This document was endorsed by Council in December 2020. This report has been prepared to inform the development of policies for the Cranbourne Major Activity Centre, including Amendment C275case to the Casey Planning Scheme. This document intended to be a background document in the Casey Planning Scheme

GTAconsultants

Cranbourne Town Centre Movement and Access Strategy

Client // City of Casey
Office // VIC
Reference // V118270
Date // 19/12/17

Cranbourne Town Centre

Movement and Access Strategy

Issue: A 19/12/17

Client: City of Casey
Reference: V118270
GTA Consultants Office: VIC

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A-Dr	28/09/17	Preliminary Draft	Jacquelyn Viti	Chris Greenland	Reece Humphreys	
A-Dr2	01/12/17	Final Draft	Jacquelyn Viti	Chris Greenland	Reece Humphreys	
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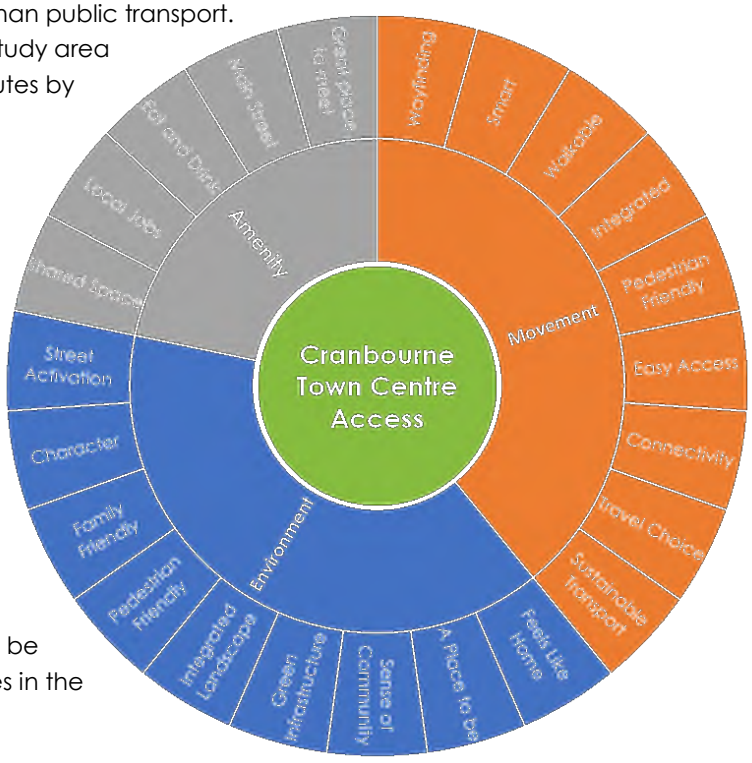
Executive Summary

The Cranbourne Town Centre has a variety of services that provides a range of transport choices for travellers, with good rail and bus provision. Internally, the challenge for the growth and viability of the Cranbourne Town Centre is being able to encourage and promote the movement of people, rather than vehicles, to enhance the vibrancy for its visitors.

As a car-centric municipality, journey to work data suggests that a significant proportion of residents in the Casey municipality work within the immediately surrounding employment clusters such as Frankston, Dandenong in addition to those that live and work locally. The majority of commuters from Cranbourne work within the City of Casey. Additionally, the majority of commuters to Cranbourne live within the City of Casey. Therefore, most daily commutes are contained within the local government area.

The spatial nature of the key generators and attractors in Cranbourne mean that people are generally more attracted to travelling by motorised vehicle rather than more sustainable modes such as walking, cycling and public transport. Whilst the suburb of Cranbourne and the more specifically the Town Centre feature several public transport options, it is not without its challenges. The Cranbourne Railway Line currently terminates towards the north part of the Town Centre which is also served by several bus routes. An additional bus interchange is also located more centrally at Lyall Street, near its intersection with South Gippsland Highway.

Although the retail uses in Cranbourne are located in reasonably close proximity to Cranbourne Rail Station, it is much easier to access Cranbourne via car than public transport for a large proportion of metropolitan Melbourne. Of note are suburbs that are located east and west of the study area or those areas not proximate to the Cranbourne rail line which are generally more than 20 minutes quicker to access via car than public transport. By way of example, a trip travelling to the study area from Frankston would take less than 30 minutes by car and up to an hour by public transport.



Parking surveys identified a total supply of 5,474 car spaces with a peak demand of 2,850 and 2,092 spaces on the Friday and Saturday, respectively. Readily available car parking opportunities encourages town centre visitors to preference the private vehicle above alternative transport modes.

Cranbourne as a regional centre will play a key role in the City of Casey which is expected to approximately double its population to 2041 from 261,000 to 514,000 residents. Of this increase, approximately 10,000 additional residents are expected to be located in Cranbourne with higher increases in the neighbouring suburbs.

The Desired Outcome for Cranbourne

Consultation with stakeholders has identified three key themes for an improved outcome for Cranbourne including Amenity, Environment and Movement. Achieving improvement with the themes will result in a range of successful outcomes as shown in the figure to the right.

In achieving the desired outcomes for access and movement, two key transport projects were identified that would have a substantial impact on easing congestion and heavy vehicle traffic for the Cranbourne Town Centre that are outside of Council's control, being:

i Construction of a bypass of the Cranbourne Town Centre
ii Extension of the Cranbourne railway line to East Cranbourne and Clyde.

It is recommended that Council endeavour to advocate for these projects as a matter of strategic importance.

Having regard for the two projects outside of Council's control, the strategy necessarily sits within the uncertainty provided. To address this uncertainty, the key action aims are as follows:

- Conversion of all or part of South Gippsland Highway through the Cranbourne Town Centre into a more enhanced street for its residents (street for people),
- Strong east-west connection between the Cranbourne Town Centre and Casey RACE to create a single consolidated activity axis,
- Reduction in car parking provision to encourage the use of sustainable modes,
- Pedestrian and bicycle connectivity improvements both into and through the town centre by improving access arrangements such as footpath widening, pram ramps, cycle lanes, wayfinding signage, street lighting upgrades and end-of-trip facilities, and
- Local public transport improvements for effective and useful connection to neighbouring activity centres including Frankston and Narre Warren.

To reduce the barrier west of Cranbourne Park Shopping Centre to east of South Gippsland Highway, it is recommended that Council provide objectives for The Cranbourne Park Shopping Centre owners. In conjunction with future development, these will help achieve connectivity within the Shopping Centre that links Lyall Street to the east to Cranbourne Drive to the west. Various modifications to the South Gippsland Highway cross-section are also detailed in our report (depending on the status of the Cranbourne Bypass) to transform this area to a great public space and reduces the east-west barrier that is evident through Cranbourne.

Recommendations have been made regarding both the existing transport characteristics of Cranbourne, as well as necessary improvements to accommodate future growth of the study area.

Table ES1 summarises the recommendations and nominate the relevant stakeholders/authorities for each Option.

Table ES1: Cranbourne Movement and Access Recommendations

Recommendation	Timeframe			Key Stakeholder/ Authority Responsible [1]
	Short Term (0-5 years)	Medium Term (5-15 years)	Long Term (15-30 years)	
Reduce car parking provision for both retail and residential developments to promote walking and cycling.	✓	✓	✓	Council
Council to implement each of the key actions themes (with the assistance of others) for the Infrastructure Options depending on the status of the two key projects out of Council's control.	○	○	✓	Council, VicRoads, Transport for Victoria, PTV
Advocate for the construction of the Cranbourne bypass and the extension of the Cranbourne railway line to East Cranbourne and Clyde.	✓	✓	✓	Council
Council to develop objectives for the future expansion of Cranbourne Park Shopping Centre which achieved improvements in connectivity from Lyall Street to Cranbourne Drive.	○	✓	✓	Council
The cross-section of South Gippsland Highway be modified in the immediate future (two lanes in each direction).	✓	✓	✓	Council, VicRoads
The cross-section of South Gippsland Highway be modified following the completion of the Cranbourne Bypass (one lane in each direction).	○	✓	✓	Council, VicRoads
Amend the current speed limit of 60km/hr on South Gippsland Highway (between Clarendon Street to Sladen Street) to 40km/hr to improve pedestrian amenity and assist with better street tree outcomes. This should be in the form of a variable speed sign.	✓	✓	✓	Council, VicRoads
Develop a strategic cycling network, supported through infrastructure such as cycling lanes, head start boxes and lights, wayfinding signage and end-of-trip facilities. Ensure that all four roads in the vicinity of the study area that make up part of the VicRoads Principal Bicycle Network include these dedicated facilities.	✓	✓	✓	Council
Develop a strategic pedestrian network, supported through infrastructure such as footpaths, pram ramps, street furniture, wayfinding signage and street lighting.	○	✓	✓	Council
Implement several regional bus routes (high frequency with dedicated bus lanes) along primary arterial roads to connect to railway stations activity centres and regions with higher job rates.	○	✓	✓	Council, PTV, VicRoads
Implement several local bus routes within Cranbourne between key areas (such as Cranbourne station, Cranbourne Park Shopping Centre, schools and Casey RACE).	✓	✓	✓	Council

[1] Any Council responsibility could be assisted by GTA Consultants where required.

✓ - works recommended to be undertaken / completed ○ - works to be considered

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Appendices

Figures

Tables

1. Introduction

1.1 Background

The Cranbourne Town Centre has a variety of services that provides a range of transport choices for travellers, with good rail and bus provision. Internally, the challenge for the growth and viability of the Cranbourne Town Centre is being able to encourage and promote the movement of people rather than vehicles to maintain robust growth into the future.

Significant transformation has occurred in Cranbourne, from a local town centre to a major activity centre servicing the growing population and employment demands of the City of Casey. This growth has resulted in a significant transformation of the precinct and its surrounding areas.

From a transport perspective, these changes have resulted in an increase in the number of trips for people wishing to travel to the retail and commercial core. The land use mix enables some trips purposes to be contained within the town centre, whilst more broadly encourage more trips from locally based catchments.

Into the future, the movement of people by non-motorised modes will be key to the success of a vibrant Cranbourne Town Centre and will present opportunities for residents and workers to achieve a higher mode share of public and active transport.

1.2 Study Objectives

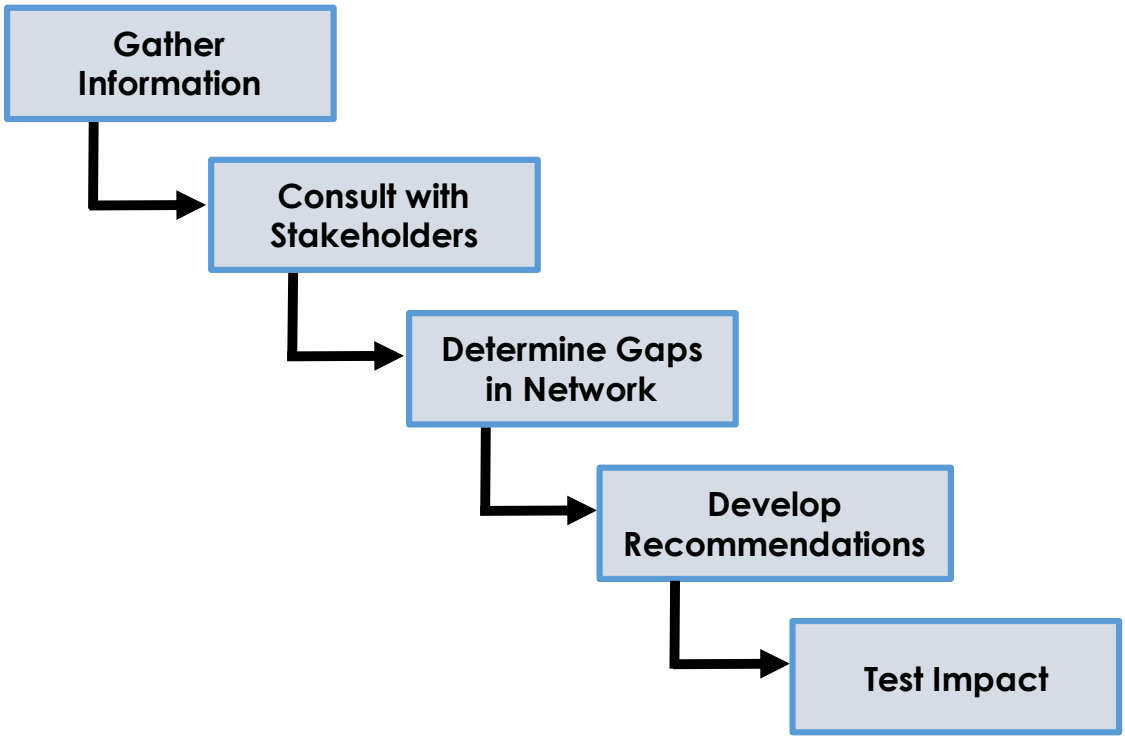
Casey City Council has engaged GTA Consultants (GTA) to develop a Movement and Access strategy for the Cranbourne Town Centre. The aims of this strategy are summarised as follows:

- *"To establish a better understanding of traffic patterns, parking supply and demand as well as opportunities for a more pedestrian friendly movement environment within the study area.*
- *To design mobility and accessibility within the town centre in accordance with the sustainable transport hierarchy of pedestrians/cyclists as first priority, public transport second followed by private vehicles.*
- *To create a well-connected pedestrian orientated activity centre that can provide safe and clear connectivity to all key destinations.*
- *To review and improve the quality of public transport access with regards to the existing rail station and bus interchange, and create better linkages to access these public transport facilities.*
- *To assess the existing road network and intersections within the study area and enhance their functions without compromising on the pedestrian and public transport connectivity.*
- *To manage congestion and parking demand through appropriate parking controls for future density increase of housing and retail/commercial developments within the study area.*
- *To promote local area traffic management plans and traffic calming strategies that will enhance traffic safety and support active transport.*
- *To establish a range of short term and medium term transport and parking strategies as well as outline necessary infrastructure improvements to support the above objectives."*

1.3 Report Structure

The intended report structure for this study has been summarised in the flow chart shown in Figure 1.1.

Figure 1.1: Report Structure



1.4 References

In preparing this report, reference has been made to the following:

- Casey Planning Scheme
- traffic, car parking, and Bluetooth pedestrian surveys commissioned by GTA Consultants as referenced in the context of this report
- SCATS traffic volume data sourced from VicRoads
- Victorian Integrated Transport Model (VITM)
- Australian Bureau of Statistics (various)
- Victorian Integrated Survey of Travel and Activity (VISTA)
- an inspection of the site and its surrounds
- four meetings with the 'Transport Working Group' for the project[1]
- one workshop with Casey City Council
- other documents as nominated.

[1] Consisting of representatives from Casey City Council, VicRoads, Transport for Victoria, PTV and GTA.

2. Existing Conditions

2.1 Location

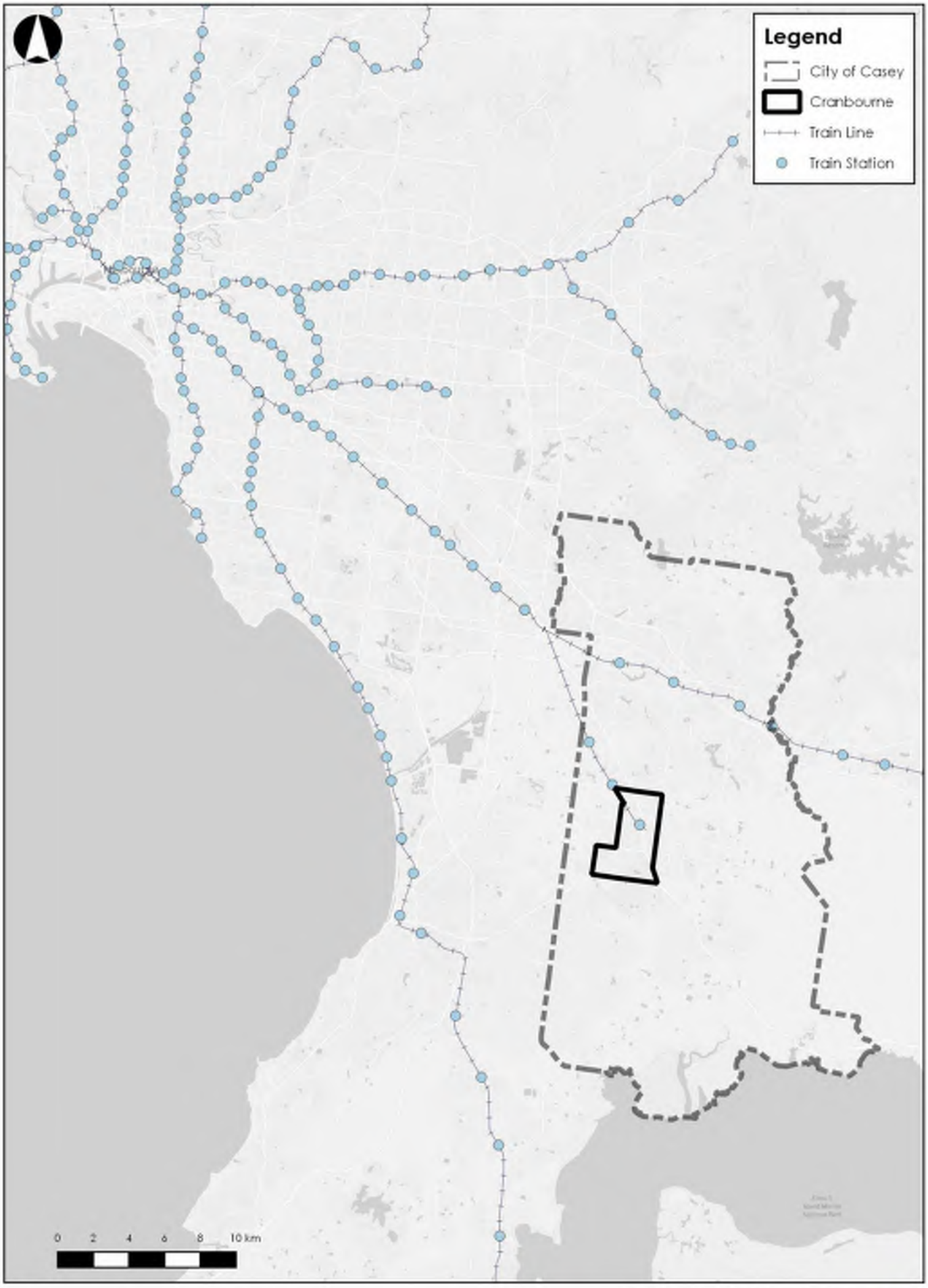
The Cranbourne Town Centre is located in the City of Casey approximately 50km south-east of Melbourne's Central Business District (CBD). It is located in the south of the City of Casey's existing urban area and is one of the City's two major activity centres along with the Fountain Gate-Narre Warren CBD. The Centre accommodates a diversity of uses including retail, commercial, institutional and residential activity.

Given its location, the Town Centre serves the daily needs of a local and extended catchment and provides regional level retail, commercial, entertainment and community services to residents, workers and visitors to the City and the wider region.

The Town Centre measures approximately 200 hectares and is zoned as an Activity Centre (ACZ1) in the Casey Planning Scheme.

The location of the study area in the context of both the south-eastern suburbs of Melbourne and the City of Casey is shown in Figure 2.1.

Figure 2.1: Cranbourne within Melbourne's Southeast Suburbs



2.2 Site Characteristics

2.2.1 Land Uses

A variety of land uses occupy the Cranbourne Town Centre and its surrounding area. Retail and commercial functions dominate the High Street retail core, with some activities spilling into the intersecting streets. Supermarkets and discount departments stores (DDS) – such as Woolworths, Coles, Kmart, Target – are largely contained within Cranbourne Park Shopping Centre.

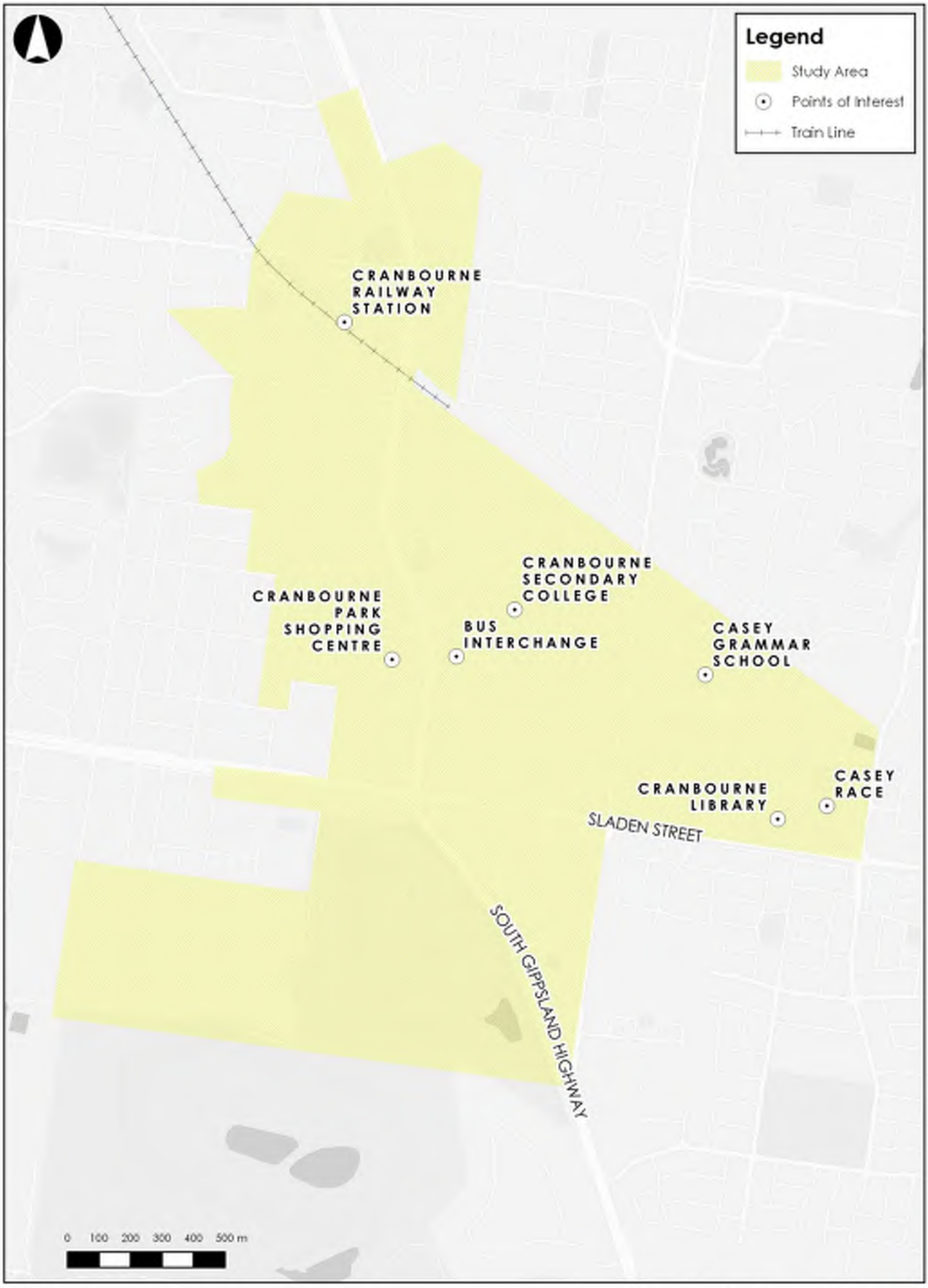
An Aldi supermarket is located off Childers Street, with the remainder of retail and commercial offerings outside the Cranbourne Park Shopping Centre being primarily smaller specialty retail stores, food and drink premises and convenience shops.

The retail premises located north of the High Street core are primarily larger sites, and include several motor vehicle sales yards and trade supplies type uses. Restricted retail and trade supply type uses continue further along the South Gippsland Highway, north of the Cranbourne Railway line. Similar uses occupy land along South Gippsland Highway, south of the High Street retail core together with some smaller warehouses and the Cranbourne Race Track located on the west of the highway.

To the east and west of the High Street are primarily residential areas comprised of older style single detached dwellings and multi-unit developments as well as more recent in-fill development. Further east, along Berwick-Cranbourne Road is the Casey Recreational Complex which houses several sports, recreation and community facilities including Casey RACE, Indoor Leisure Centre, Archery Club as well as Cranbourne Library and The Shed.

For reference, Figure 2.2 shows the location of the study area that includes the key points of interest.

Figure 2.2: Study Area (Local Context)

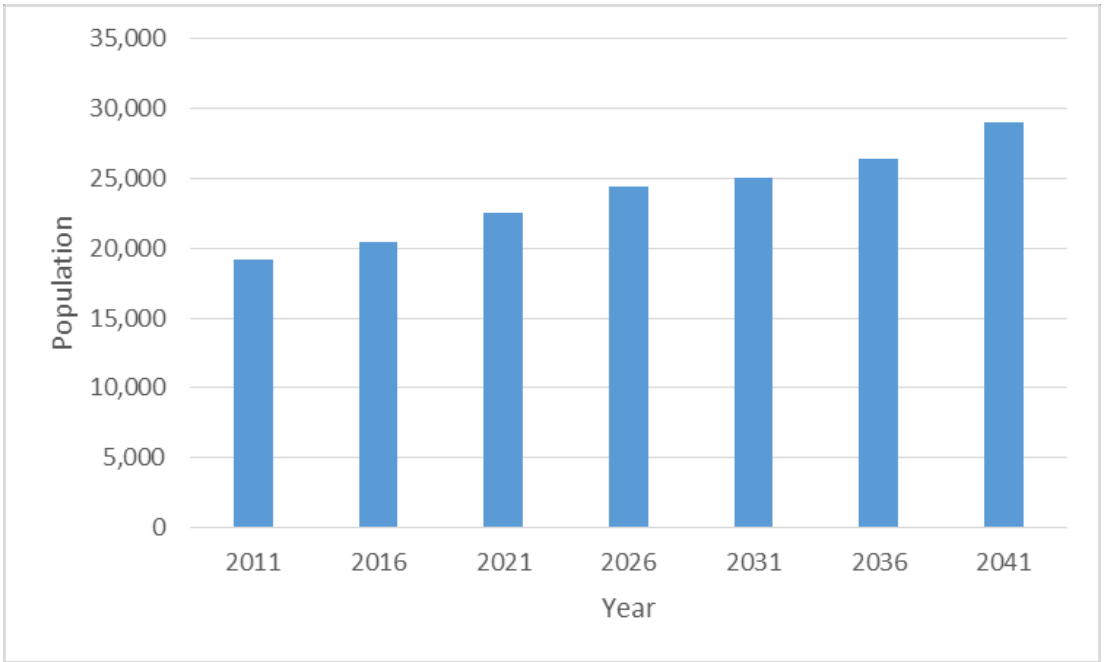


2.2.2 Population

The existing population of Cranbourne is approximately 19,000 residents based on the 2011 Census data. More broadly, the City of Casey is expected to approximately double its population between 2011 and 2041 from 261,000 to 514,000 residents. Of this increase, approximately 10,000 additional residents are expected to be located in Cranbourne. This is anticipated to add significantly more traffic onto the network, thus increasing the importance of the major infrastructure projects recommended in this report.

