approach	944	4.8	944	4.8		0.403		4.3	NA	2.6	19.0				
East: RoadName															
Lane 1	296	5.0	296	5.0	682	0.433	100	13.1	LOS B	2.4	17.4	Short	35	0.0	NA
Lane 2	104	4.9	104	4.9	35	2.986	100	1894.5	LOS F	45.6	332.4	Full	500	0.0	0.0
Approach	400	5.0	400	5.0		2.986		503.3	LOS F	45.6	332.4				
North: RoadName															
Lane 1	560	5.0	560	5.0	1541	0.363	100	2.8	LOS A	1.5	10.9	Full	500	0.0	0.0
Lane 2	2	0.0	2	0.0	833	0.003	100	7.7	LOS A	0.0	0.1	Short	30	0.0	NA
Approach	562	5.0	562	5.0		0.363		2.9	NA	1.5	10.9				
West: RoadName															
Lane 1	29	0.0	29	0.0	25	1.202	100	464.1	LOS F	6.4	44.6	Full	500	0.0	0.0
Approach	29	0.0	29	0.0		1.202		464.1	LOS F	6.4	44.6				
All Vehicles	1936	4.8	1936	4.8		2.986		114.0	NA	45.6	332.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach Lane Flows (veh/h)

South: RoadName

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	40	-	-	40	0.0	1857	0.022	100	0.0	2
Lane 2	-	453	-	453	5.0	1889	0.240	100	NA	NA
Lane 3	-	-	452	452	5.0	1119	0.403	100	0.0	2
Approach	40	453	452	944	4.8		0.403			

East: RoadName

Mov.	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.

From E To Exit:	S	W	N			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	296	-	-	296	5.0	682	0.433	100	0.0	2
Lane 2	-	2	102	104	4.9	35	2.986	100	NA	NA
Approach	296	2	102	400	5.0		2.986			
North: RoadName										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	135	425	-	560	5.0	1541	0.363	100	NA	NA
Lane 2	-	-	2	2	0.0	833	0.003	100	0.0	1
Approach	135	425	2	562	5.0		0.363			
West: RoadName										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	1	27	29	0.0	25	1.202	100	NA	NA
Approach	1	1	27	29	0.0		1.202			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1936	4.8	2.986

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Critical Gap pcu/h	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.											

Variable Demand Analysis

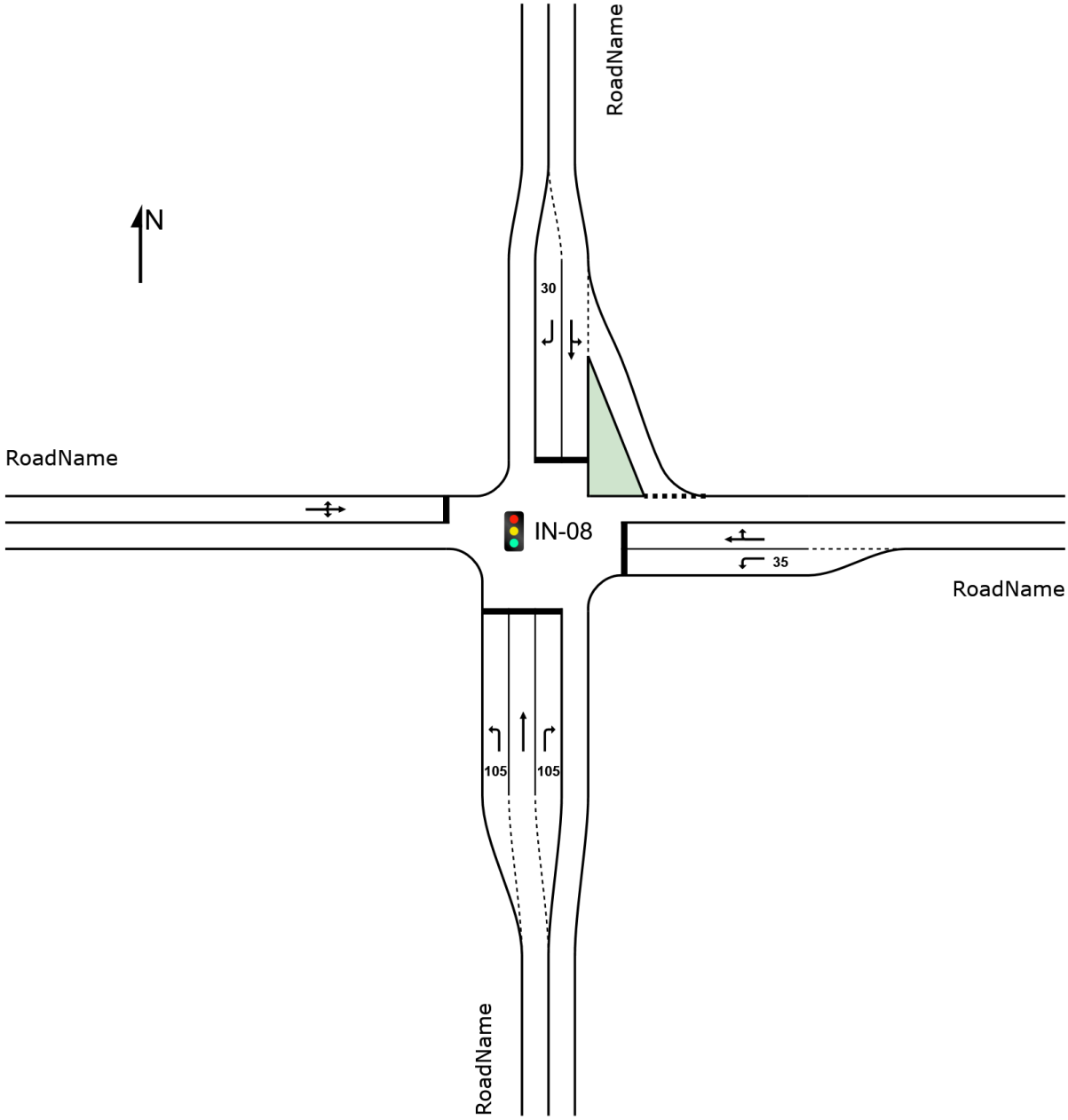
	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: RoadName				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
East: RoadName				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	34.7	3575.2	NA
North: RoadName				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: RoadName				
Lane 1	0.0	2.5	363.7	NA