Figure 2.3 outlines the population forecast for Cranbourne[2].

Figure 2.3: Population Forecast (Cranbourne)

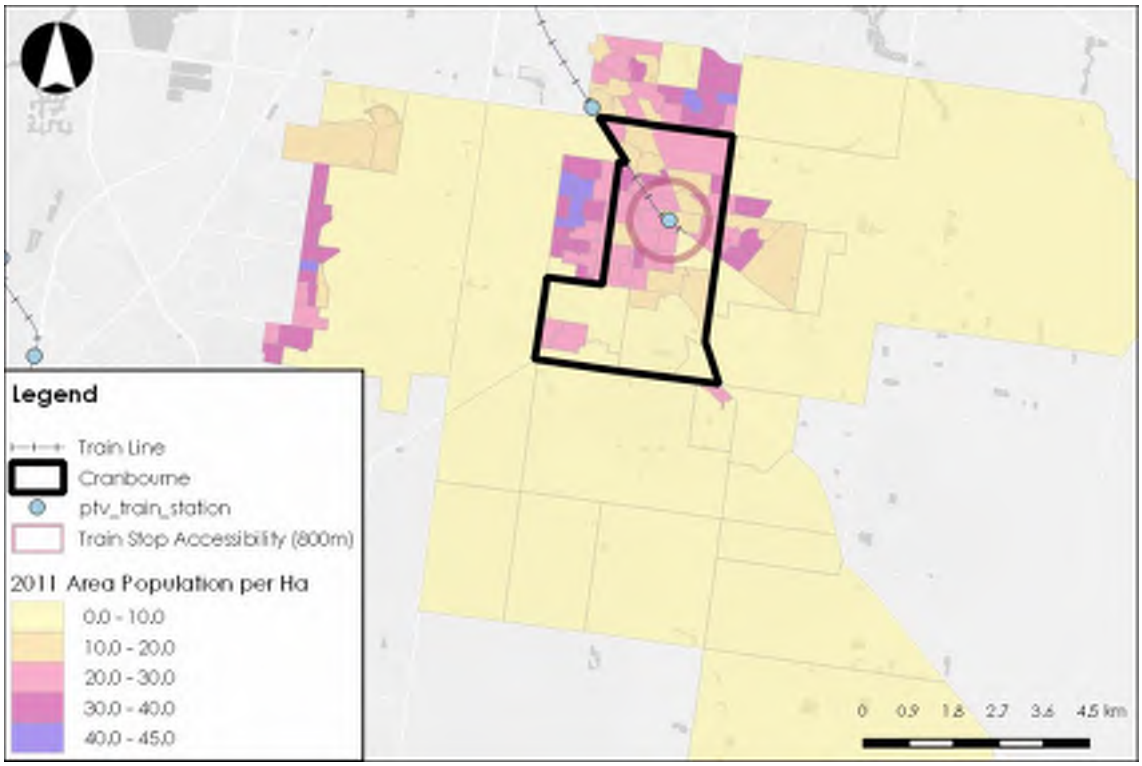


2.2.3 Where People Live

The existing dwelling density for the suburb of Cranbourne has been sourced from 2011 ABS Census data and is shown graphically in Figure 2.4.

[2] Source: http://forecast.id.com.au/casey/population-summary

Figure 2.4: Where People Live (Housing Density)



The data indicates dwelling density is generally between 10 and 30 dwellings per hectare within the Activity Centre, excluding areas categorised as predominantly non-residential zones (e.g. the industrial area immediately southeast of Cranbourne Rail Station). This indicates that not many people live near the Town Centre currently.

The Town Centre is generally identified as a 'Substantial Change Area' in the City of Casey Housing Strategy. Substantial Change Areas are categorised by having high accessibility to railway stations and activity centres where opportunities for higher density and more diverse housing will be supported.

Infill development along the Town Centre spine and within close proximity of Cranbourne Rail Station is expected to cater for a sizeable proportion of population increases within the suburb.

2011 census data was used in preparation of this report as the most recently available at the time of its inception. For consistency, this data was also used as inputs for the relevant models and tools employed as part of this project. 2016 census data has since been released and as expected, has shown an increase in the number of residents.

2.2.4 Reliance on Motor Vehicles

The existing car ownership levels for the suburb of Cranbourne has been sourced from 2011 ABS Census data and is shown in Figure 2.5.

Figure 2.5: Reliance on Motor Vehicles (Car Ownership)

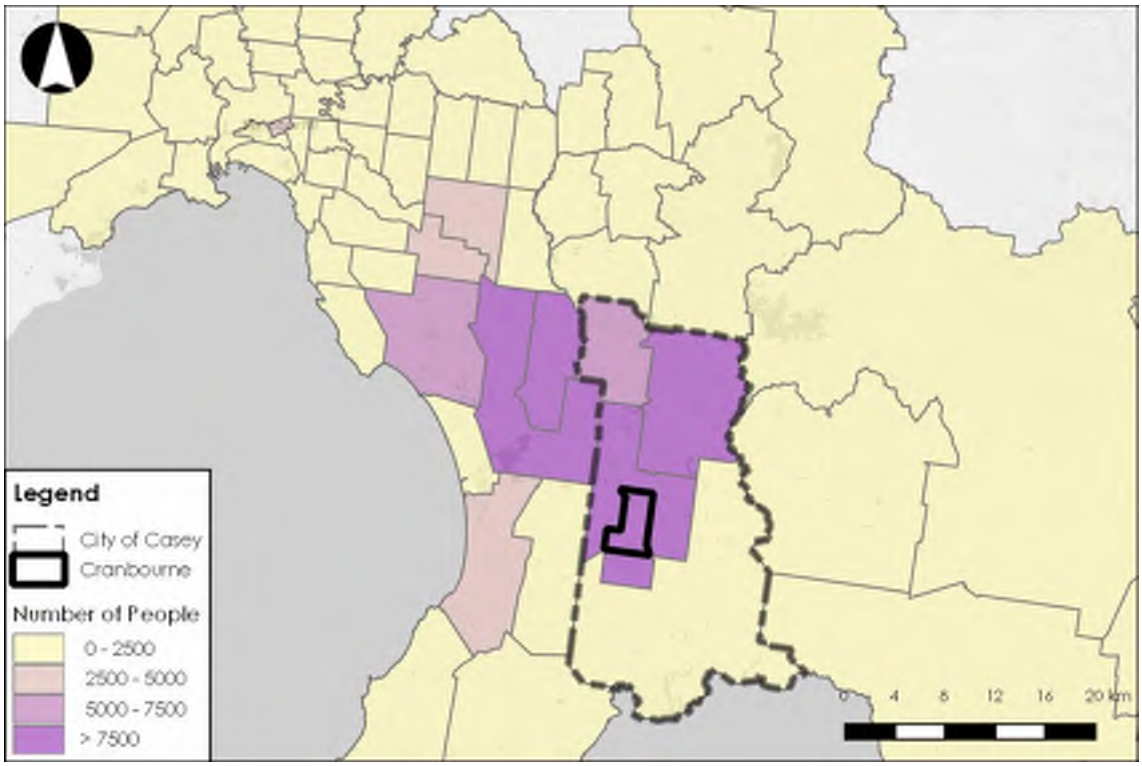
The data indicates car ownership ranges from 1.1 to 1.2 cars per dwelling within the Activity Centre, to generally 1.5 to 2.0 cars per dwelling on the outer fringe of the study area. This therefore indicates heavy reliance on motor vehicles in Cranbourne.

2.2.5 Where People Work

Journey to work data suggests that approximately 50% of residents that live within the City of Casey work within the same municipality or in the immediately surrounding employment clusters such as Frankston, Dandenong. A proportion of residents also work within the Melbourne CBD.

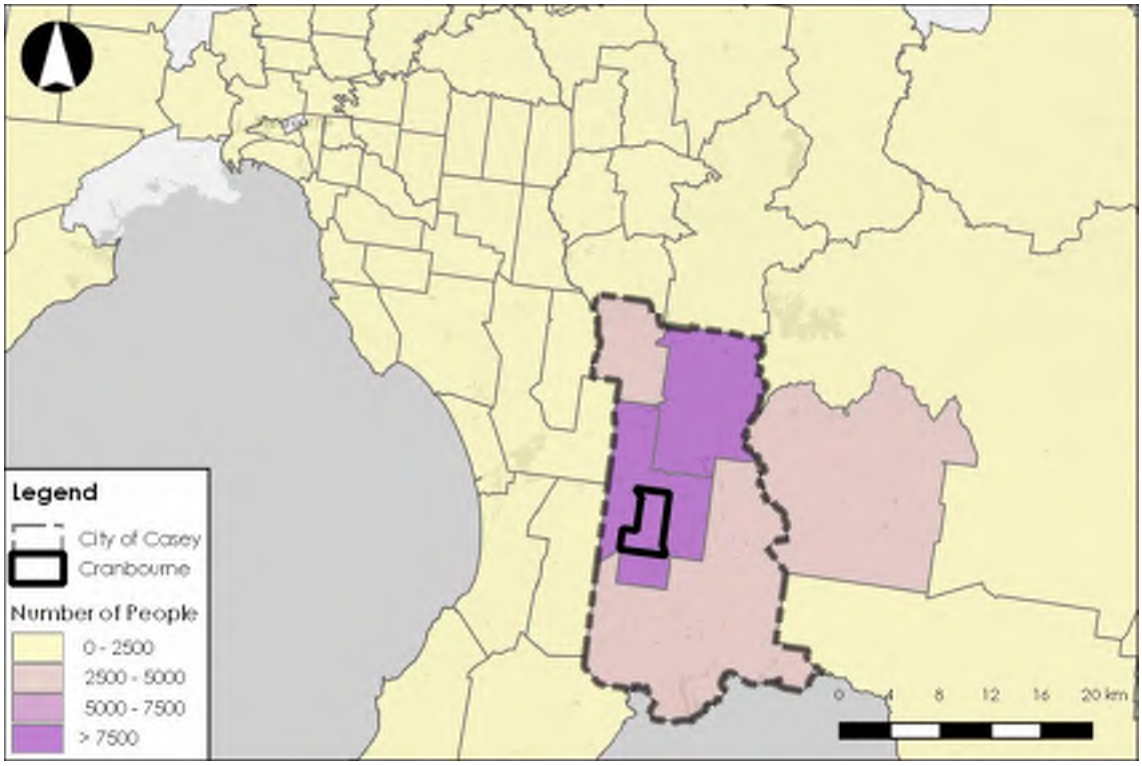
The location of work places for residents within the City of Casey is shown geospatially in Figure 2.6.

Figure 2.6: Where Residents Work (Residents of Casey)



A similar catchment exists for employees working within the City of Casey, with workers residing locally and within bordering municipalities such as Cardinia, Frankston, Dandenong and Monash. This shown geospatially in Figure 2.7.

Figure 2.7: Where Employees Live (Employees of Casey)



In summary, most people who live in Cranbourne work in that region and most people who work in Cranbourne live in that region.

This strong relationship between place of residence and place of work further stimulates the importance of achieving the principles of a '20-minute neighbourhoods' for the Cranbourne Town Centre area.

2.2.6 Where People Travel

Journey to 'other activity' and 'education' trip data indicates that the majority of leisure and school trips are made within the Casey municipality. The data suggests a strong reliance of non-work related inner-municipal trips favouring private car use given the limited local public transport coverage.

This relationship is shown in Figure 2.8 to Figure 2.11 on the following pages.

Figure 2.8: Journey to Other Activity (from Casey)

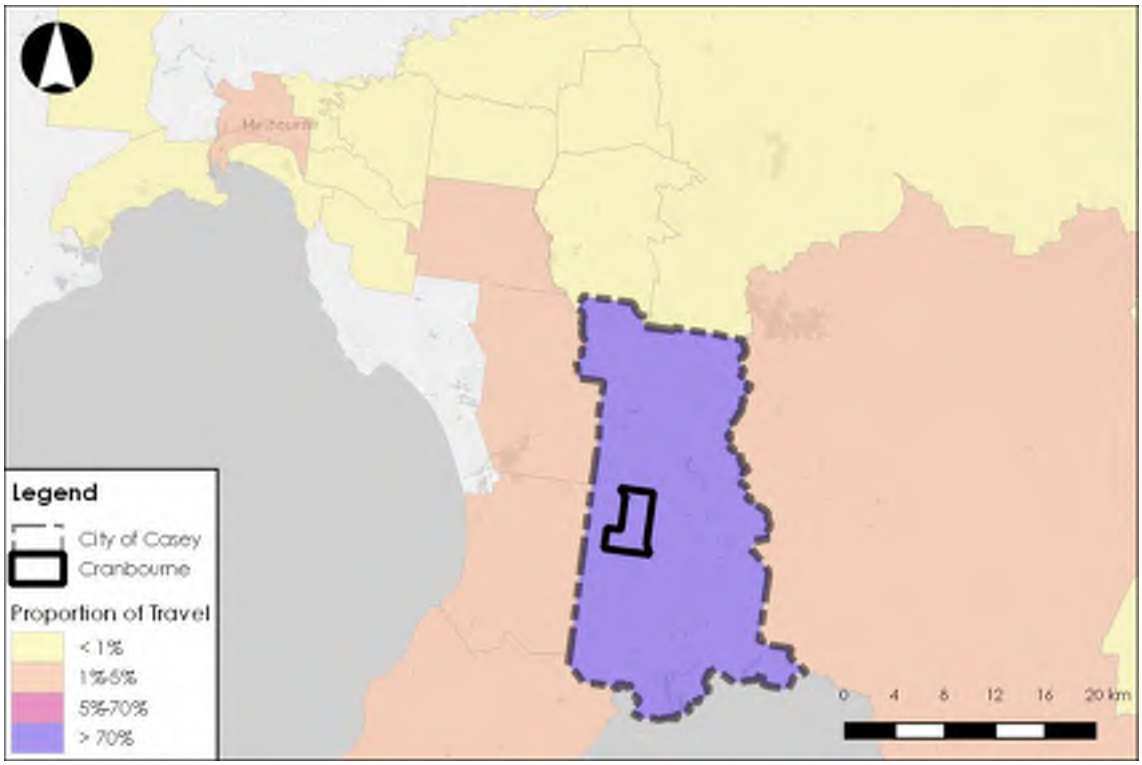


Figure 2.9: Journey to Other Activity (to Casey)

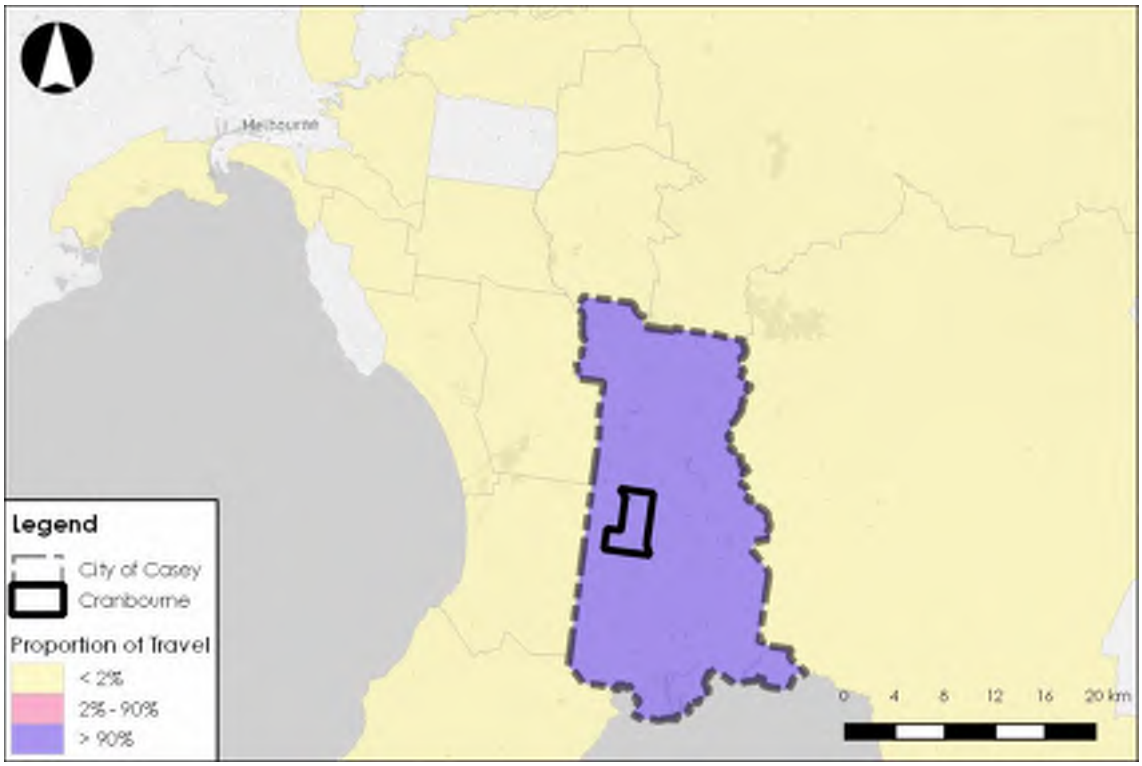


Figure 2.10: Journey to School (from Casey)

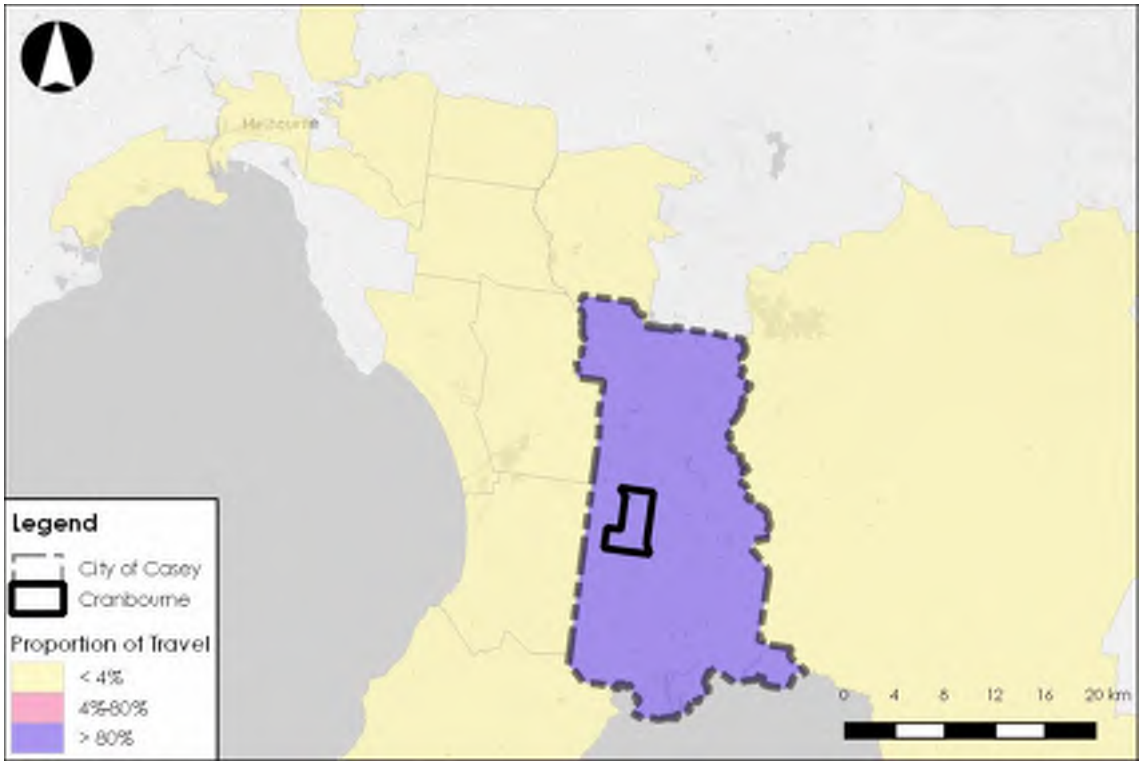
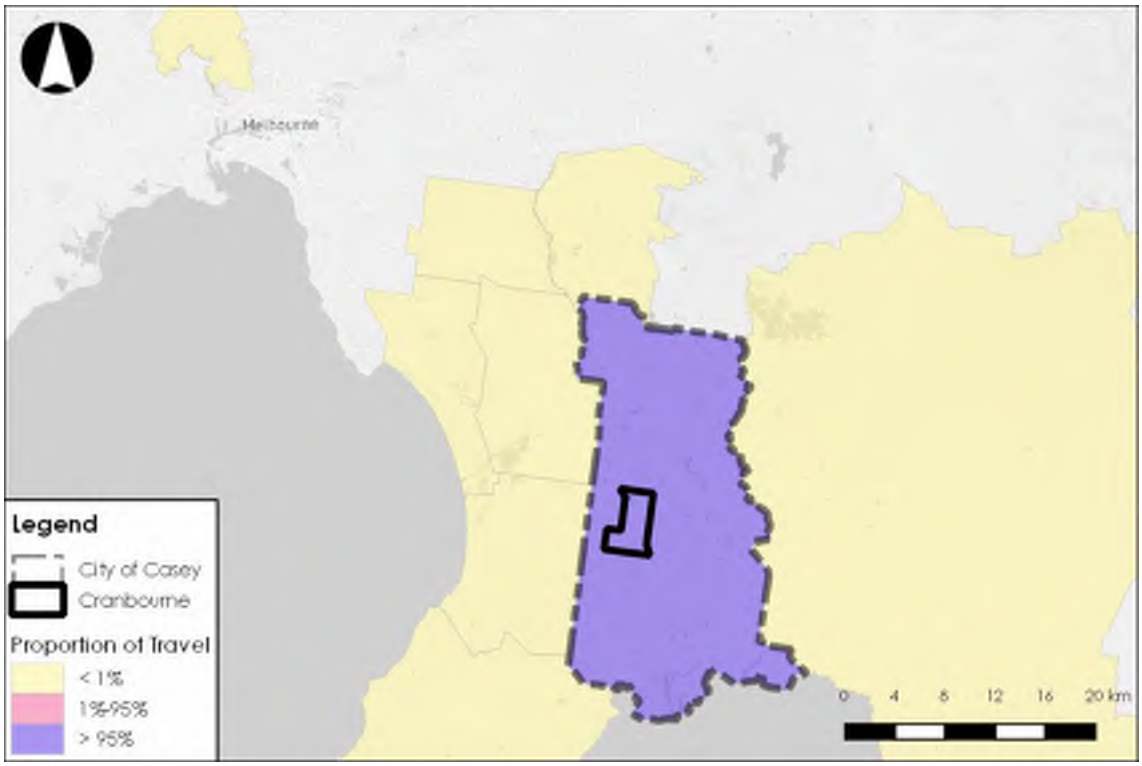


Figure 2.11: Journey to School (to Casey)



2.3 Transport Network

2.3.1 Road Network

The Cranbourne Town centre is well served by an established road network. The South Gippsland Highway (M420) runs through the centre with Berwick-Cranbourne Road (C407) to the south and Narre Warren-Cranbourne Road (C404) to the east which are all VicRoads managed arterial roads. Local major and collector roads provide connection to the greater local road network.

2.3.2 Accident Review

A review of the reported casualty accident history for the roads and intersections with the study area has been sourced from VicRoads CrashStats accident database. This database records all accidents causing injury that have occurred in Victoria since 1987 (as recorded by Victorian Police) and categorises these accidents as follows:

- Fatal injury: at least one person was killed in the accident or died within 30 days as a result of the accident.
- Serious injury: at least one person was sent to hospital as a result of the accident.
- Other injury: at least one person required medical treatment as a result of the accident.

A summary of the accidents in the study area for the last available five-year period is presented in Figure 2.12.

Figure 2.12: Reported Crash History

Number of crashes*

Severity	2011	2012	2013	2014	2015	2016	2017	Grand Total
Fatal crashes	1		1					2
Serious injury crashes	5	9	9	6	7	8		44
Other injury crashes	17	11	11	25	31	24	1	120
Grand Total	23	20	21	31	38	32	1	166

Number of persons*

Injury Level	2011	2012	2013	2014	2015	2016	2017	Grand Total
Fatality	1		1					2
Serious Injury	5	9	11	9	7	8		49
Other Injury	20	22	16	30	38	31	1	158
Non Injury	38	28	27	47	47	67	2	256
Grand Total	64	59	55	86	92	106	3	465

Source: VicRoads

A review of the crash history indicates that the majority of reported casualty accidents within the study area have occurred on South Gippsland Highway over the last five-year period. Of the 166 reported casualty accidents, only two of have been fatalities.

The data indicates that the number of reported casualty accidents has generally increased over time within the study area. In addition, the number of accidents have increased every year to 2015, with a reduction in 2016 (although the number of people involved in a crash increased). Whilst this increase is not considered significant, it is likely to be primarily due to an increase in traffic volumes resulting from population growth in the area.

2.3.3 Active Travel Network

While the Cranbourne Town Centre is in close proximity to rail and bus services and is a high activity area (particularly along its High Street retail strip), the sprawling nature of the Cranbourne Town Centre, with unguided low amenity pedestrian linkages, does little to promote active travel in the area.

The Centre's low level of connectivity has an impact on its functionality. The amenity and legibility of the Centre has the ability to influence community perception regarding its role as a formal and informal meeting place, its sense of community identity and its inclusiveness.

Four roads in the vicinity of the study area make up part of the VicRoads Principal Bicycle Network. Of these four roads, only Sladen Street (Berwick-Cranbourne Road) contains dedicated bicycle facilities in the form of on-road bicycle lanes which provide east-west connectivity. No dedicated north-south facilities near the Town Centre.

The above information is shown in Figure 2.13.

Figure 2.13: Existing Bicycles Facilities

Source: TravelSmart

Having regard to the above, the study area is not considered well serviced by formal cycling infrastructure.

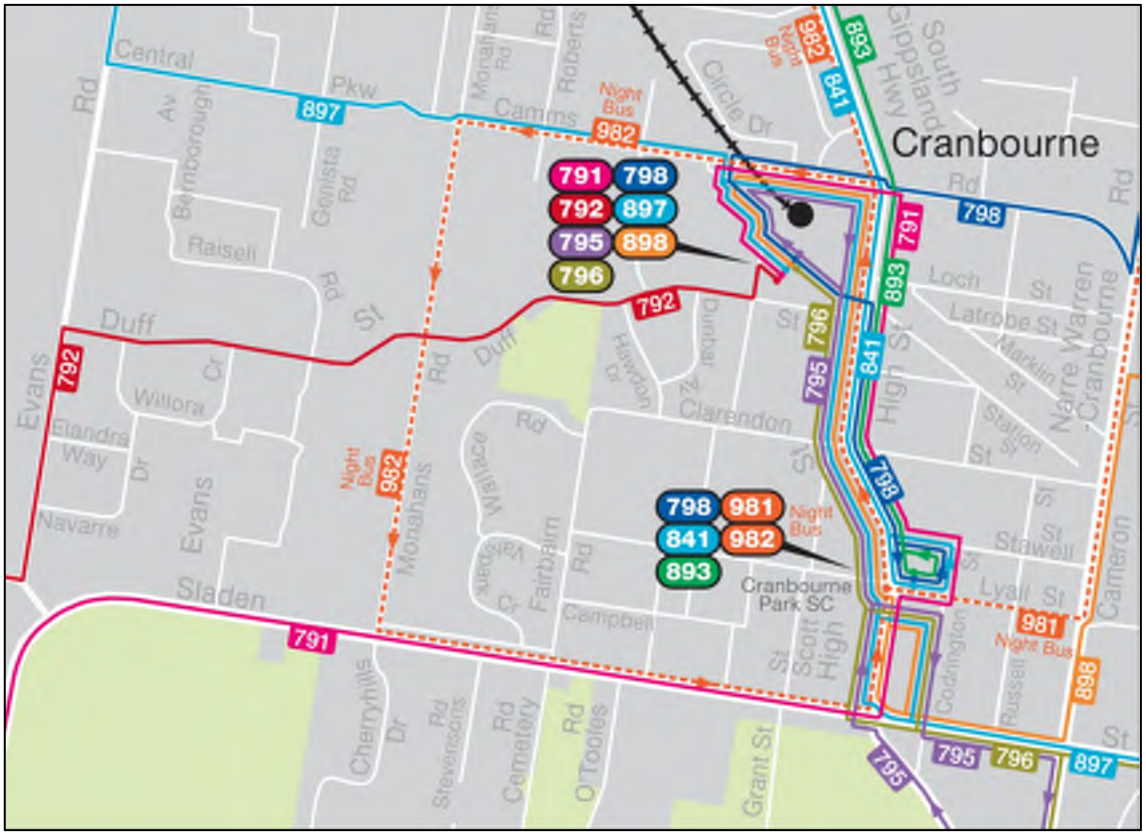
2.3.4 Public Transport Network

The suburb of Cranbourne and the more specifically the Town Centre feature a number of public transport options. The Cranbourne Railway Line currently terminates towards the north part of the Town Centre which is also served by several bus routes. An additional bus interchange is also located more centrally at Lyall Street, near its intersection with South Gippsland Highway.

Bus services generally run at 20-minute frequencies and predominantly service the Cranbourne area and nearby activity centres such as Frankston, Narre Warren and Dandenong.

Figure 2.14 shows the subject site in relation to existing public transport routes within its vicinity.

Figure 2.14: Public Transport Map



Source: PTV

More discussion on the suitability of the PT network is provided in Section 3 of this report.

2.3.5 SmartRoads

SmartRoads is a VicRoads policy which sets 'modal' priorities on the road network and underpins many of the strategies significant to the operational directions that support broader strategies around land use and transport.

"There is no single solution to managing congestion on our roads. Sustainable management of congestion will require an integrated approach involving better management of the existing network, building new infrastructure, visionary land use planning, encouraging sustainable transport modes, and changes in behaviour by individuals, businesses and a level of government." [3]

All road users will continue to have access to all roads. However, certain routes will be managed to work better for cars while others for public transport, cyclists and pedestrians during the various peak and off-peak periods. In this regard, the following is noted by VicRoads for the various modes assigned to arterial roads across the network that form part of the Network Operating Plans:

- *"Facilitate good pedestrian access into and within activity centres in periods of high demand*
- *Prioritise trams and buses on key public transport routes that link activity centres during morning and afternoon peak periods*
- *Encourage cars to use alternative routes around activity centres to reduce the level of 'through' traffic*

[3] Sourced from VicRoads

- *Encourage bicycles through further developing the bicycle network*
- *Prioritise trucks on important transport routes that link freight hubs and at times that reduce conflict with other transport modes"*

The VicRoads SmartRoads Network Operating Plan for the area surrounding the study area has been reproduced in Figure 2.15.

Figure 2.15: VicRoads SmartRoads Network Operating Plan

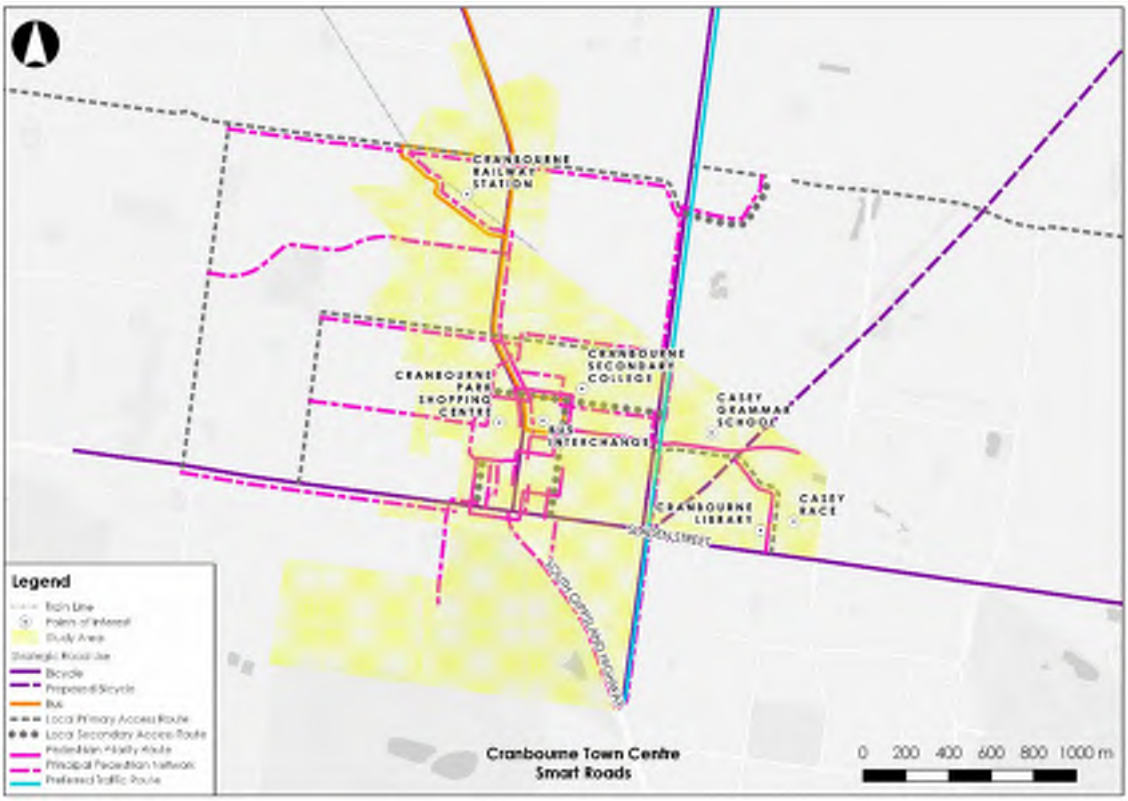


Figure 2.15 indicates that South Gippsland Highway is a bicycle and bus priority route, that also notes a requirement to carry traffic through the Cranbourne Town Centre. In addition, South Gippsland Highway is also a pedestrian priority area south of Clarendon Street. As such, there are competing modal priorities in this area.

It should also be noted that there are several north-south and east-west pedestrian priority routes in the Town Centre, with the preferred traffic route in the area being Narre-Warren Cranbourne Road that runs north-south to the east of the Town Centre. Whilst these are a representation of the VicRoads priorities, further examination on the suitability of various pedestrian/cyclist connections will be examined within this report.

3. Existing Network Performance

3.1 Methodology

Significant traffic and transport data collection was undertaken to determine a baseline transport network performance measure for the Cranbourne Town Centre. Data obtained for this baseline included:

- Pedestrian directional surveys and Bluetooth pedestrian desire line surveys at 20 key locations within the study area to determine existing walking patterns and routes
- Car parking surveys of some 5,500 car parking spaces to determine existing demand in across various parts of the study area and for the study area as a whole
- Traffic volume surveys of 25 intersections to feed into the development of a sub-area transport model from VITM to produce a calibrated and validated 2017 base model, and
- Relevant public transport data to influence GIS map projections.

This section of the report provides a summary of the traffic data and the performance of the network.

3.2 Active Travel

3.2.1 Pedestrian Bluetooth Data

A collective total of 532 hours of Bluetooth pedestrian movements surveys were undertaken around the Town Centre. Bluetooth loggers were installed at 20 locations around the Town Centre which recorded origin-destination movements between key sites including:

- Cranbourne Rail Station
- Bus interchange at Lyall Street
- Cranbourne Park Shopping Centre
- Cranbourne Secondary College
- Casey Grammar School
- Casey RACE
- Cranbourne Library.

The surveys were undertaken Thursday 23 March – Sunday 26 March 2017 and are summarised in Table 3.1 in relation to the timing of surveys at each site.

Table 3.1: Bluetooth Reader Station Timings

Site	Days/Times				
	Thursday 23/3	Friday 24/3	Saturday 25/3	Sunday 26/3	Total
Cranbourne Rail Station (2 locations)	7am-11am 3pm-8pm	7am-11am 3pm-8pm	10am-4pm	10am-4pm	30 hours x 2
Bus Interchange (3 locations)	7am-11am 3pm-8pm	7am-11am 3pm-8pm	10am-4pm	10am-4pm	30 hours x 3
Shopping Centre (8 locations)	9am-8pm	9am-8pm	10am-4pm	10am-4pm	34 hours x 8
Cranbourne Secondary (3 locations)	7am-10am 2:30pm-4:30pm	7am-10am 2:30pm-4:30pm	-	-	10 hours x 3

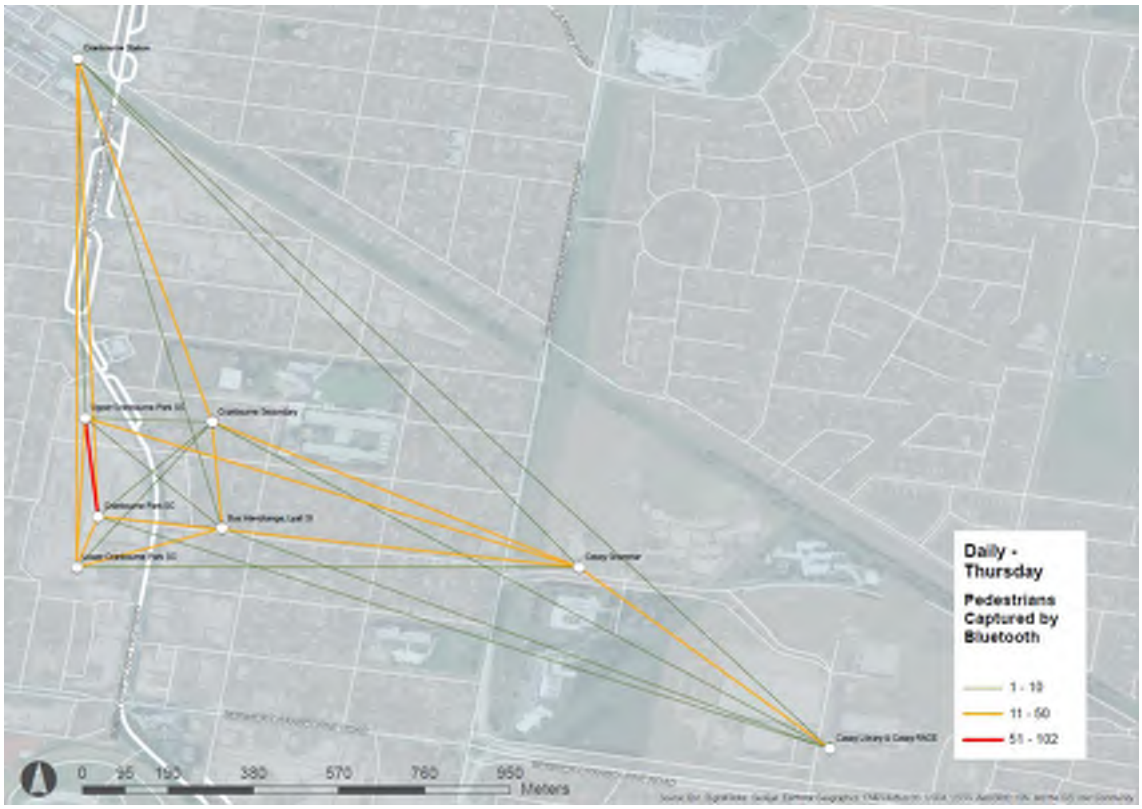
Site	Days/Times				
	Thursday 23/3	Friday 24/3	Saturday 25/3	Sunday 26/3	Total
Casey Grammar (2 locations)	7am-10am 2:30pm-4:30pm	7am-10am 2:30pm-4:30pm	-	-	10 hours x 2
Casey RACE (1 location)	8am-8pm	8am-8pm	10am-4pm	10am-4pm	36 hours x 1
Library (1 location)	10am-8pm	10am-6pm	10am-4pm	-	24 hours x 1
Total					**532 hours**

To illustrate the outputs in an easily identifiable format, sites were grouped together for analysis purposes (e.g. two loggers were provided at Cranbourne Rail Station and these were combined into one site when assessing pedestrian movements to and from the Station as opposed to each individual location at the Station specifically).

The pedestrians captured by Bluetooth for each of the four daily periods[4] are shown in Figure 3.1 to Figure 3.4, with the pedestrian volumes grouped in three summary data ranges.

It should be noted that given these volumes are pedestrians carrying Bluetooth devices only, the results should be used for comparative purposes only (i.e. the total number of pedestrian movements between these locations would naturally greater but moreover the relative magnitude to the other routes).

Figure 3.1: Where People Walk Thursday (Total: 7:00am-8:00pm)



[4] 'Daily periods' are for all times listed in Table 3.1 for that particular day.

Figure 3.2: Where People Walk Friday (Total: 7:00am-8:00pm)

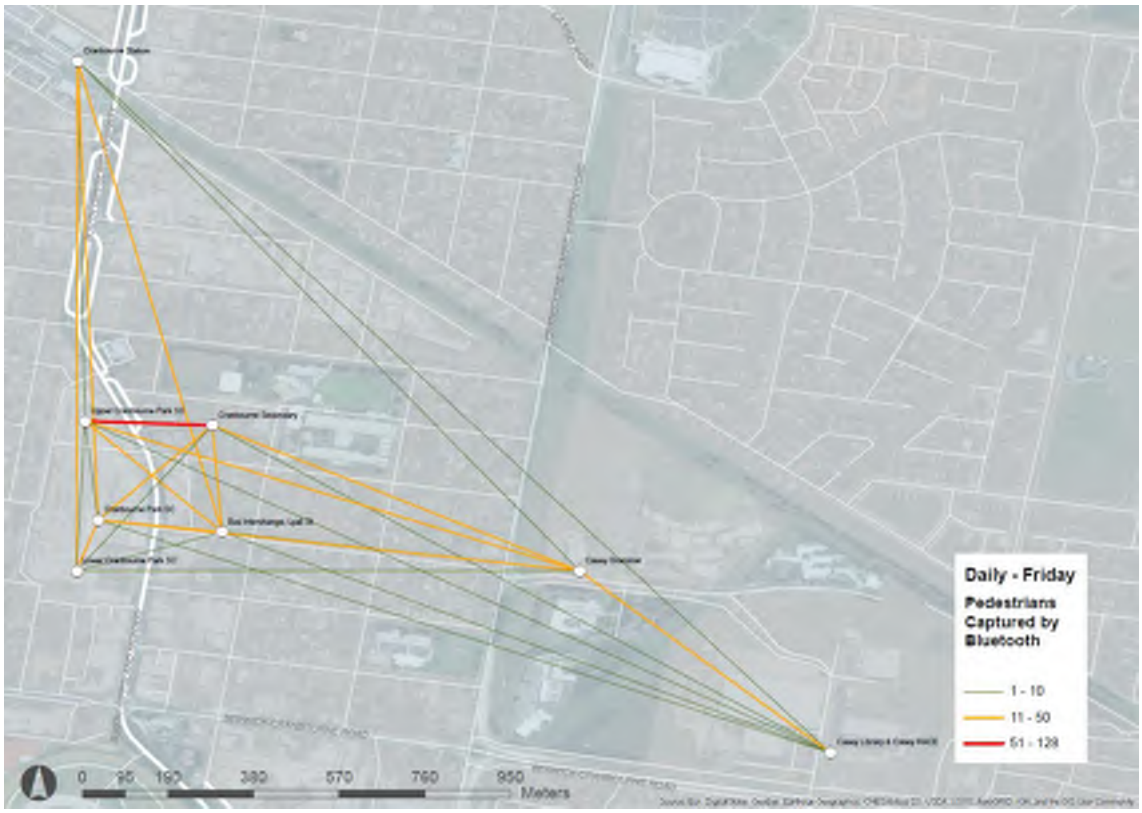


Figure 3.3: Where People Walk Saturday (Total: 10:00am-4:00pm)

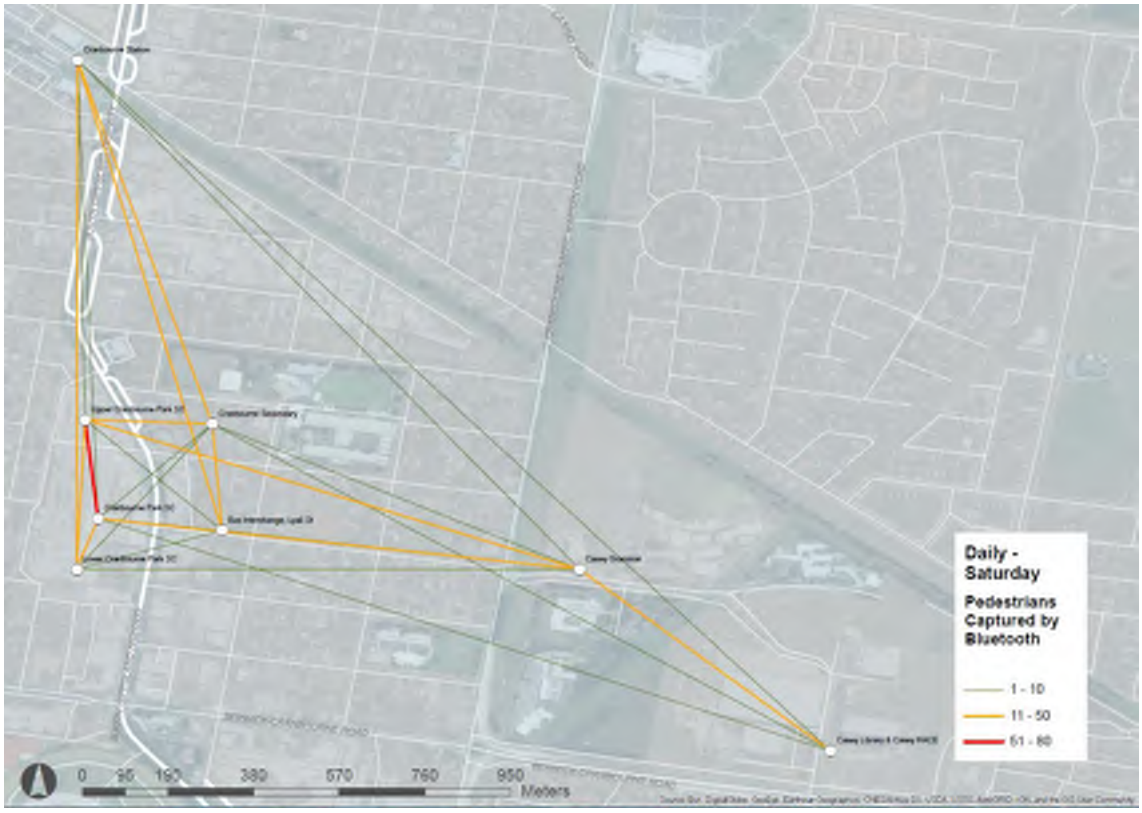
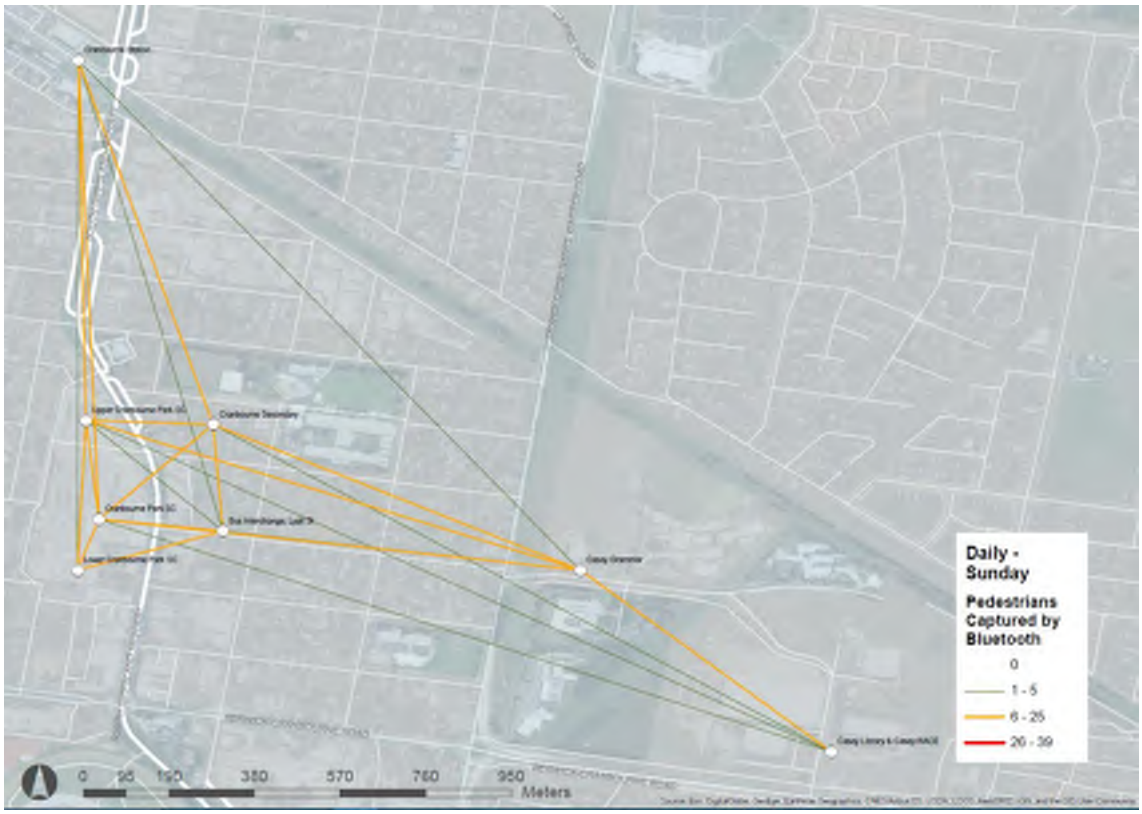


Figure 3.4: Where People Walk Sunday (Total: 10:00am-4:00pm)



The maps indicate that generally, the largest (Bluetooth captured) movements were around the Cranbourne Park Shopping Centre, with other popular routes being north-south to the Cranbourne Railway Station and east-west to the Bus Interchange (Lyall Street) and Casey Grammar.

In addition, the following summarises other key items that can derived from the Bluetooth data outputs:

- Low pedestrian movements to/from Casey RACE to any other key location within the study area likely due to the spatial separation.
- The majority of pedestrians at Cranbourne Railway Station to either Cranbourne Park Shopping Centre, the bus interchange at Lyall Street or the nearby schools.
- High pedestrian movements are shown between different areas of the Cranbourne Park Shopping Centre and surrounding retail areas.

It is critical to note that the outputs summarise all point to point movements captured. For example, if a pedestrian walked from Cranbourne Railway Station to Cranbourne Secondary College via the Cranbourne Park Shopping Centre, the above maps would show separate movements from Cranbourne Railway Station to Cranbourne Park Shopping Centre and Cranbourne Park Shopping Centre to Cranbourne Secondary College, as opposed to simply Cranbourne Railway Station to Cranbourne Secondary College.

3.2.2 Pedestrian Movement

Due to the sheer span and distance of the study area, it is evident that there are limitations for pedestrian movement between key destinations as shown by the Bluetooth data results shown previously.

Indeed, Table 3.2 indicates that walking times to/from key destinations within the study area generally vary from between 10-30 minutes.

Table 3.2: Walking Travel Time Estimates to/from Key Study Area Locations

Locations	Distance	Walking Travel Time
Casey Grammar to Cranbourne Central	1.0km	13 minutes
Casey RACE to Cranbourne Central	1.6km	21 minutes
Casey Race to Cranbourne Station	2.6km	32 minutes

Source: Google

A summary of appropriate walking distance by activity is provided in Table 3.3.

Table 3.3: Guidance on Acceptable Walking Distances[5]

Adjacent (Less than ~50m)	Short (Less than ~250m)	Medium (Less than ~400m)	Long (Less than ~500m)
People with disabilities Deliveries and loading Emergency services Convenience store	Grocery store Professional services Medical clinic Residents	General Retail & Visitors Restaurant Employees Entertainment centre Religious institution	Airport parking Major sport or cultural event Overflow parking

Research indicates that a distance of 500m is considered to be the upper limit of acceptable range for typical walking distances to key locations.

Furthermore, Figure 3.5 and Figure 3.6 illustrate both a five-minute walking catchment area and a 400m radial catchment from key locations, respectively. These diagrams further illustrate the time required to walk from one side of the study area to the other due to both distance and lack of infrastructure.