SITE LAYOUT

Site: IN-08 [IN-08 Wangoom Road / Mortake Road_Signalised (Site Folder: Ultimate - PM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Organisation: O'BRIEN TRAFFIC | Licence: PLUS / FLOATING | Created: Wednesday, 20 August 2025 3:51:16 PM
Project: C:\Users\ChiragSafi\OneDrive - O'Brien Traffic\02 General - Company Data\Document\Current Documents\26720 East of Aberline PSP \Documents\SIDRA\26720SIDRA REVISED FINAL (TO VPA).sip9

LANE SUMMARY

Site: IN-08 [IN-08 Wangoom Road / Mortake Road_Signalised (Site Folder: Ultimate - PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: RoadName															
Lane 1	40	0.0	40	0.0	1061	0.038	100	12.5	LOS B	0.6	4.1	Short	105	0.0	NA
Lane 2	453	5.0	453	5.0	1079	0.419	100	9.1	LOS A	8.7	63.6	Full	500	0.0	0.0
Lane 3	452	5.0	452	5.0	538	0.839	100	37.2	LOS D	16.9	123.7	Short	105	0.0	NA
Approach	944	4.8	944	4.8		0.839		22.7	LOS C	16.9	123.7				
East: RoadName															
Lane 1	296	5.0	296	5.0	845	0.350	100	18.3	LOS B	6.4	46.9	Short	35	0.0	NA
Lane 2	104	4.9	104	4.9	173	0.603	100	41.6	LOS D	3.7	27.3	Full	500	0.0	0.0
Approach	400	5.0	400	5.0		0.603		24.4	LOS C	6.4	46.9				
North: RoadName															
Lane 1	560	5.0	560	5.0	681[1]	0.823	100	38.0	LOS D	19.3	141.0	Full	500	0.0	0.0
Lane 2	2	0.0	2	0.0	159	0.013	100	46.3	LOS D	0.1	0.5	Short	30	0.0	NA
Approach	562	5.0	562	5.0		0.823		38.1	LOS D	19.3	141.0				
West: RoadName															
Lane 1	29	0.0	29	0.0	110	0.268	100	42.6	LOS D	1.1	7.4	Full	500	0.0	0.0
Approach	29	0.0	29	0.0		0.268		42.6	LOS D	1.1	7.4				
All Vehicles	1936	4.8	1936	4.8		0.839		27.8	LOS C	19.3	141.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Approach Lane Flows (veh/h)

South: RoadName

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	40	-	-	40	0.0	1061	0.038	100	0.0	2
Lane 2	-	453	-	453	5.0	1079	0.419	100	NA	NA
Lane 3	-	-	452	452	5.0	538	0.839	100	19.8	2
Approach	40	453	452	944	4.8		0.839			

East: RoadName

Mov. From E	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

To Exit:	S	W	N			veh/h	v/c	%	%	No.
Lane 1	296	-	-	296	5.0	845	0.350	100	31.8	2
Lane 2	-	2	102	104	4.9	173	0.603	100	NA	NA
Approach	296	2	102	400	5.0		0.603			

North: RoadName

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	135	425	-	560	5.0	681[1]	0.823	100	NA	NA
Lane 2	-	-	2	2	0.0	159	0.013	100	0.0	1
Approach	135	425	2	562	5.0		0.823			

West: RoadName

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	1	27	29	0.0	110	0.268	100	NA	NA
Approach	1	1	27	29	0.0		0.268			

	Total	%HV	Deg.Satn (v/c)
All Vehicles	1936	4.8	0.839

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
There are no Exit Short Lanes for Merge Analysis at this Site.												

Variable Demand Analysis

	Initial Queued Demand veh	Residual Queued Demand veh	Time for Residual Demand to Clear sec	Duration of Oversatn sec
South: RoadName				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
Lane 3	0.0	0.0	0.0	0.0
East: RoadName				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
North: RoadName				
Lane 1	0.0	0.0	0.0	0.0
Lane 2	0.0	0.0	0.0	0.0
West: RoadName				
Lane 1	0.0	0.0	0.0	0.0