[5] Guidance from the Victorian Transport Policy Institute, Canada

Figure 3.5: Five Minute Walking Catchment

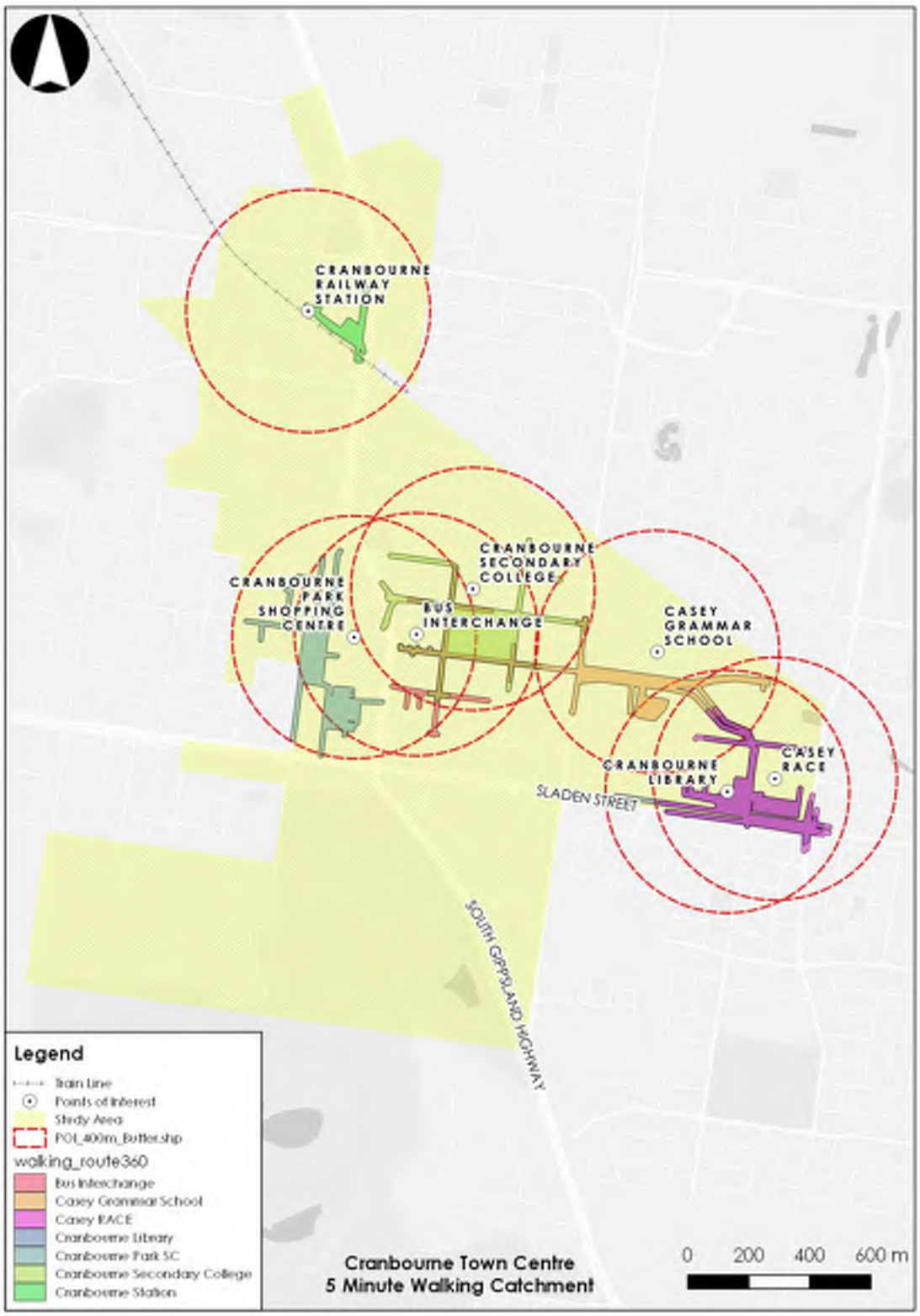
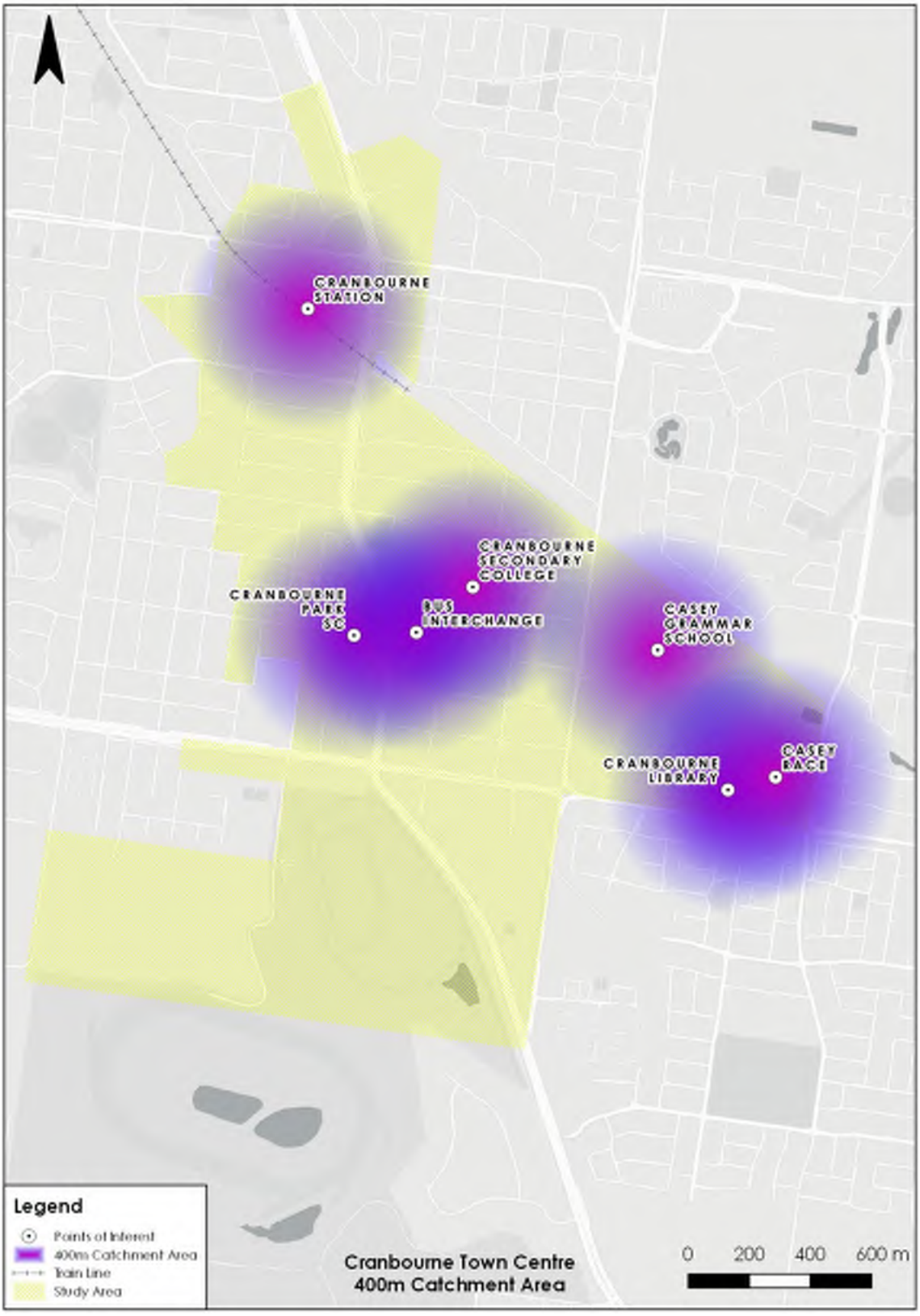


Figure 3.6: 400m Catchment Area



The above figures of the 5-minute walking and 400m catchment areas clearly demonstrate that it is not conducive to walk between either Casey RACE/Casey Grammar and Cranbourne Park or the Cranbourne railway station. This highlights the difficulty to achieve outcomes of a 20-minute neighbourhood.

Further commentary regarding improving the ability to connect key locations through local services is provided later in this report.

3.3 Public Transport

A range of statistical information on existing public transport frequencies, patronage utilisation and network coverage for the Town Centre and the greater Casey municipality.

This data has been analysed spatially to develop several GIS outputs to represent the existing conditions for public transport accessibility:

i Average boarding and alighting data for bus stops in the vicinity of the Town Centre was obtained for November 2016 to March 2017. The predominant bus boarding locations were at the Cranbourne Rail Station and at the interchange on Lyall Street. A heat map of boarding locations near of the Town Centre is shown in Figure 3.7.

ii Relative access to medium to high frequency public transport for the Town Centre in comparison to activity centres in the vicinity of the site is shown in Figure 3.8. The data identifies similar catchment areas that are located on the rail lines including Narre Warren, Berwick and Frankston. However, it is evident that Cranbourne is not well connected to these areas.

iii Access to public transport within the Town Centre in comparison to the suburb of Cranbourne is shown in Figure 3.9. The data identifies average to poor public transport accessibility for properties outside of the Activity Centre, particularly to the south of the study area.

iv Figure 3.10 details public transport service frequency by stop in and around the Town Centre. Similar to those identified in Figure 3.9, public transport stops located away from the core of the Activity Centre and Cranbourne Station are generally identified as 'low' frequency (i.e. bus frequencies of 15 minutes or greater in the peak hour). It is important to note that whilst some locations inner to the Activity Centre are classed as 'medium' or 'high' frequency locations, a review of the data indicates that this is due to multiple routes servicing these bus stops. As discussed in Section 2.3.4, individual bus route frequencies are typically 20 minutes or higher.

v Public transport travel time catchments have been sourced from 2017 VITM (Victorian Integrated Transport Model) model for trips to and from the Town Centre. The travel times have been separated into the AM and PM peak hours and are shown in Figure 3.11 to Figure 3.14.

Figure 3.7: PTV Bus Boarding by Stop

Figure 3.8: Public Transport Coverage (Casey)

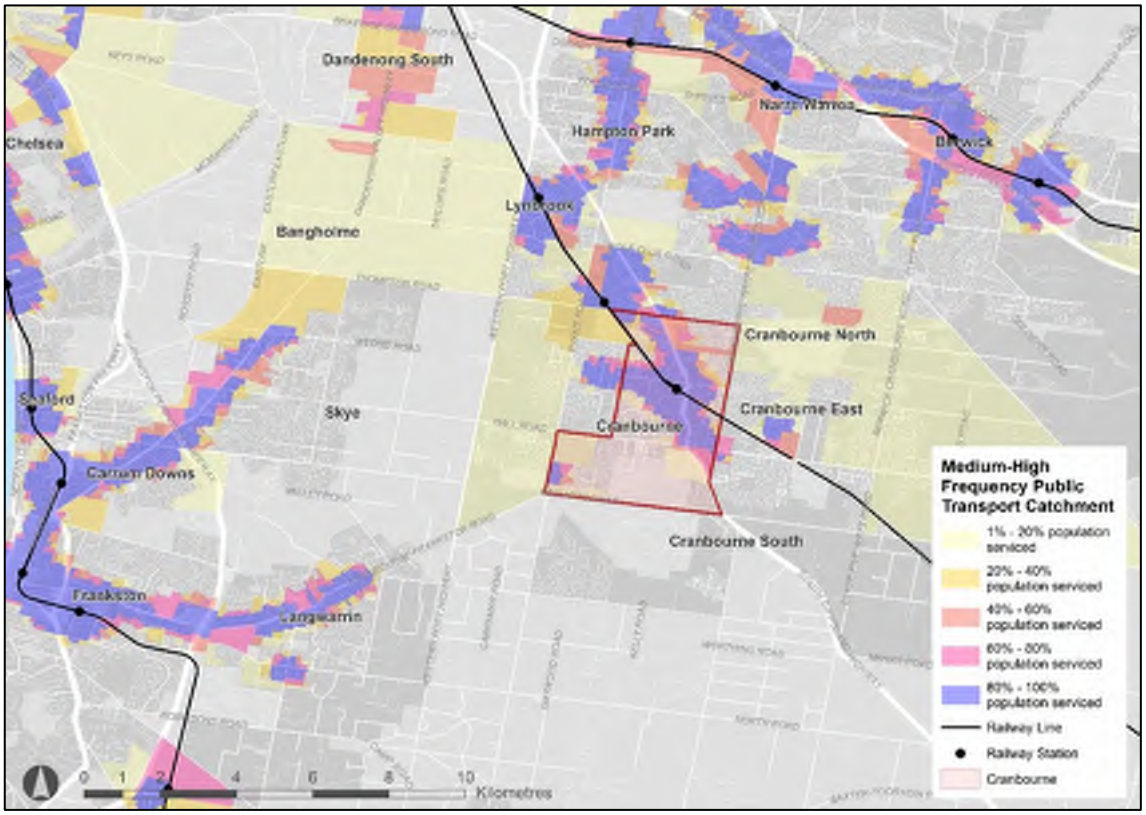


Figure 3.9: Public Transport Coverage (Cranbourne)

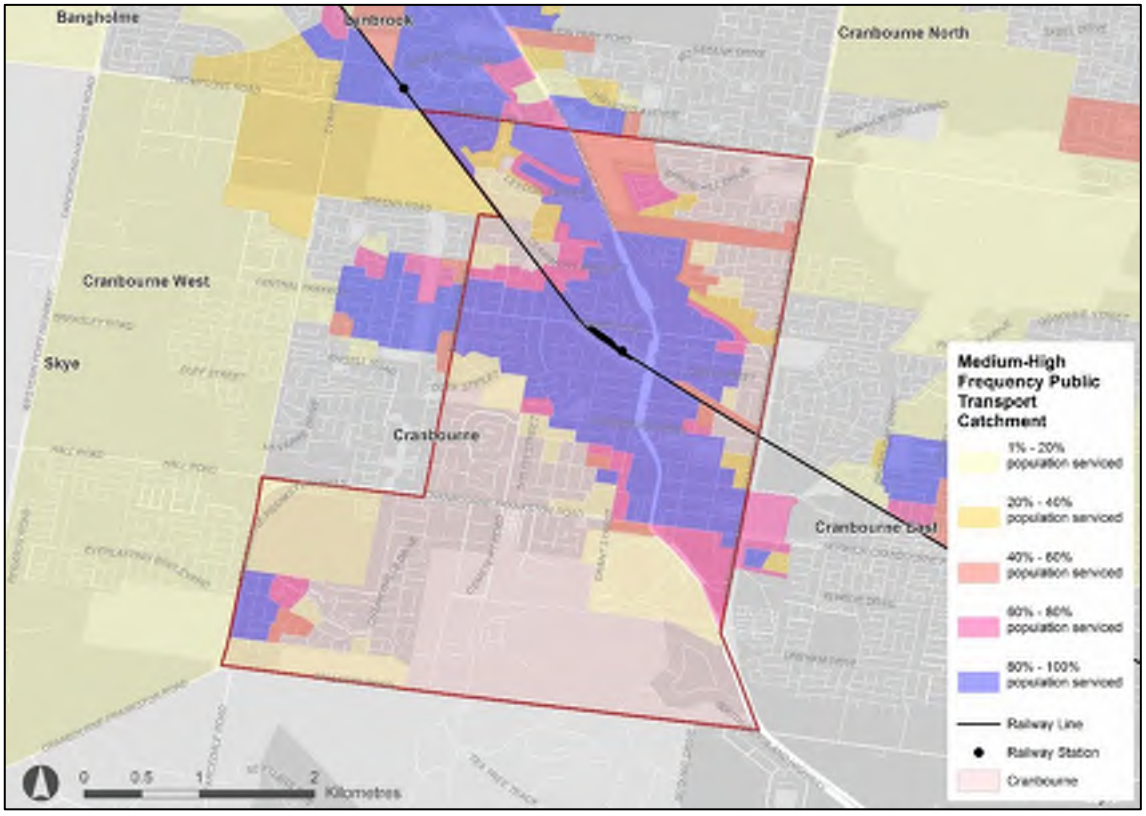


Figure 3.10: Public Transport Frequency (Weekday AM Peak)

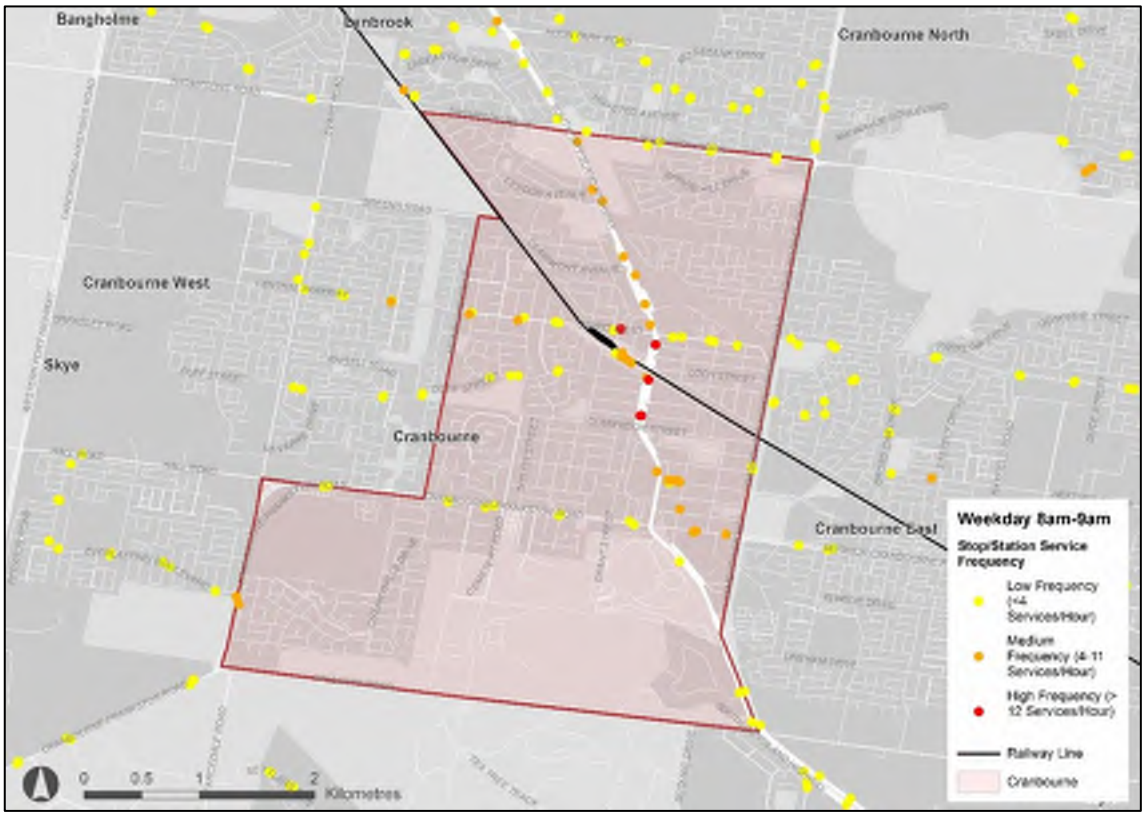


Figure 3.11: Public Transport Travel Times (from Cranbourne in AM Peak Hour)

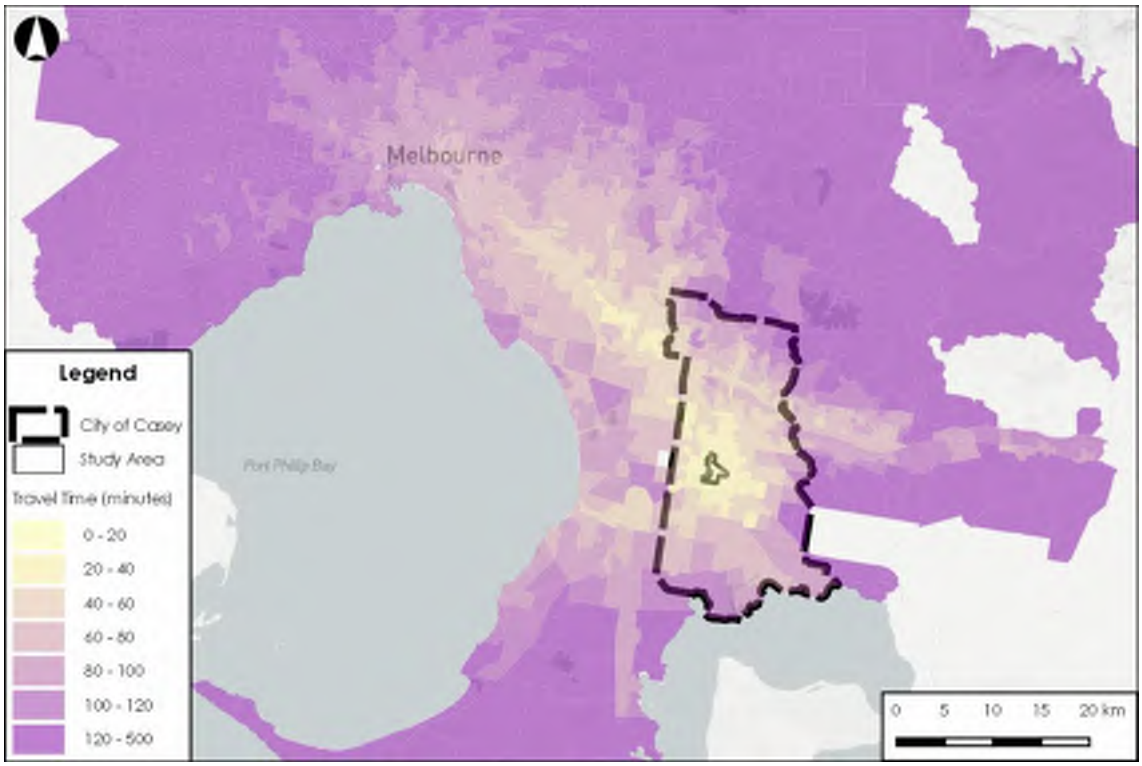


Figure 3.12: Public Transport Travel Times (to Cranbourne in AM Peak Hour)

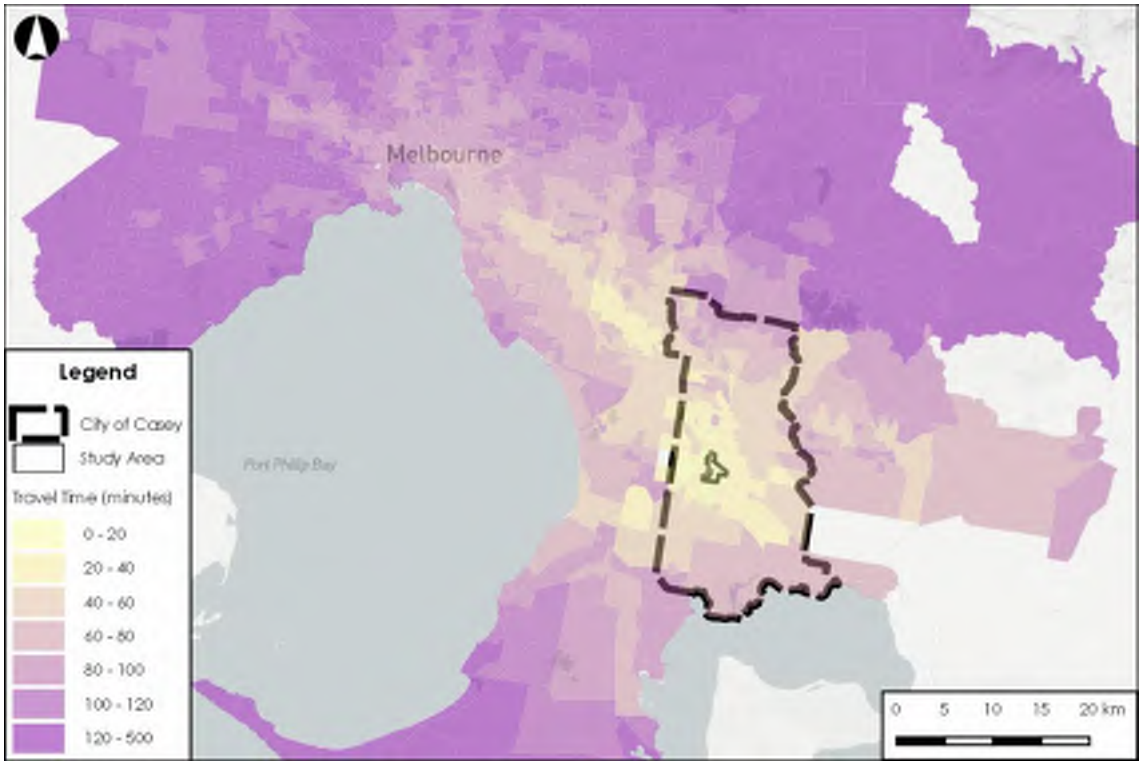


Figure 3.13: Public Transport Travel Times (from Cranbourne in PM Peak Hour)

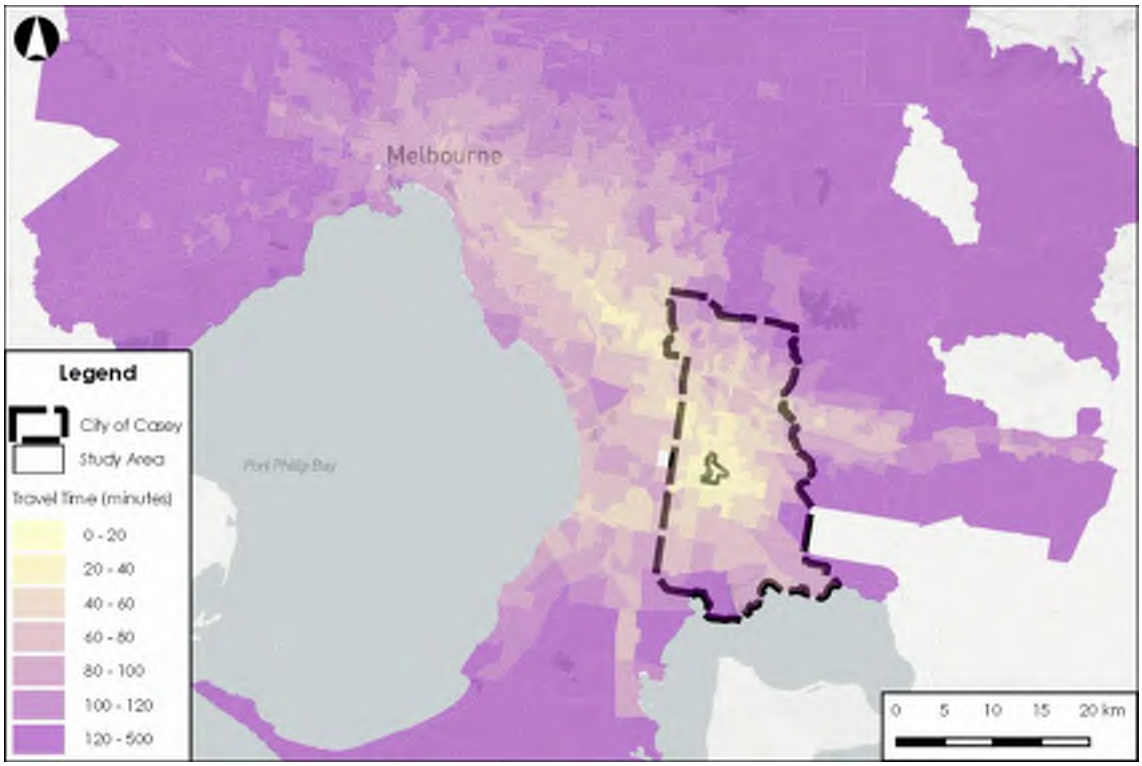
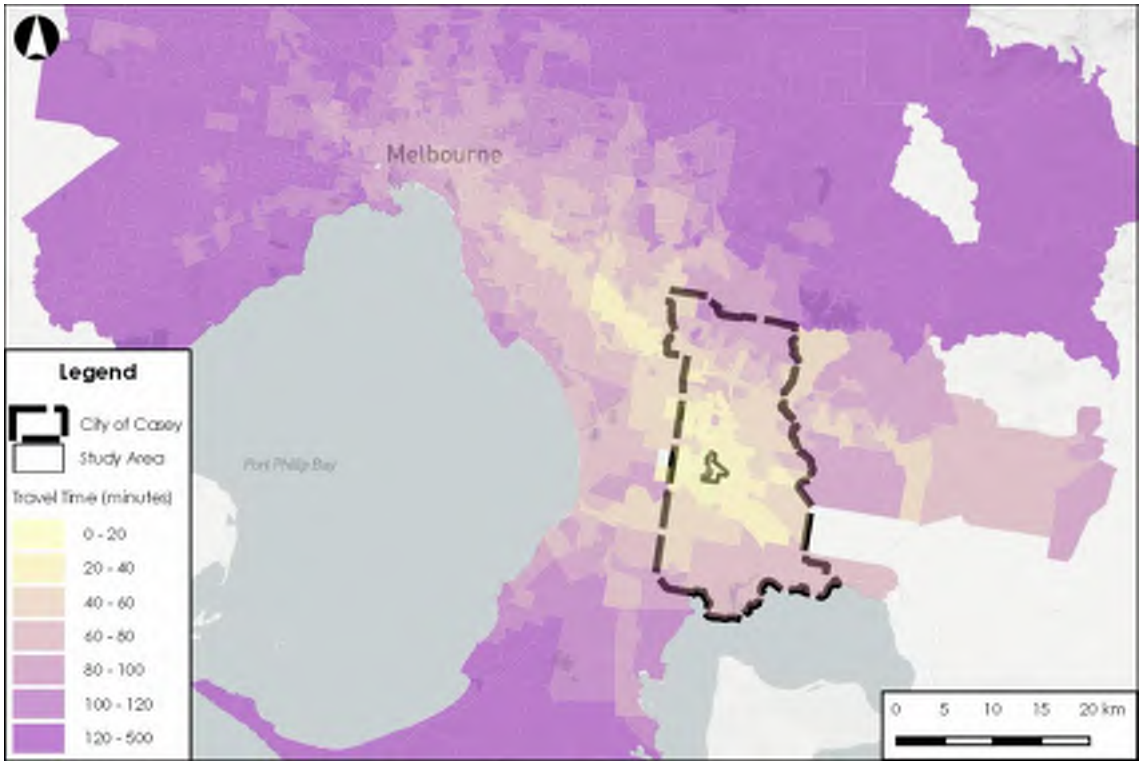


Figure 3.14: Public Transport Travel Times (to Cranbourne in PM Peak Hour)



In terms of annual heavy rail boarding numbers, Cranbourne Rail Station attracts some 600,000 boarding's per year, ranking it as a relatively average Station in comparison to the entire metropolitan region (91st in total boarding's from the 208 stations).

Although the study area is in close proximity to Cranbourne Rail Station, the data suggests the site is much easier to access via car than public transport for a large proportion of metropolitan Melbourne. Further, suburbs that are located not proximate to the Cranbourne rail line are

generally more than 20 minutes quicker to access via car than public transport. For example, a trip travelling to the study area from Frankston would take less than 30 minutes by car[6] and up to an hour by public transport.

It is also noted that some areas in close proximity to the study area would take more than 30 minutes' travel time via public transport, highlighting the limited accessibility of the site and that car travel is the currently preferred mode.

3.4 Victorian Integrated Transport Model (VITM)

3.4.1 Overview

It is recognised the importance of understanding the travel patterns both broadly and locally and as part of this study have undertaken transport modelling using the Victorian Integrated Transport Model (VITM). The purpose of the modelling is to understand the existing travel behaviour in Cranbourne and to broadly estimate future travel patterns as a result of land use and employment changes.

The VITM is a tool developed by the Department of Transport (DoT) (now Department of Economic Development Jobs, Transport and Resources (DEDJTR)) to assist in the planning of road and public transport infrastructure in Victoria. VITM is a multimodal strategic model that uses future population, employment and land use data projections to forecast travel behaviour and the impacts of changes to the road and public transport networks. VITM contains all major freeways, main arterials and connector roads within the Melbourne Statistical Division.

3.4.2 Calibration and Validation

Model calibration is a process in which the model inputs are refined to reflect observed conditions. It allows the model to produce travel demands in line with actual measured traffic conditions and public transport usage.

Existing traffic counts are compared to the corresponding modelled link volumes for a current year. Following any model adjustments, the model is rerun, and modelled results compared to the traffic counts. This process is repeated until the model results come to a point where they meet a number of calibration criteria (called convergence).

Strategic network models are generally calibrated to reflect existing traffic counts across a wide corridor or regional area. Strategic network models are not expected to accurately match traffic counts at individual locations, instead model calibration is typically measured by comparing counts across a number of locations such as a screenline, and/or a group of counts at a regional level.

Model Calibration and Validation guidelines have been developed by VicRoads for use in strategic modelling work. The document entitled 'Transport Modelling Guidelines, Volume 2: Strategic Modelling (April 2012)' has been used as a reference in this case. This document outlines the model calibration targets for VITM modelled traffic volumes.

For reference, the Calibration and Validation report associated with the traffic modelling study can be found in Appendix A of this report and has been satisfactorily signed off by both VicRoads and Transport for Victoria.

[6] Private vehicle travel times discussed within Section 3.5 of this report

3.5 Road Network

3.5.1 Travel Times and Travel

GTA has obtained a range of statistical information for existing road network performance for the Town Centre and the greater Casey municipality. This data has been analysed spatially to develop several GIS outputs summarised as follows:

i Vehicle travel times to and from Cranbourne in the AM and PM peak periods have been sourced from VITM and are shown in Figure 3.15 to Figure 3.18. As shown, a 60-minute catchment generally extends to the eastern suburbs to the north, Warragul to the east and the extent of the Mornington Peninsula to the south.

ii Accessibility and travel times are far superior by car when compared with public transport currently available in Cranbourne.

iii 2011 ABS Journey to Work details method of travel to work (by place of residence) by mode of travel of driver, train, bicycle or walking. each metric details a very high reliance on private motor vehicle travel in comparison to all other modes of travel within the study area. The outputs are shown in Figure 3.19 to Figure 3.22.

Figure 3.15: AM Peak Private Vehicle Travel Times (from Cranbourne)

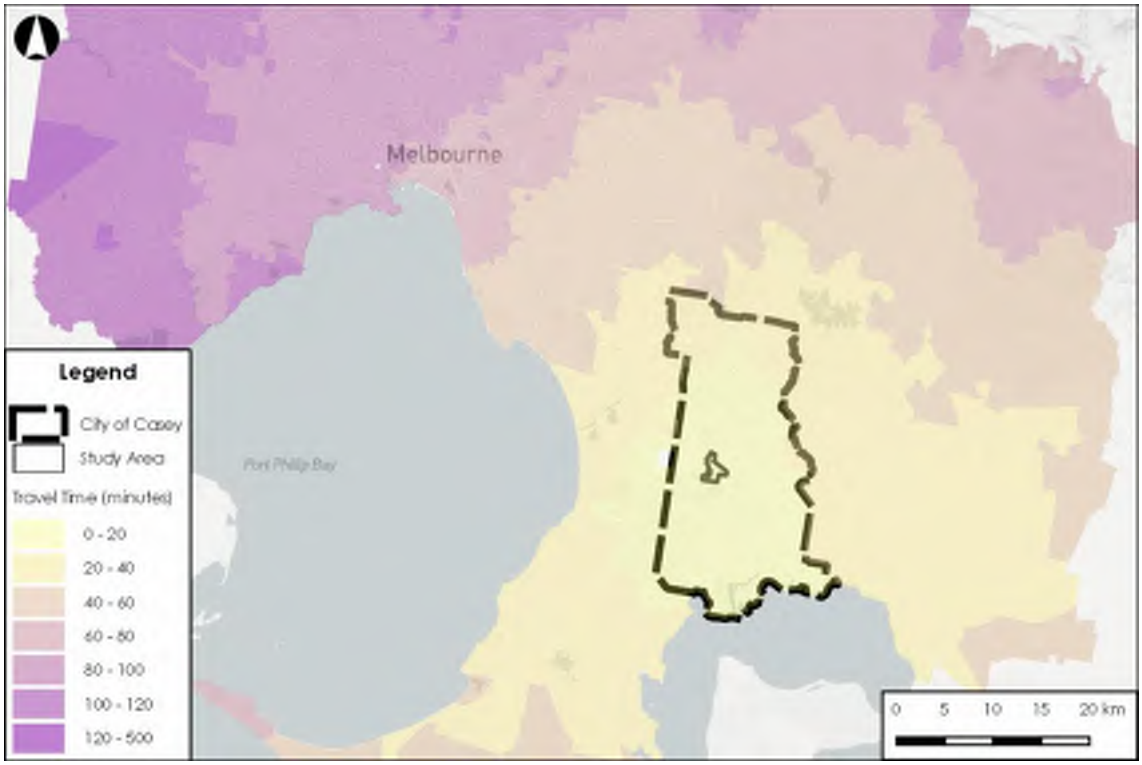


Figure 3.16: AM Peak Private Vehicle Travel Times (to Cranbourne)

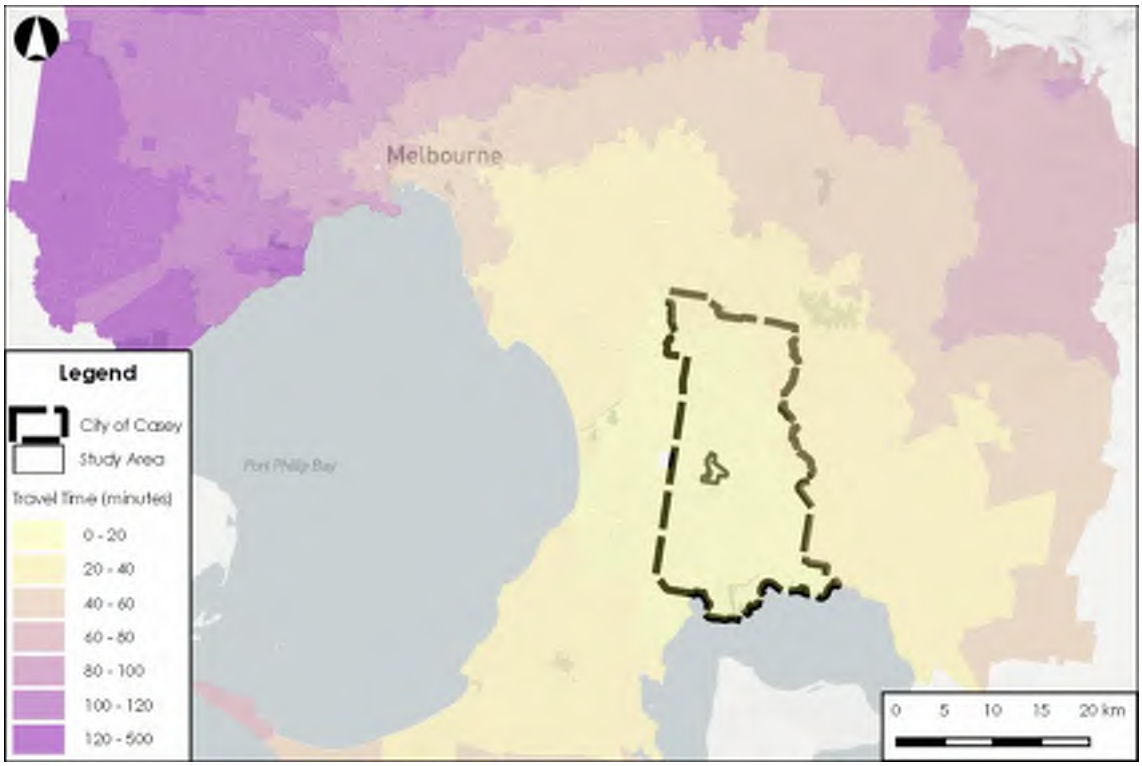


Figure 3.17: PM Peak Private Vehicle Travel Times (from Cranbourne)

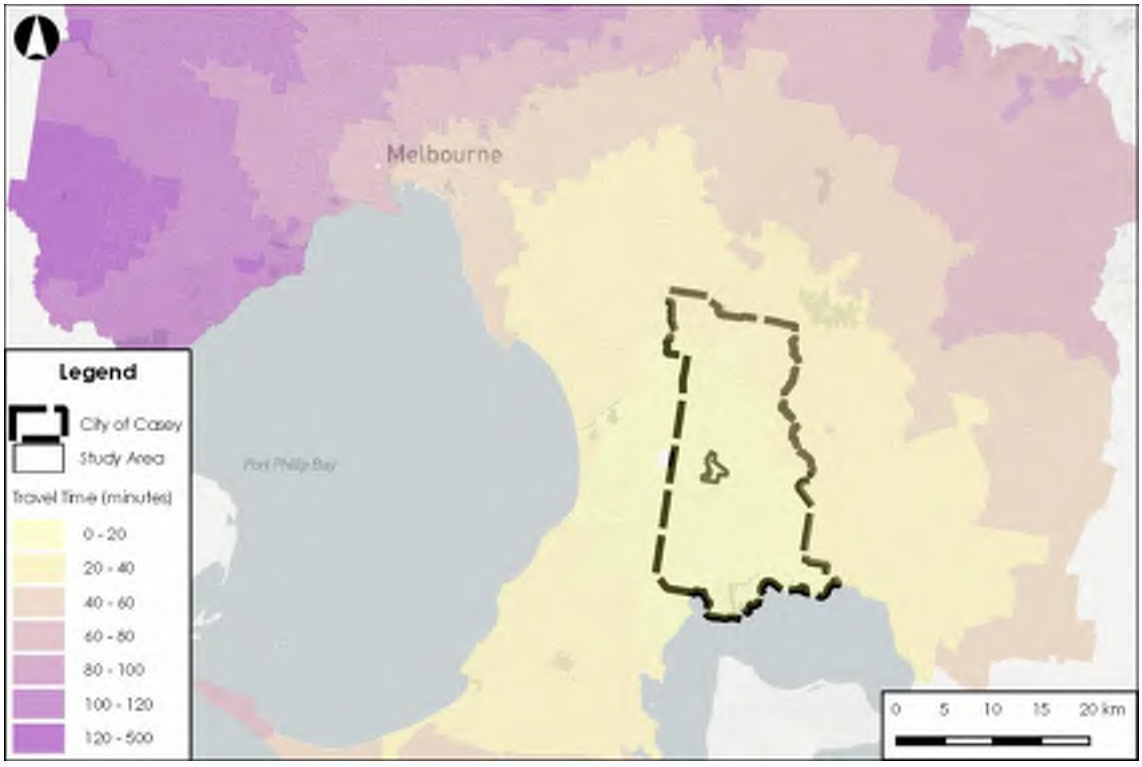


Figure 3.18: PM Peak Private Vehicle Travel Times (to Cranbourne)

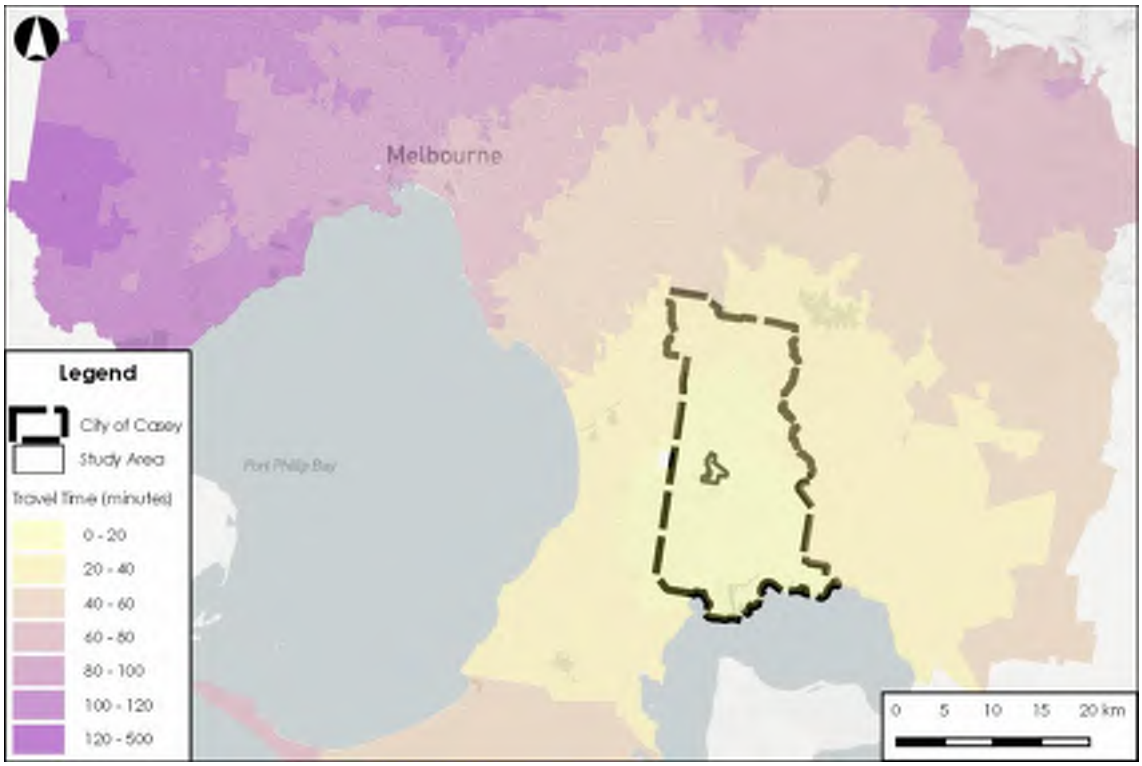


Figure 3.19: Mode of Travel to Work – Driver (By Place of Residence)

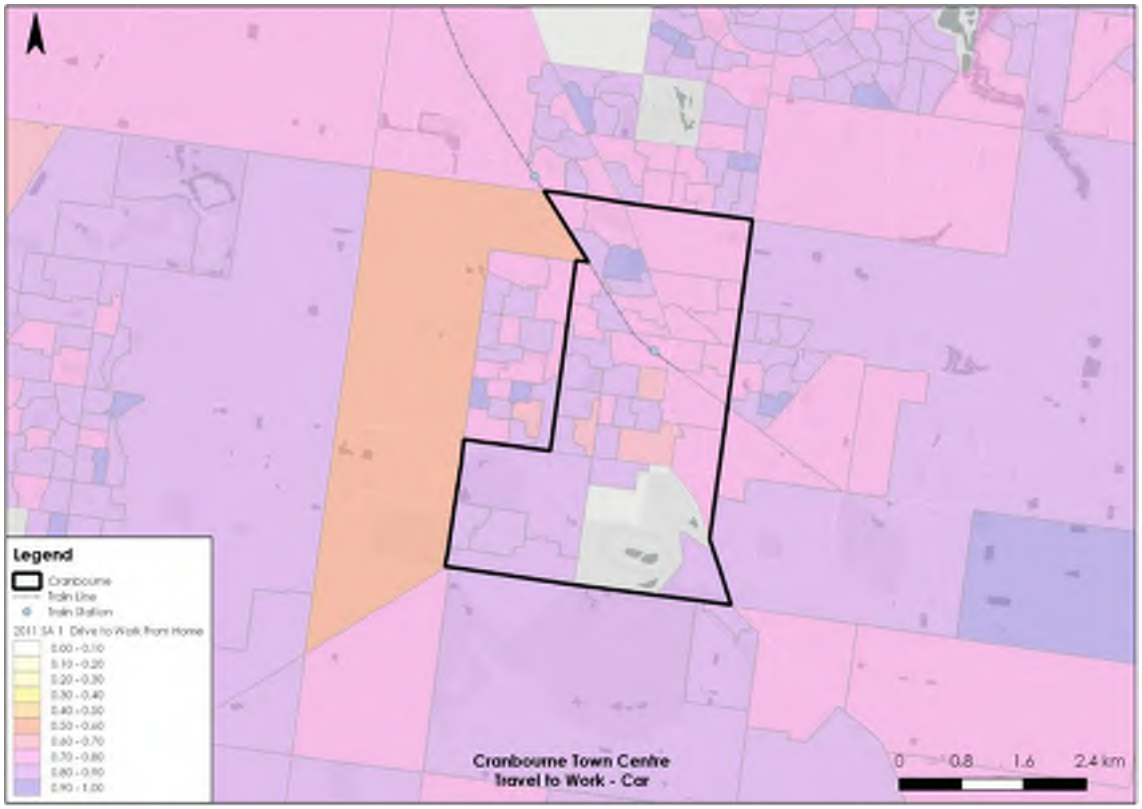


Figure 3.20: Mode of Travel to Work – Train (By Place of Residence)

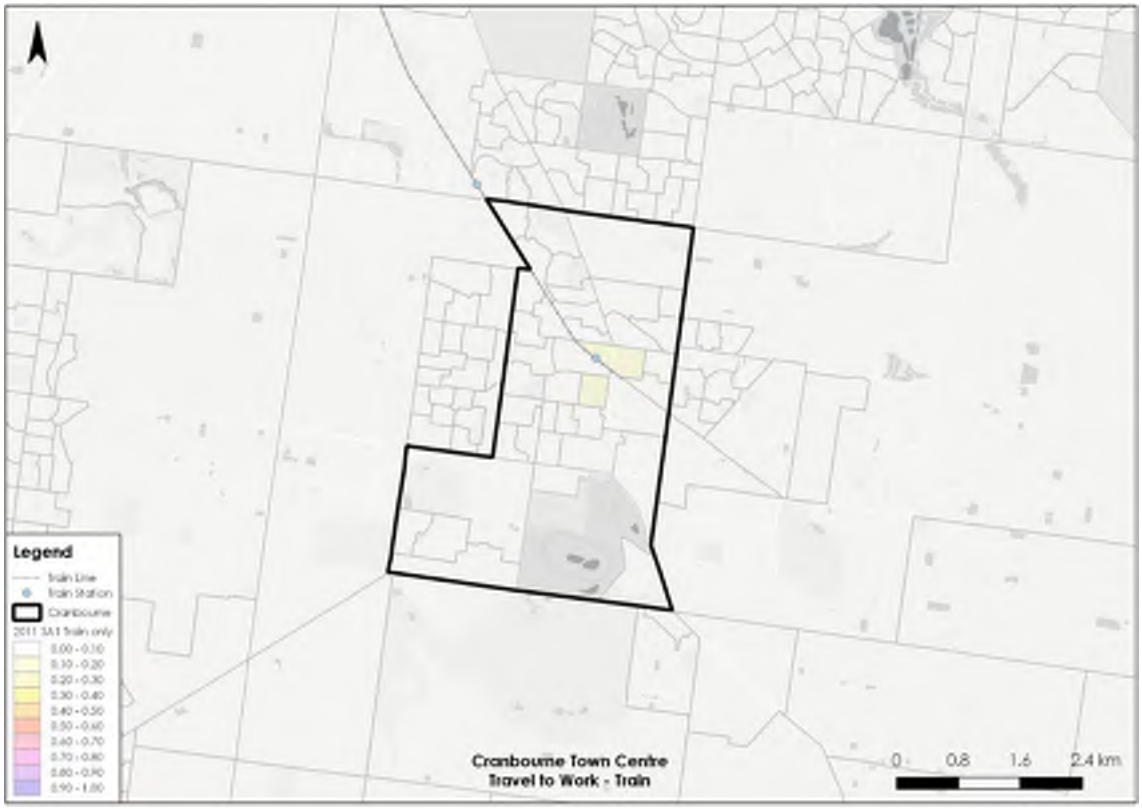


Figure 3.21: Mode of Travel to Work – Bicycle (By Place of Residence)

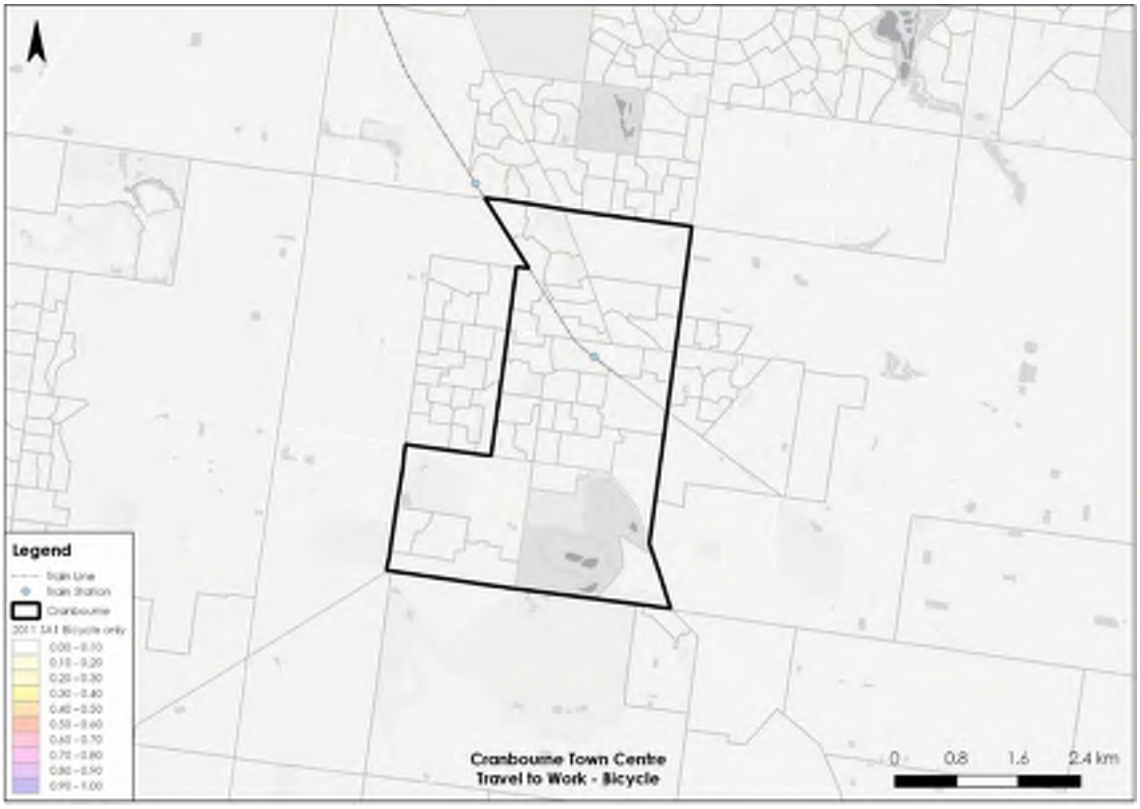
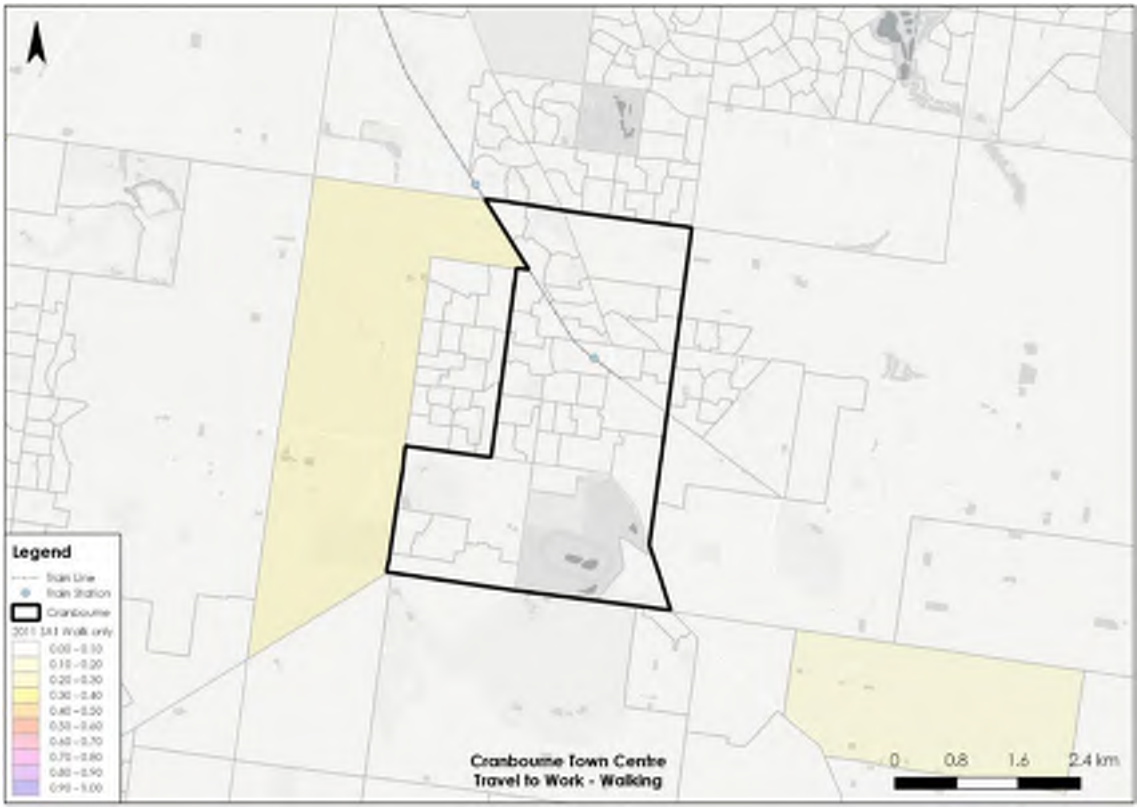


Figure 3.22: Mode of Travel to Work – Walk (By Place of Residence)



3.5.2 Network Performance

The operation of key intersections within the study area have been assessed using *SIDRA INTERSECTION 7*[7], a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance is referred to as the *Level of Service* (LOS). The LOS is a method that uses both delay and volume/capacity ratio. For signalised intersections, an LOS of 'E' is typically considered the ideal limit, beyond which queues and delays increase disproportionately[8].

A summary of the intersection and mid-block LOS[9] in Figures 3.23 to 3.25.

[7] Program used under license from Akcelik & Associates Pty Ltd.

[8] SIDRA INTERSECTION adopts the following criteria for Level of Service assessment:

Level of Service

A	Excellent
B	Very Good
C	Good
D	Acceptable
E	Poor
F	Very Poor

[9] Noting that this was not undertaken for Saturday peak period as the traffic volumes were not available from the strategic model.

Figure 3.23: Intersection LOS – AM Peak

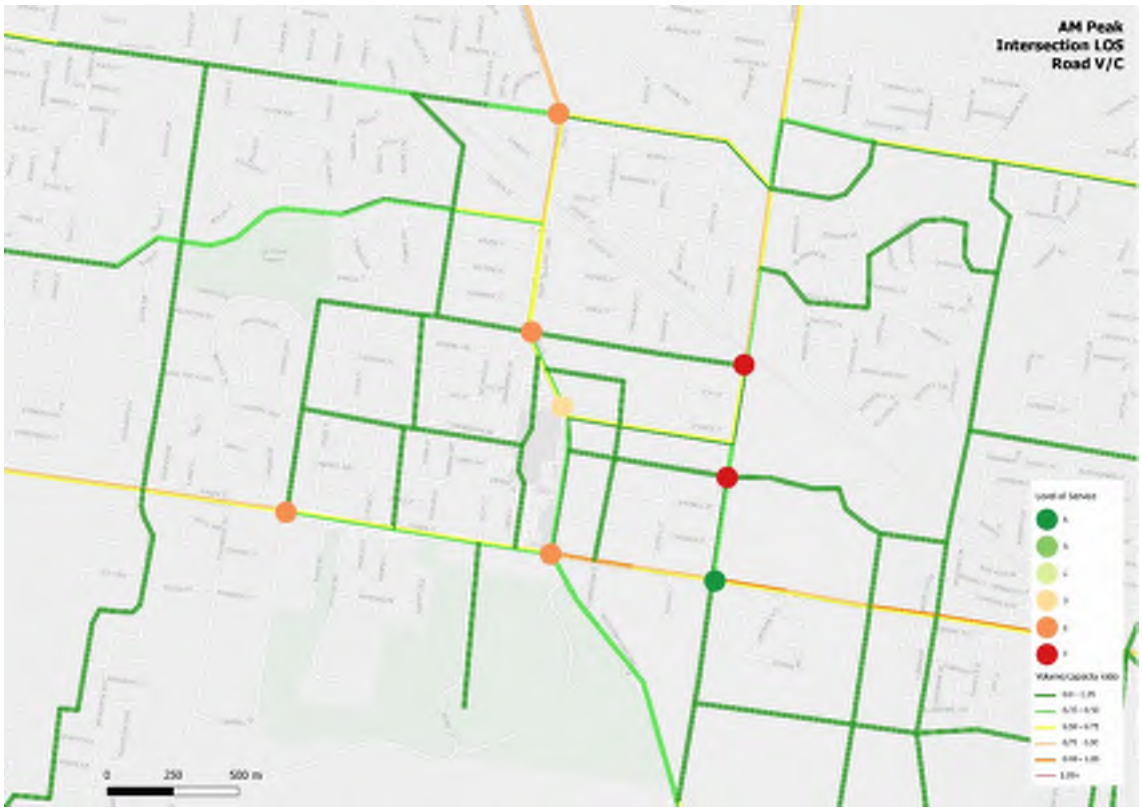


Figure 3.24: Intersection LOS – PM Peak

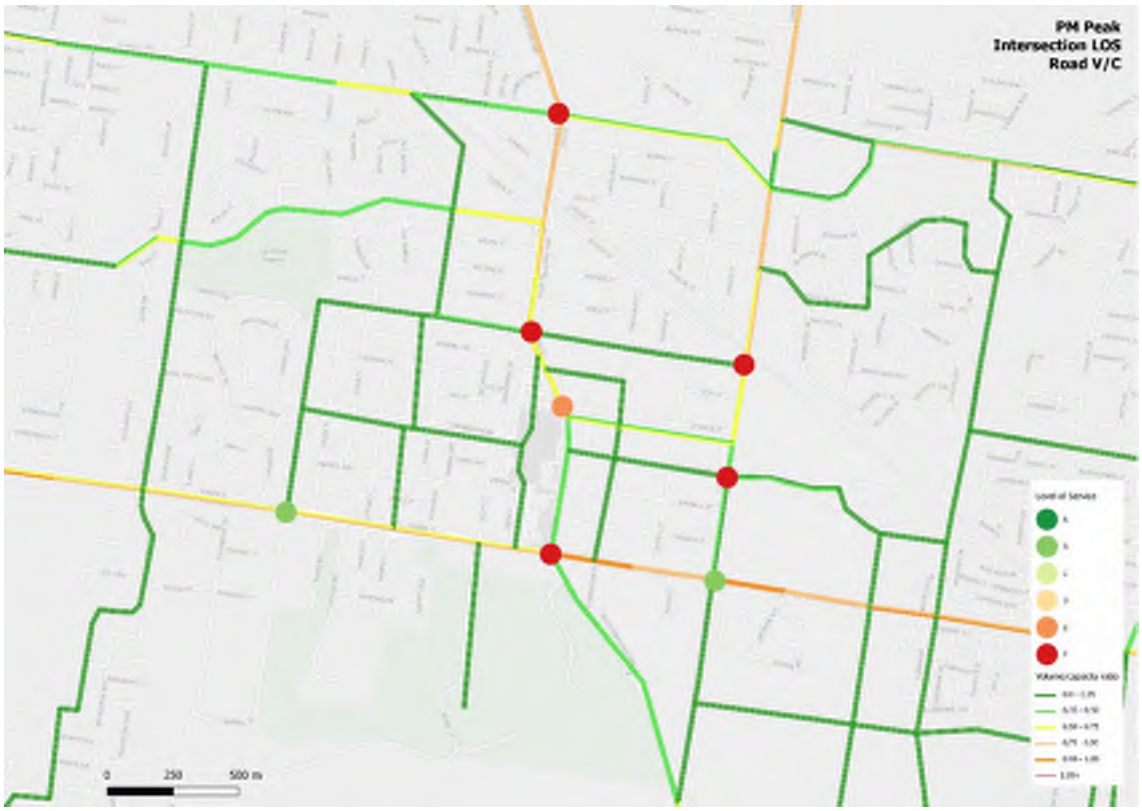
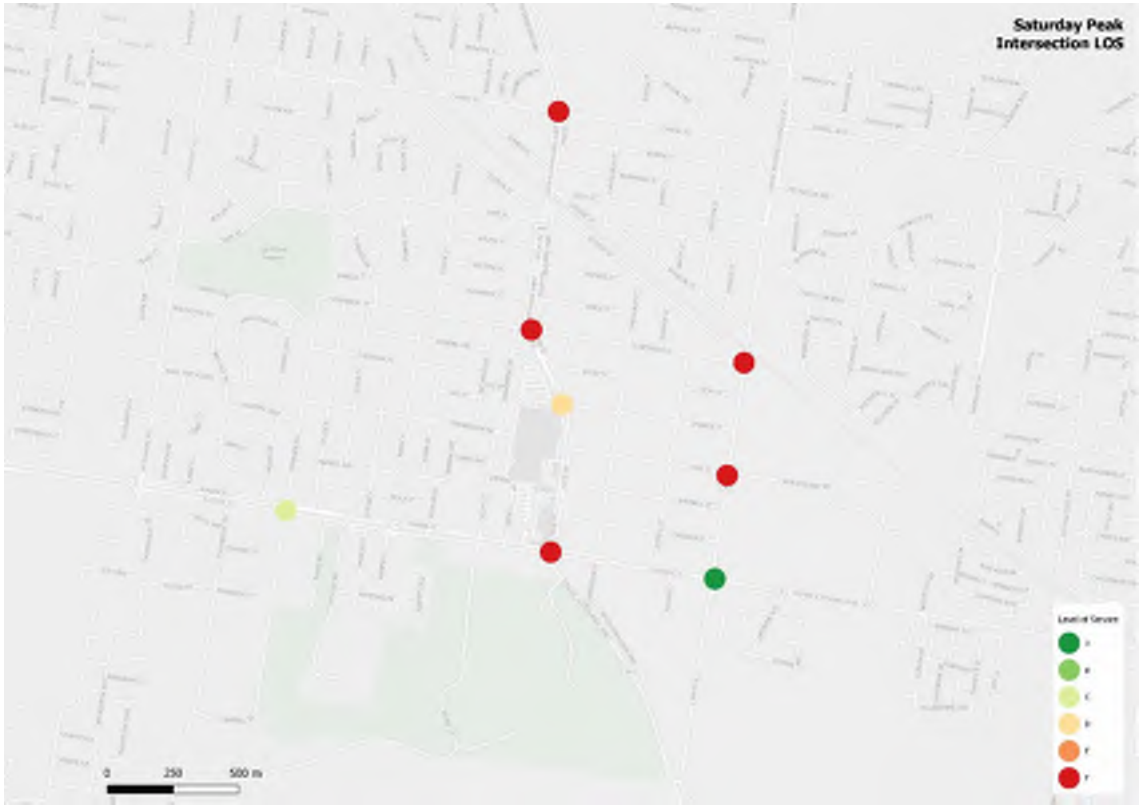


Figure 3.25: Intersection LOS – SAT Peak



It is evident that South Gippsland Highway (north of Clarendon Street), Sladen Street and Narre-Warren Cranbourne Road (north of Clarendon Street) are reaching capacity having regard to the mid-block LOS. Generally, all other key roads in the study area operate under a good LOS.

In addition, the following intersections experience an LOS of F in at least two of the three peak hour periods:

- South Gippsland Highway/Camms Road
- South Gippsland Highway/Clarendon Street
- South Gippsland Highway/Sladen Street
- Narre-Warren Cranbourne Road/Clarendon Street
- Narre-Warren Cranbourne Road/Lyall Street.

Having regard to the above, it is clear that the traffic issues are more operation rather than road space.

In summary, the Level of Service at the key intersections under existing conditions is generally low which indicates that intersection capacity is an issue. Notwithstanding, midblock outputs indicate that the surrounding road network within the study area generally operates within capacity.

4. Car Parking

4.1 Overview

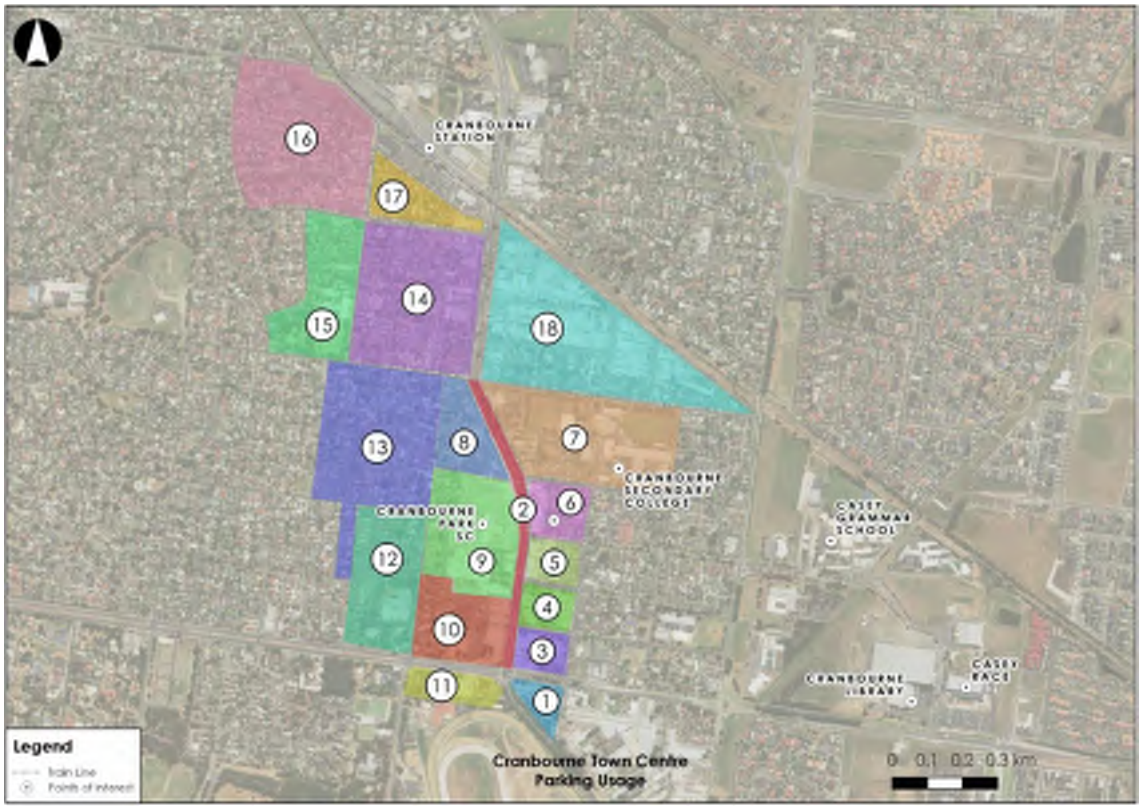
Surveys of existing car parking facilities within the study area (and zones) were undertaken on Friday 24 March 2017 and Saturday 25 March 2017 between 8:00am and 8:00pm and included the following:

- on and off-street publicly available parking inventory
- hourly parking demand counts.

It is noted that off-street private parking, such as those associated with specific commercial sites or tenancies not accessible to the general public (i.e. basement car parks and residential dwellings) were not included in the surveys. However, off-street private parking that is accessible to the public, such as Cranbourne Park Shopping Centre, was included in the surveys.

As shown in Figure 4.1, the car parking data has been aggregated into 18 geographical zones.

Figure 4.1: Car Parking Inventory Area



Whilst further commentary will be provided in Section 4.3 regarding car parking demands, it should be noted that the peak demand occurred on Friday at 11:00am.

4.2 Car Parking Supply

The car parking inventory identified the supply of car parking within the identified zones, including the restrictions applicable to each parking space.

The inventory identified a total supply of 5,474 car spaces at the peak parking time (11:00am on Friday) consisting of 2,423 on-street and 3,051 off-street spaces.

A summary of the car parking supply at the time of peak parking is set out in Table 4.1 (broken up by parking location).

Table 4.1: Cranbourne Parking Supply – By Location (11:00am)

Zone	On-Street	Off-Street	Total Supply
1	42	0	42
2	94	0	94
3	38	79	117
4	63	94	157
5	42	73	115
6	77	130	207
7	214	45	259
8	13	693	706
9	44	1,089	1,133
10	29	510	539
11	19	51	70
12	212	0	212
13	368	0	368
14	324	0	324
15	197	0	197
16	165	0	165
17	72	287	359
18	410	0	410
Total	**2,423 spaces (44%)**	**3,051 spaces (56%)**	**5,474 spaces**

Table 4.1 indicates that there is generally an even spread of on-street car parking throughout the surveyed area, whilst a substantial proportion of off-street car parking is located in Zones 8, 9 and 10 to the west of South Gippsland Highway, between Clarendon Street and Sladen Street.

It should be noted however, that a review of the data indicates that there were several smaller off-street private car parking areas that were not captured in the car parking demand surveys due to access or visual limitations (e.g. parking located at back of house, parking in garages or other enclosed buildings such as warehouses). Notwithstanding, the study will supplement this data (via Nearmap aerial imagery) in Section 4.4 of this report.

4.3 Car Parking Demand

4.3.1 Car Parking Demand – Overall

Car parking demand surveys were undertaken on Friday 24 March 2017 and Saturday 25 March 2017 between 8:00am and 8:00pm. These surveys identified a peak demand of 2,850 and 2,092 spaces on the Friday and Saturday, respectively.

The characteristics across the two survey days are shown in Figure 4.2. A comparison of on-street and off-street parking is provided later within Section 4.3.3 of this report.

Figure 4.2: Overall Study Area Daily Car Parking Demands

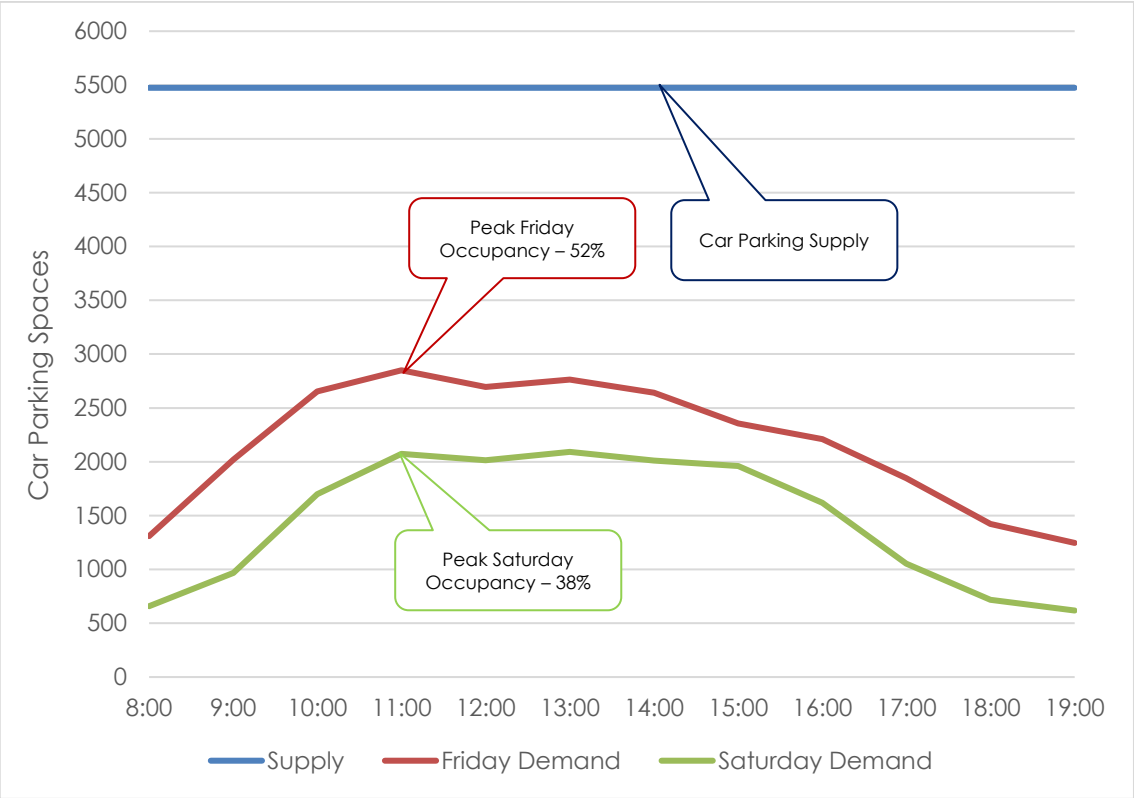


Figure 4.2 indicates that Friday experienced higher demands, with the daily peak occurring at 11:00am with 52% of spaces occupied. In comparison, Saturday's peak also occurred at 11:00am with 38% of spaces occupied.

Additionally, the car parking demand in each zone during the peak Friday period is shown in Figure 4.3.

Figure 4.3: Peak Car Parking Demand Zone Summary (11:00am)

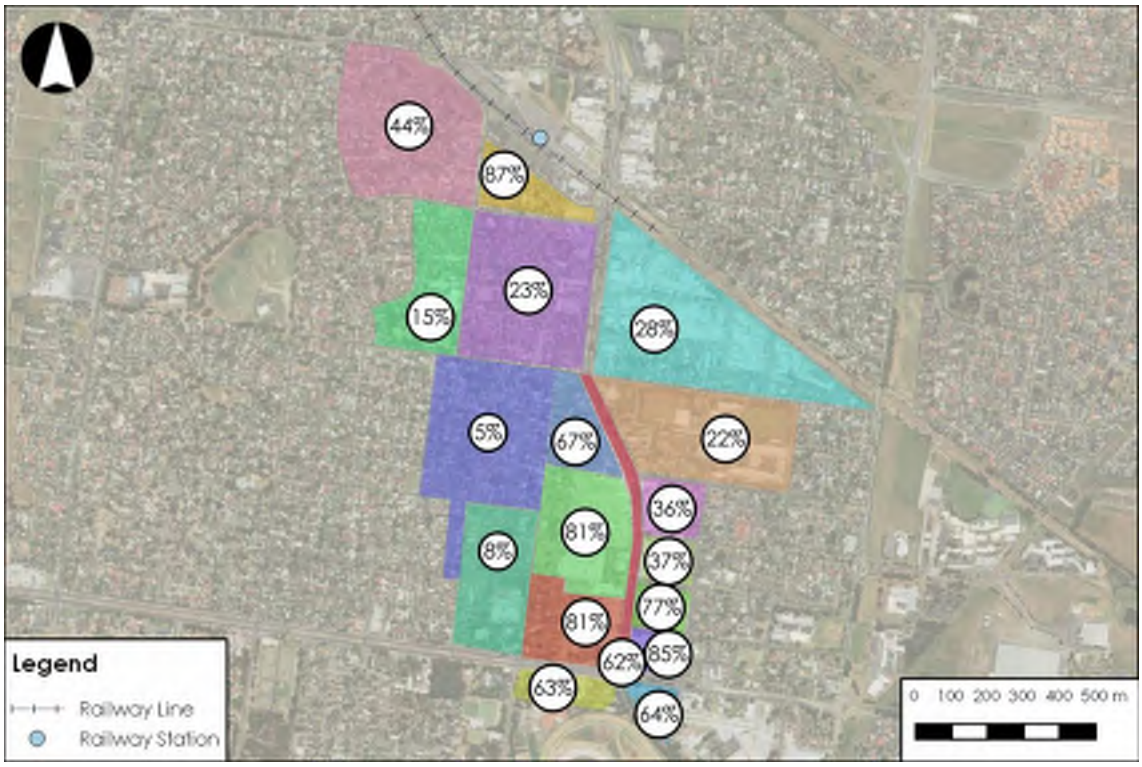


Figure 4.3 indicates that highest overall car parking demands occurred at Zone 17 (Cranbourne Station), with high occupancy levels also experienced at key retail areas being Zones 3, 4, 9 and 10.

To put these occupancy levels in context, an on-street car parking occupancy of approaching 85% is typically considered to represent theoretical capacity. This occupancy level represents the equilibrium and a good utilisation of car parking and, given the dynamic nature of parking, provides the ability for drivers arriving to an area to find a car parking space without excessive circulation.

A higher weekday occupancy in the study area is not unexpected given some land uses and users which traditionally generate higher weekday demands including:

- Office / Commercial
- Education
- Railway commuters

Given the higher demands surveyed on Friday, further detailed analysis will therefore be restricted to Friday data as this represents the peak car parking conditions for Cranbourne.

4.3.2 Car Parking Demand – Per Zone (Friday)

The Friday car parking peak demand profiles within each zone are provided in Appendix B of this report. It is noted that analysis is restricted to Friday, when peak demand was observed to occur in the study area.

Upon review of the car parking demand data, the following high-level observations are made:

- **Zone 1**: Car parking demands gradually increase throughout the day, with the peak demand of 64% occupancy occurring at 3:00pm.
- **Zone 2**: Car parking spaces are consistently around 50-60% occupied throughout the day, noting that this area represents the on-street car parking demands on South Gippsland Highway within Cranbourne Town Centre.
- **Zone 3**: Car parking demands are high (peak occupancy 85% at 1:00pm), with a general lowering trend after lunchtime.
- **Zone 4**: Car parking demands range from moderate to high in Zone 4, with a peak occupancy level of 77% at 12:00pm.
- **Zone 5, 6 & 7:** North of Zone 4 (i.e. between Bakewell Street and Clarendon Street on the east side of South Gippsland Highway), car parking demands are low, with a peak occupancy level of 37% in any of these three zones.
- **Zone 8**: It is evident that car parking demands are higher on the west side of South Gippsland Highway given that Zone 8 has a peak occupancy level of 67%, despite being located between Stawell Street and Clarendon Street to the north of Cranbourne Town Centre.
- **Zone 9:** This area generally emphases the majority of Cranbourne Park Shopping Centre high car parking demands in mid-morning as expected for this use. It should be noted however, that a peak occupancy level of 81% indicates that there are sufficient vacancies within the car park.
- **Zone 10**: Car parking spaces are consistently around 70-80% occupied throughout the day, with a drop in demands not experienced until 4:00pm.
- **Zone 11**: Moderate car parking demands were observed in Zone 11, with a peak occupancy level of 63%.
- **Zone 12, 13, 14 & 15:** The areas west of Cranbourne Park Shopping Centre are generally residential in nature and as such, experience low car parking demands (majority of on-street car parking).

- **Zone 16:** Despite the residential catchment in Zone 16, car parking demands are higher in this area (compared with the abovementioned zones) presumably due to potential overspill in commuter car parking demands of the adjacent Cranbourne railway station.
- **Zone 17**: The highest car parking demands for any zone within the study area were recorded in Zone 17 due to the close vicinity of the Cranbourne railway station. The peak occupancy level was 87%.
- **Zone 18:** Low car parking demands were recorded in Zone 17 presumably due to most of the area being occupied with Industrial-type land uses.

4.3.3 Off-Street and On-Street Demands

As detailed earlier, there are 3,051 spaces located off-street and 2,423 spaces located on-street within the study area.

The supply and demand of off-street and on-street spaces across the weekday are provided in Figure 4.4.

Figure 4.4: Off-Street and On-Street Supply and Demand (Friday)

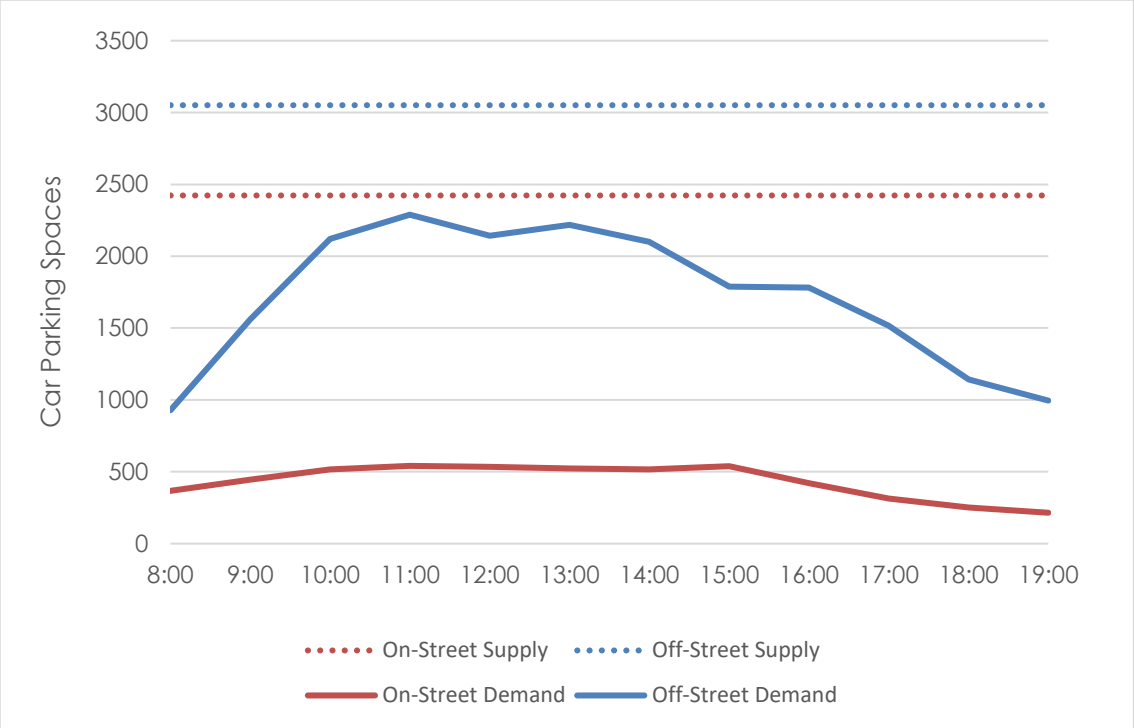


Figure 4.4 shows that the majority of car parking vacancies within the study area can be found within the on-street car parking supply, with low demands at the start and end of the day, however experience a higher peak in the middle of the day (i.e. peak at 11:00am on Friday). Granted, some of these vacancies are located within residential precincts of the study area, which (at a high level) is considered acceptable given the location of these residential areas to the periphery of the activity centre.

Indeed, as detailed earlier, car parking spaces are consistently around 50-60% occupied throughout the day on South Gippsland Highway within Cranbourne Town Centre. As such, removal of on-street car parking in this area could be considered in any future South Gippsland Highway carriageway amendments explored in Section 5 of this report.

4.4 Assessment of Car Parking

4.4.1 Overview

A car parking assessment has been developed to estimate the car parking generating characteristics for Cranbourne.

This assessment has been prepared and calibrated to generally reflect existing operating conditions. It can then be used as a basis to determine future car parking rates by assessing the impacts of variations in development patterns and future mode splits.

The car parking model has been created using the following inputs:

- land use data
- typical car parking rates for uses contained within the study area
- temporal distributions of demand
- existing car parking supply and demands for the study area.

4.4.2 Land Use Data Information

Existing land use data was provided by City of Casey and sourced from the following reports prepared by SGS Economics:

- *'Cranbourne Town Centre Economic Assessment'* (dated June 2017)
- *'Cranbourne Town Centre Residential Demand Study'* (dated June 2017).

The abovementioned reports provide data on existing and expected future land use information forecasts.

Table 4.2 provides a summary of the existing land use data within the study area as defined in the SGS documents and converted to a Planning Scheme defined land use.

Table 4.2: Summary of Land Use Data within Study Area

Use		Size/No.	Unit
SGS Report Definition [1]	Appropriate Planning Scheme Definition		
Supermarket - Full Line	Supermarket	7,650	sqm
Supermarket - Other	Supermarket	2,978	sqm
Department Store	Shop	17,295	sqm
Specialty Store - Non-Food	Shop	16,698	sqm
Specialty Store - Food	Shop	963	sqm
Large Format Retail - High Density	Restricted Retail	2,946	sqm
Large Format Retail - Medium Density	Restricted Retail	3,230	sqm
Large Format Retail - Low Density	Car/Boat Sales yard	913	sqm
Hospitality – Cafes & Restaurants	Convenience Restaurant / Food & Drink Premises	3,491	sqm
Hospitality - Take-Away	Food & Drink Premises	7,638	sqm
Hospitality – Bars & Pubs	Tavern	2,473	sqm
Commercial	Office / Shop	20,894	sqm
Institutional – Education	Child Care Centre	1,677	sqm
Institutional – Public & Community	(Multiple)	3,252	sqm
Industrial	Industry	455	sqm
Residential	Dwelling	134,732	dwellings
Other	(Multiple)	397	sqm

[1] Uses as defined in the SGS report, noting omission of 'Institutional – Health' or 'Institutional – Arts and Recreation' due to very low floor area within the study area and lack of applicable rates.

4.4.3 Car Parking Rate by Land Use

The majority of the floor space summarised in Table 4.2 can be accounted for by a number of key uses, being retail, commercial and residential land uses. Consequently, the modelling of the car parking characteristics is relatively sensitive to the car parking rates adopted for these uses and relatively insensitive to the car parking rates adopted for the balance of the uses.

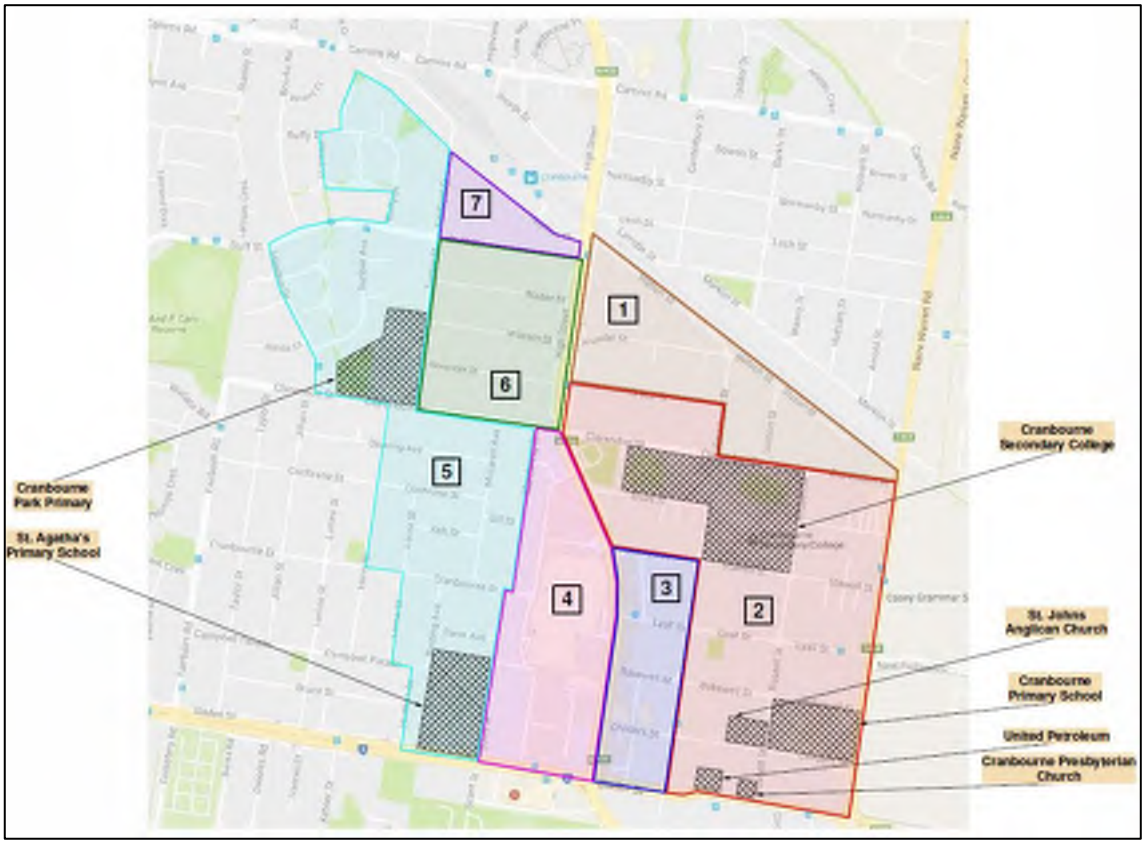
As a starting point, Column B car parking rates outlined in the Casey Planning Scheme have been adopted having regard to proximity to public transport, the mix of land uses, prioritisation of walking and cycling initiatives, etc. Application of Column B rates would therefore remove the need utilise a temporal profile.

4.4.4 Calibration

The zones in respect to the car parking demand surveys shown in Figure 4.1 do not match the zones outlined in the SGS report within the study area[10]. As such, the car parking areas surveyed were converted to match (as best as possible) with the zones outlined in the SGS report to allow a comparison between land use and car parking for each zone.

Figure 4.5 has been prepared to illustrate the amended zoning areas to match the land use information provided in the SGS report.

Figure 4.5: Zoning Alteration – To Match SGS Economic Report



The following key items should be noted in relation to the above figure:

- There are several 'hatched' areas within Zone 2 and Zone 5. These areas are schools and churches and were omitted from the analysis (along with car parking along the frontage) for the following reasons:

[10] This was due to the zones specified in the project brief in relation to car parking demand surveys.

- These uses generate car parking demands that are contained largely on-site during activity centre peak periods
- These uses do not generate high car parking demands during the observed peak period
- These uses do not contain (usable) statutory rates

- Zone 1 is dominated by industrial land uses which generally contain a large amount of private on-site car parking, with minimal (or no) off-site demands. As such, this area has been omitted from the analysis.

4.4.5 Theoretical Car Parking Demand

As a starting point, Column B car parking rates generally reflect typical car parking rates experienced inactivity centres (compared to Column A rates) having regard to proximity to public transport, the mix of land uses, prioritisation of walking and cycling initiatives, etc.

In this regard, the theoretical car parking demand of the study area can be calculated by applying the Column B car parking rates. Table 4.3 provides an assessment of the theoretical car parking demand of the study area for consideration.

Table 4.3: Theoretical Car Parking Demand

Use		Zone 2		Zone 3		Zone 4		Zone 5		Zone 6		Zone 7	
Planning Scheme Use	Column B Rate	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.
Supermarket	5	0	0	1,744	87	8,884	443	0	0	0	0	0	0
Shop	3.5	397	13	1,800	62	32,595	1,139	0	0	164	5	0	0
Restricted Retail	2.5	330	8	1,469	36	3,177	78	0	0	0	0	1,200	29
Car/Boat Sales yard	2.5	200	5	82	2	0	0	0	0	631	15	0	0
Convenience Restaurant / Food & Drink Premises	3.5	412	14	2,024	70	8,545	299	0	0	148	5	0	0
Tavern	3.5	0	0	2,473	86	0	0	0	0	0	0	0	0
Office / Shop	3.5	3,139	109	9,319	326	5,843	204	0	0	2,593	90	0	0
Child Care Centre	3.5	450	15	0	0	0	0	0	0	450	15	777	27
Multiple	3.5	3,354	113	0	0	0	0	0	0	0	0	0	0
Industry	1	455	4	0	0	0	0	0	0	0	0	0	0
Dwelling	0.05	43,648	21	3,103	1	5,641	2	53,251	26	24,205	11	4,884	2
Theoretical Zone Parking Demand		305		677		2,165		26		141		58	
Total Theoretical Parking Demand (Column B Rates)		**3,372 car parking spaces**											

Table 4.3 indicates that the study area has a theoretical demand of 3,372 spaces, based on an adoption of Column B rates set out in the Casey Planning Scheme.

4.4.6 Observed Car Parking Demand

It is appropriate to compare the theoretical car parking demand of the study area to the demands recorded by the car parking demand surveys summarised in Section 4.3 of this report.

We also note that to provide an appropriate comparison, smaller off-street private car parking areas[11] (that were not captured in the car parking demand surveys) have been supplemented within the data set (via Nearmap aerial imagery) to allow a more accurate comparison of the overall car parking demand within the study area.

Table 4.4 sets out the observed car parking demand of the study area, including the supplementary data.

Table 4.4: Observed Car Parking Demand

	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
Observed Zone Parking Demand	146	436	1,879	46	188	68
Total Observed Parking Demand	**2,763 car parking spaces**					

Table 4.4 indicates that the study area has an observed demand of 2,763 spaces, which is 609 spaces less (18%) than the theoretical demand outlined in Table 4.3.

4.4.7 Interpretation of the Assessment

The car parking assessment provides supporting evidence for the future consideration of specific car parking rates for Cranbourne.

Table 4.5 below provides a summary of car parking supply versus theoretical and observed demands from the car parking assessment for the overall study area.

Table 4.5: Total Parking Supply v Observed and Predicted Demands (from Car Parking Assessment)

	Actual Supply	Theoretical Demand	Observed Demand
Spaces	5,474	3,372	2,763
Occupancy	-	62%	50%

It is noted that the car parking assessment has been compared with respect to the theoretical and observed demands for the study area in general, with Table 4.5 indicating that the observed car parking demands are significantly less than the car parking supply and that car parking is generated less than Column B rates shown in the theoretical demand.

As such, the data would indicate that there is a current oversupply of car parking in Cranbourne.

4.5 Future Car Parking Requirements

4.5.1 Future Land Use

Below provides a summary of the future non-residential land use data within the study area as defined in the SGS documents and converted to a Planning Scheme defined land use, with Table 4.6 showing the data by year and Table 4.7 showing the existing and ultimate build out by zone.

[11] A review of the survey data indicates that some private car parking was not captured either due to access or visual limitations (e.g. parking located at back of house, parking in garages or other enclosed buildings such as warehouses)

Table 4.6: Future Land Use Data – By Year - Non-Residential (sqm)

SGS Report Definition [1]	Existing	Future Year			
		2021	2026	2031	2036
Supermarket - Full Line	7,650	7,650	7,650	7,650	7,650
Supermarket - Other	2,978	2,978	4,478	4,478	4,478
Department Store	17,295	18,825	20,355	21,885	23,415
Specialty Store (Food and Non-Food)	17,661	20,662	23,662	26,662	29,661
Large Format Retail (Low, Medium and High Density)	9,167	9,168	9,168	9,168	9,168
Hospitality (Cafes & Restaurants, Take-Away and Bars & Pubs)	13,602	15,671	17,740	19,911	21,832
Commercial	20,894	25,896	29,932	33,962	37,992
Institutional – Education	16,691	16,691	16,691	16,691	16,691
Institutional – Public & Community	3,642	3,642	3,642	3,642	3,642
Industrial	2,208	2,208	2,208	2,208	2,208

[1] Uses as defined in the SGS report, noting omission of 'Institutional – Health' or 'Institutional – Arts and Recreation' due to very low floor area within the study area and lack of applicable rates.

Note: This data has been calculated for Zones 2, 3, 4, 6 and 7 only

Table 4.7: Future Land Use Data – By Zone – Non-Residential (sqm)

SGS Report Definition [1]	Zone 2		Zone 3		Zone 4		Zone 6		Zone 7	
	Existing	2036	Existing	2036	Existing	2036	Existing	2036	Existing	2036
Supermarket - Full Line	0	0	0	0	7,650	7,650	0	0	0	0
Supermarket - Other	0	0	1,744	1,744	1,234	2,734	0	0	0	0
Department Store	0	0	0	0	17,295	23,415	0	0	0	0
Specialty Store (Food and Non-Food)	397	397	1,800	4,775	15,300	24,225	164	264	0	0
Large Format Retail (Low, Medium and High Density)	870	870	1,551	1,551	3,177	3,177	631	631	1,200	1,200
Hospitality (Cafes & Restaurants, Take-Away and Bars & Pubs)	412	1,916	4,497	7,497	8,545	11,319	148	400	0	700
Commercial	3,139	17,385	9,319	9,319	5,843	6,730	2,593	4,558	0	0
Institutional – Education	0	0	0	0	0	0	0	0	424	424
Institutional – Public & Community	626	626	0	0	0	0	0	0	92	92
Industrial	455	455	0	0	0	0	0	0	0	0

[1] Uses as defined in the SGS report, noting omission of 'Institutional – Health' or 'Institutional – Arts and Recreation' due to very low floor area within the study area and lack of applicable rates.

Note: This data has been calculated for Zones 2, 3, 4, 6 and 7 only

In addition, Table 4.8 provides a summary of theoretical capacity for residential dwellings within the study area, based on proposed rezoning of land.

Table 4.8: Future Land Use Data – Theoretical Residential Capacity

Zone	No. of Dwellings			Size (sqm) [1]
	Medium Density	High Density	Total	
2	-	4,270	4,270	26,689
3	70	-	70	1,750
6	-	1,790	1,790	11,188
7	-	470	470	2,938
Totals	**70**	**6,530**	**6,600**	**42,563**

[1] Size is based on medium density dwellings having a density of 40 dwellings per hectare and high-density dwellings having a density of 160 dwellings per hectare.

4.5.2 Future Car Parking Assessment

The Column B car parking rates have been applied to the future land use projections to calculate the future car parking demands.

Table 4.9 provides an assessment of the future theoretical car parking demand of the study area, by use and year, and Table 4.10 provides this assessment by zone and by year.

Table 4.9: Theoretical Future Car Parking Demand, by Use and Year

Use		2021		2026		2031		2036	
Planning Scheme Use	Column B Rate	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.	Area (sqm)	Stat. Req.
Supermarket - Full Line	5	7,650	382	7,650	382	7,650	382	7,650	382
Supermarket - Other	5	2,978	148	4,478	223	4,478	223	4,478	223
Department Store	3.5	18,825	658	20,355	712	21,885	765	23,415	819
Specialty Store (Food and Non-Food)	3.5	20,662	720	23,662	826	26,662	931	29,661	1,036
Large Format Retail (Low, Medium and High Density)	2.5	7,429	183	7,429	183	7,429	183	7,429	183
Hospitality (Cafes & Restaurants, Take-Away and Bars & Pubs)	3.5	15,671	529	17,740	602	19,911	686	21,832	754
Commercial	3.5	25,896	815	29,932	911	33,962	1,050	37,992	1,190
Institutional – Education	3.5	424	14	424	14	424	14	424	14
Institutional – Public & Community	3.5	717	24	717	24	717	24	717	24
Industrial	1	455	4	455	4	455	4	455	4
Dwellings [1]	0.05 [2]	42,563	21	42,563	21	42,563	21	42,563	21
Total Theoretical Future Demands		**2021**		**2026**		**2031**		**2036**	
		3,477		**3,881**		**4,262**		**4,629**	

[1] Includes theoretical capacity for residential dwellings (i.e. maximum build out) in each year and assuming 100sqm per dwelling
[2] To account for residential visitor demands

Table 4.10: Theoretical Future Car Parking Demand, by Zone and Year

Zone	Description	Existing Supply	Total Theoretical Future Demands [1]			
			2021	2026	2031	2036
2	East of South Gippsland Highway (including schools)	259	195	301	454	600
			75%	116%	175%	232%
3	Shops on eastern side of South Gippsland Highway	596	725	780	834	881
			122%	131%	140%	148%
4	Shopping Centre	2,378	2,326	2,565	2,736	2,894
			98%	108%	115%	122%
6	Residential streets east of South Gippsland Highway (north of shopping centre)	324	201	201	201	203
			62%	62%	62%	63%
7	Residential streets south of railway station	72	51	55	58	72
			71%	77%	81%	101%
Total		**3,629**	**3,498**	**3,902**	**4,283**	**4,650**
			96%	**108%**	**118%**	**128%**
Difference from Supply			+131	-273	-654	-1,021

[1] Includes theoretical capacity for residential dwellings (i.e. maximum build out) in each year

The above tables indicate that the existing supply for the whole study area will be exceeded by 2026, with an additional 273 spaces required by 2026, and 1,021 spaces by 2036. The zones seeing the highest under-supply of spaces are those around the commercial core.

It is noted, however, that the existing observed demands for the study area are 18% less than the theoretical demands. Should these observed demands continue, the future demands will be lower than the theoretical demands. These demands are shown in Table 4.11.

Table 4.11: Cranbourne Parking Supply – By Location

	Existing Supply	Total Theoretical Future Demands (18% reduction)			
		2021	2026	2031	2036
18% less demands	**3,629**	**2,869**	**3,200**	**3,512**	**3,813**
		79%	88%	97%	105%
Difference from Supply		+760	+429	+117	-184

This table indicates that the existing supply across the study area will cater for future demands until sometime between 2031 and 2036, with an additional 184 spaces required by 2036. However, optimum capacity is 85% (3,084 occupied spaces), which will occur by 2026.

It is important to note that this is on the basis that no new car parking will be built during this time and also does rely on available car parking in surrounding residential areas.

4.6 Summary and Recommendation

Based on future residential and non-residential land use information within the study area, it is expected that the existing total car parking supply will cater for future demands until sometime between 2031 and 2036, noting that an optimum capacity of 85% will occur by 2026.

In normal circumstances, providing additional off-street car parking spaces to cater for future demands would be recommended. However, having regard to the current 'car dominated' characteristics of the study area identified in Sections 2 and 3 of this report, and the opportunities for future integration with other sustainable transport modes and improved connectivity between key areas explored in the proceeding sections of this report, further consideration of the benefits of not providing additional car parking are recommended to be explored to promote walking and cycling.

Indeed, it is further recommended that a formal car parking strategy be undertaken at a later date to provide detailed advice and guidance to Council as to how to effectively manage existing and future car parking resources. The advice contained within a strategy provides the basis for the development of statutory and non-statutory mechanisms.

Possible items that could be considered as an outcome in this study could be as follows:

- Modify existing parking restrictions to ensure the mix, times, duration, and (potentially) fees to reflect the Strategy objectives and guiding principles.
- Consider the implementation of paid parking in key locations within the study area, whilst ensuring that paid off-street parking is more 'attractive' to users than on-street opportunities, and that fee parking surrounding land uses with higher demand have higher fees.
- Develop an activity centre wide parking wayfinding strategy to best encourage the most effective utilisation of off-street car parking facilities.
- Consider engaging a parking payment app provider that allows users to identify vacant spaces.
- Develop a car share parking strategy and policy to support the introduction of car share vehicles.

- Develop a policy to reallocate road space currently used for on-street car parking to other land uses to support a mode shift in transportation.
- Developers to be encouraged to future proof the provision of car parking by constructing multi-deck car parking with minimum floor to ceiling heights of 3 metres, to enable parking to be repurposed.
- Council adopt a strategy to make land available in a potential PPP type arrangement to facilitate public parking development to serve the activity centre in conjunction with mixed use development.

5. Place Making

5.1 Current Place Making Conditions

5.1.1 Overview

Great public spaces are those places where celebrations are held, social and economic exchanges occur, friends run into each other, and cultures mix. They are the "front porches" of our public institutions – libraries, field houses, schools – where we interact with each other and government. When theses spaces work well, they serve as the stage for our public lives.

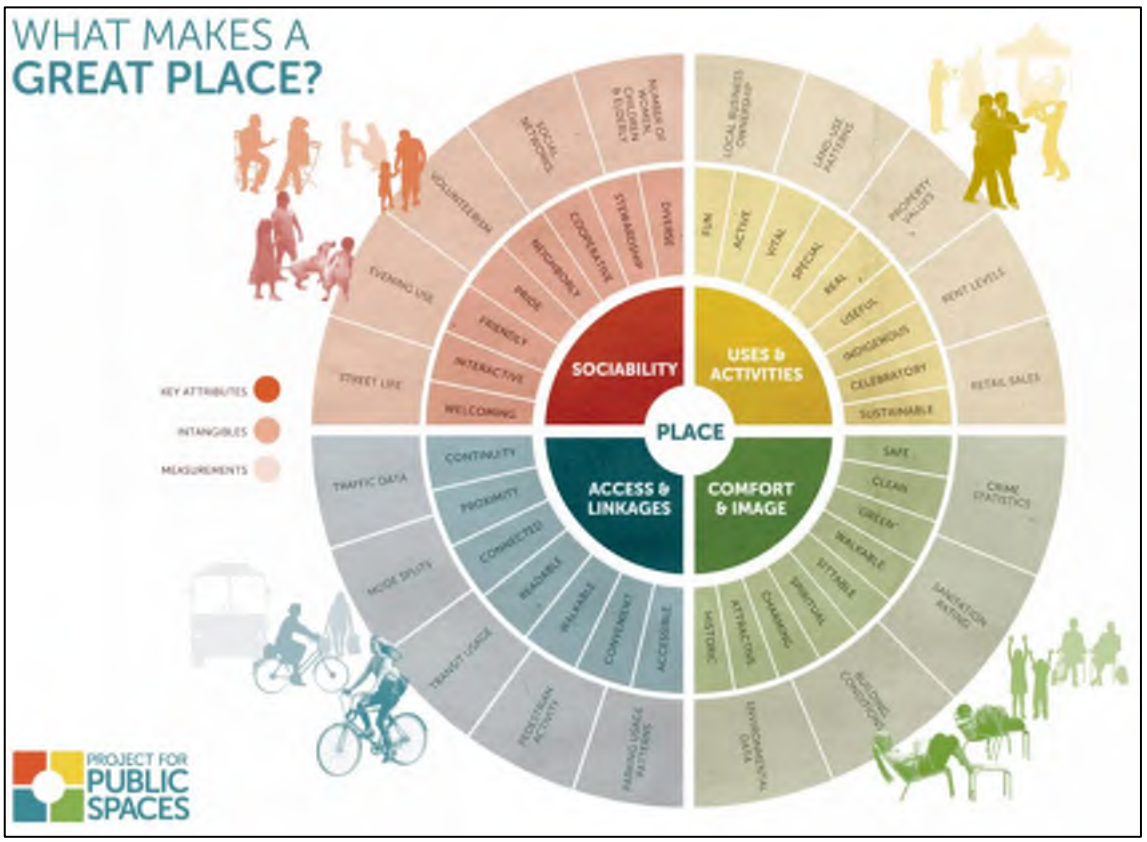
What makes some places succeed while others fail?

In evaluating thousands of public spaces around the world, the '*Project for Public Spaces*' found that to be successful, they generally share the following four qualities:

- *"they are **accessible**;*
- *people are engaged in **activities** there;*
- *the space is **comfortable** and has a good image;*
- *and finally, it is a **sociable** place: one where people meet each other and take people when they come to visit."*

To summarise the above qualities, Figure 5.1 illustrates a place diagram as a tool to assist the evaluation of various places, including Cranbourne Town Centre.

Figure 5.1: What Makes a Great Place



5.1.2 Cranbourne Town Centre

Upon review of Sections 2, 3 and 4 of this report (which detail the existing transport conditions in Cranbourne), it is evident that study area currently lacks many of the elements that make a 'great place'.

In respect to this movement and access study, specific examples within the 'sociability' and 'access and linkages' attributes are apparent for South Gippsland Highway and identified in Figure 5.2.

Figure 5.2: Cranbourne (South Gippsland Highway) Great Place Assessment

5.2 The Role of the Street

The role of streets is arguably the most important aspect in place-making and planning. Roads play a multi-faceted role in the transport network, promoting local connectivity with high amenity and safety, encouraging sustainable and active transport modes and facilitating throughput across the precinct.

One of the main functional aspects that should be considered, regardless of the mode(s) being supported, is the continuum across which they provide a "link" or "place" function. These terms have been developed by Professor Peter Jones (Centre for Transport Studies, UCL, London), and he outlines the following characteristics with their functionality:

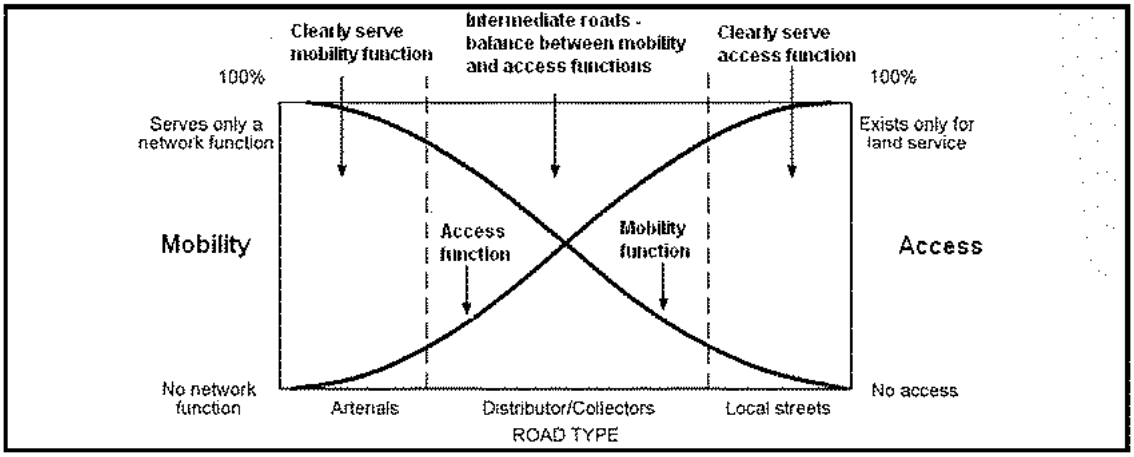
- "Links" are movement conduits that have design objectives to save time.
- "Places" are destinations in their own right and have design objectives to spend time.

When appropriately applied and integrated with land use, the balancing of "link" and "place" functions help forms an orderly, efficient and supportive road network for the community.

The above considerations differ from historical transport approaches in that they recognise that streets contribute in more ways than just moving people; they also consider economic, environmental and social aspects that encourage people to interact and spend time.

It should also be noted that this "link" and "place" approach has been used in Australia, but more around the level of access to the abutting land use, such as through Figure 5.3 that has been reproduced from the Austroads Guide to Traffic Management, Part 4: Network Management.

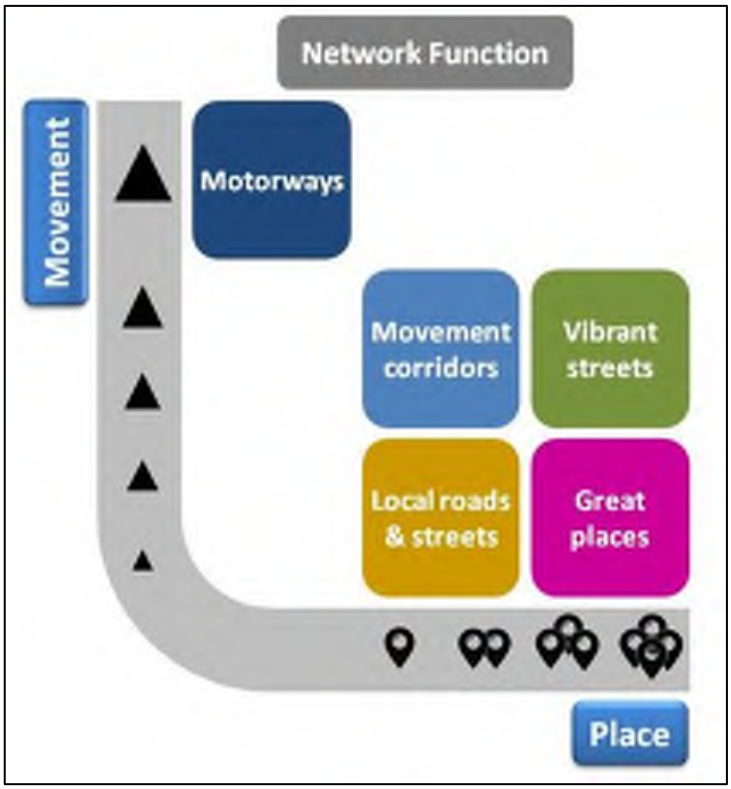
Figure 5.3: Road Type and Function (Source: Austroads)



This broad approach is beginning to be realised by VicRoads, who are starting to try and apply *'movement and place frameworks'* to help guide the development of the road network. Such an approach does help to define priorities for each different road type and can also be used to gain community and stakeholder support.

Frameworks need to be flexible enough and include enough categories to reflect the varying road types and their functions that exist in the network. Given the scale and complexity of the study area, the primary focus is to restore Cranbourne as the focal point of the community. A vibrant area for meeting and place making relies on a resilient transport network. We recognise the importance of understanding the travel patterns both broadly and locally, with a potential movement and place framework shown in Figure 5.4.

Figure 5.4: Potential Movement and Place Framework for Cranbourne Town Centre



The main challenge for the Cranbourne Town Centre will be the conversion of South Gippsland Highway into an area that could be considered a "Vibrant Street' and a 'Great Place' in the future. Further review of the potential modifications to this area and the associated community benefits for Cranbourne will be provided in Section 6 of this report.

5.3 The Vision

Cranbourne is an area that aims to deliver a vibrant community for where people can work and live given the future population forecasts, as shown in Figure 5.5.

Figure 5.5: Cranbourne Town Centre and the Vision

As detailed earlier in this report, significant population increases are expected in both Cranbourne and Casey, with a majority of people working in or around Cranbourne who currently live in Cranbourne. Therefore, it is expected that Cranbourne will continue to be a place to live and work, however it currently lacks many of the elements that make a 'place to be'.

5.4 Melbourne, Casey and Cranbourne – A City of the Future

Melbourne in the future is likely to look far different to that of today. It will be considerably larger, its residents will be far more connected, the importance of information and data will be significant, and people will move around the city differently.

Transport planning for Cranbourne needs to have consideration to emerging technology and trends. The challenge is that the speed that technology is moving (and the resulting impact) is clearly evident such that the technology that is commonplace today was not contemplated four years ago. For example, shared transport networks are now a reality (e.g. Uber now operates in 73 countries and 473 cities). These networks are constantly evolving and it is clear that they are likely to form a more important part of the future of urban transport systems, especially given the additional potential uplift as a result of connected autonomous vehicles.

It is important to have these concepts in mind when planning, as catering for future demands (mostly through building in flexibility to adapt to change) is an essential part of planning. Some considerations for future planning for Cranbourne are outlined in Table 5.1.

Table 5.1: 'City of the Future' trends to be considered in planning

Key transport related trends	Examples of the outcomes of trends to consider
Changing Demographics of Melbourne	Melbourne will likely have more people from non-English speaking backgrounds. Less access to cars. Greater movements internationally.
The next generation is likely to interact with neighbourhoods in a different way	The 'home-work' trip will become more blurred. Streets become social spaces.
Movement vs. Connectivity	People are likely to be completely connected and have constant access to real-time personalised information.
E-commerce	Online shopping is likely to be common place, which will drive increased deliveries of all goods. Home-based services are likely to increase.
Changing work places	Potentially there will be some impact, shared workspaces may become more common place.
Shared Transport Networks or Ride sharing	Likely to have a significant impact on transport network. The industry is likely to grow, and new models will develop.
Connected Autonomous vehicles	Have the potential to be fundamentally game-changing but the technology and its application is still in its early days. Self-driving coaches and trucks are likely to be a reality in the near future.

More discussion and consideration regarding some of the above items are provided throughout this document.

5.5 Demand Management

Consideration of a Demand Management Strategy, which Infrastructure Victoria terms as 'Changing behaviour, managing demand' should be investigated for the Cranbourne Town Centre.

This strategy should incorporate the number of levers that can contribute to achieving transport outcomes.

Todd Litman of the Victoria Transport Policy Institute (Canada) provides a summary of considerations (Table 5.2) in his paper *How Land Use Factors Affect Travel Behaviour*.

Table 5.2: ***Land Use Factors Affect Travel Behaviour***

Land Use Factors	Transport Impacts	Planning Objectives
○ Regional accessibility ○ Density ○ Land use mix ○ Centeredness ○ Road and path connectivity ○ Roadway design ○ Active Transport (walking and cycling conditions) ○ Public transit service quality ○ Parking supply and management ○ Site design ○ Mobility management ○ Integrated Smart Growth programs	○ Vehicle ownership ○ Vehicle trips and travel (mileage) ○ Walking ○ Cycling ○ Public transit travel ○ Ridesharing ○ Telecommuting ○ Shorter trips	○ Congestion reduction ○ Road and parking cost savings ○ Consumer savings and affordability ○ Improved mobility for non-drivers ○ Traffic safety ○ Energy conservation ○ Pollution emission reduction ○ Improved public fitness and health ○ Habitat protection ○ Improved community liability

The work completed by Litman should guide into the elements within Access and Movement Strategy for the Cranbourne Town Centre.

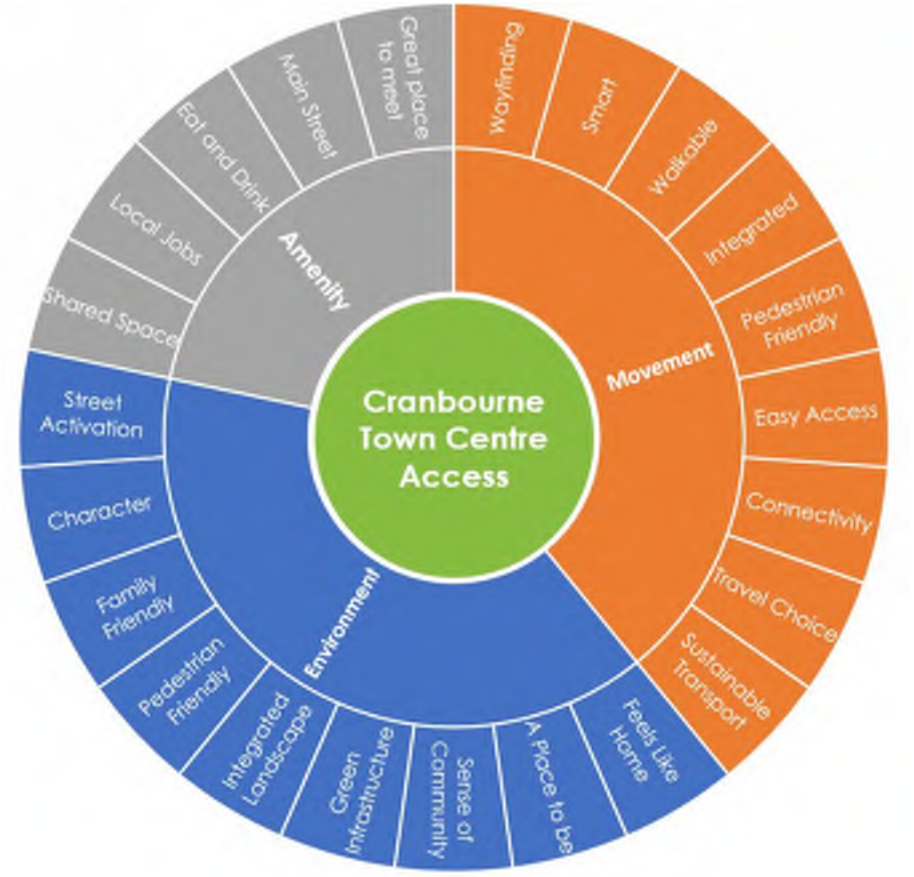
6. Cranbourne Movement Strategy

6.1 Future Aspirations

A workshop at Casey City Council offices was undertaken on 9 August 2017 to ascertain Council's future aspirations for the Cranbourne Town Centre. A brainstorming session on the desired outcomes for the centre identified the following key items, with the detail shown graphically in Figure 6.1.

- Amenity, of where people want to be
- Movement, of people on all modes of transport
- Environment, of where people want to live and work.

Figure 6.1: Cranbourne Town Centre Future Aspirations



The aspirations are generally consistent with the aims outlined in the Cranbourne Town Centre Structure Plan (2011) and Cranbourne Town Centre Urban Design Framework (2011).

Notable objectives from the abovementioned documents include objectives such as *"a pleasant pedestrian environment for shopping and dining"*, *"renewed active and vibrant streetscaped for the corridor"* and *"improve the interaction between the eastern and western retail precincts"*, which are all consistent with the aspirations shown in Figure 6.1.

6.2 Other Key Transport Developments

Through discussions at the 'Transport Working Group' meetings, two key transport developments were identified that will have a significant impact to the transport movement and access for the Cranbourne Town Centre that lie outside of Council's control. These are:

i Construction of a bypass of the Cranbourne Town Centre
ii Extension of the Cranbourne railway line to East Cranbourne and Clyde.

Council's transport strategy necessarily sits within the uncertainty provided by these two major transport developments.

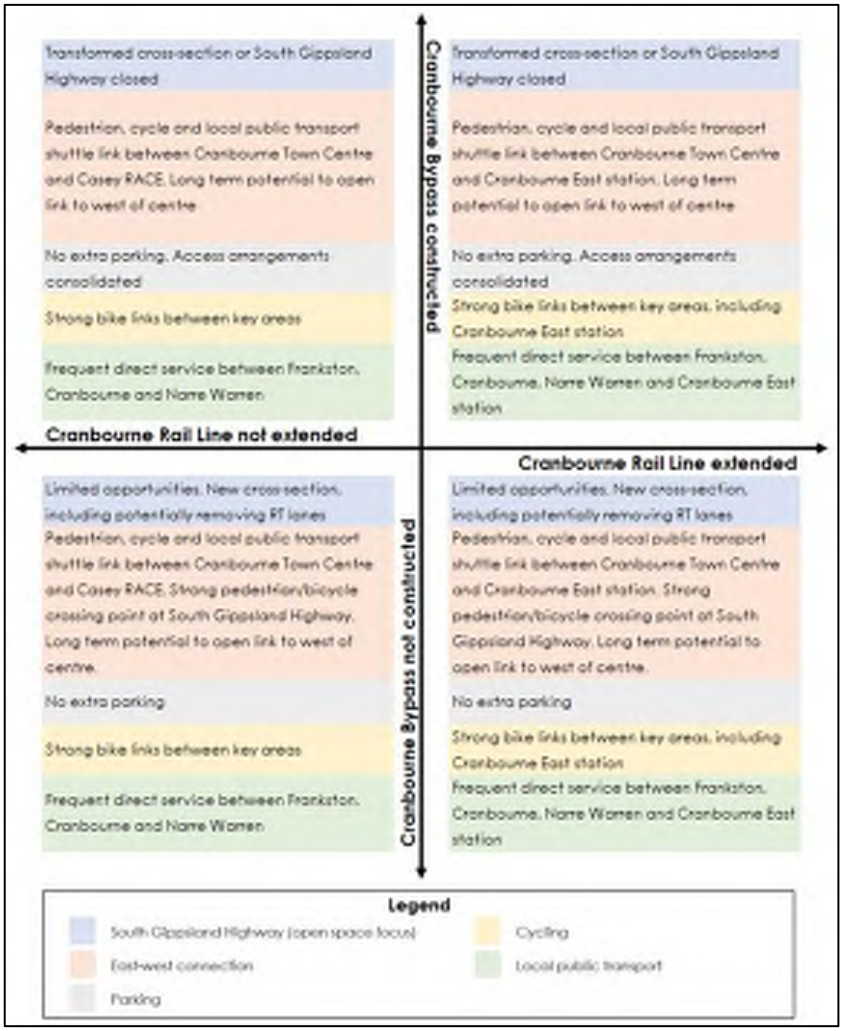
Council's transport strategy is restricted by uncertainties regarding the approval of these two major projects. To address this uncertainty, the key action aims related to transport and movement are considered as follows:

- Conversion of all or part of South Gippsland Highway through the Cranbourne Town Centre into a more enhanced street for its residents (street for people),
- Strong east-west connection between Cranbourne Town Centre and Casey RACE through Lyall Street to New Holland Drive. This will create a single consolidate activity axis with amended access arrangements
- Reduction in car parking provision and change to vehicle access to encourage the use of sustainable modes,
- Pedestrian and bicycle connectivity improvements both into and through the town centre, and
- Local public transport improvements for effective and useful connection to neighbouring activity centres including Frankston and Narre Warren.

It is assumed that State government decisions on the Cranbourne bypass and the extension of the Cranbourne Rail Line are independent. As such, this creates four broad major transport infrastructure options (bypass constructed/not constructed, and Cranbourne rail extension constructed/not constructed) within which the Cranbourne Town Centre's development must proceed.

Having regard to the above, Figure 6.2 summarises how the key local action themes might be expressed under each of the major transport infrastructure options.

Figure 6.2: Cranbourne Infrastructure Options



It is recommended that Council implement each of the key action themes (with the assistance of others) for the Infrastructure Options depending on the status of the two key projects out of Council's control.

6.3 What is the Current Key Movement Barrier?

Through discussions at the 'Transport Working Group' meetings, it was identified that the key east-west link barrier was a conbination of South Gippsland Highway and Cranbourne Park Shopping Centre.

6.3.1 South Gippsland Highway

South Gippsland Highway is as a primary arterial road and is a divided, dual carriageway road aligned in a north-south direction and is configured with three-lanes in each direction through Cranbourne Town Centre, reducing to two lanes in each direction at the periphery of the study area.

South Gippsland Highway has a road reserve width of approximately 40m within Cranbourne Town Centre, with four sets of signalised crossing points between Sladen Street and Clarendon Street (850m), is subject to a posted (static) speed limit of 60km/hr and carries approximately 35,000 vehicles per day.

Based upon on-site observations and subsequent key stakeholders, the following are considered key factors to the east-west connectivity barrier in respect to South Gippsland Highway:

- Width of road reserve (crossing width)
- Lack of pedestrian crossings (activation)
- Traffic volumes
- Freight (noise)
- Speed limit.

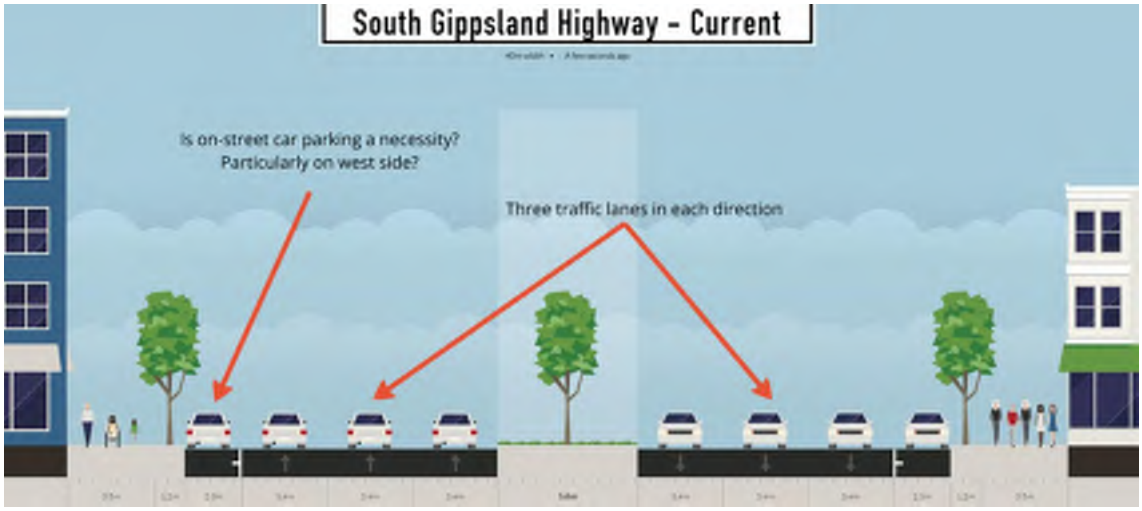
To change the 'role of the street' for South Gippsland Highway to a 'great place' where the community can 'live', 'work' and 'be', an examination of the existing cross-section is provided below and the potential modifications that could be implemented to benefit Cranbourne Town Centre.

6.3.2 South Gippsland Highway Cross-Section

Existing Cross-Section

The existing cross-section of South Gippsland Highway (in Cranbourne Town Centre) is shown in Figure 6.3.

Figure 6.3: South Gippsland Highway Existing Cross-Section



The following summarises of the key characteristics noted regarding the existing South Gippsland Highway cross-section:

- Three lanes in each direction, two parking lanes and a wide median (primarily for turning vehicles), providing a wide crossing width.
- Footpaths of approximately 3.5m in width, as well as additional planting areas provide wide existing footpaths on both sides of the carriageway.
- Having regard to the car parking demands for the study area, on-street car parking is not considered necessary.
- Having regard to mid-block traffic performance and that Cranbourne currently lacks many of the elements that make a 'great place', a road carriageway that has three lanes in each direction is not considered necessary.

Future Cross-Section (Interim)

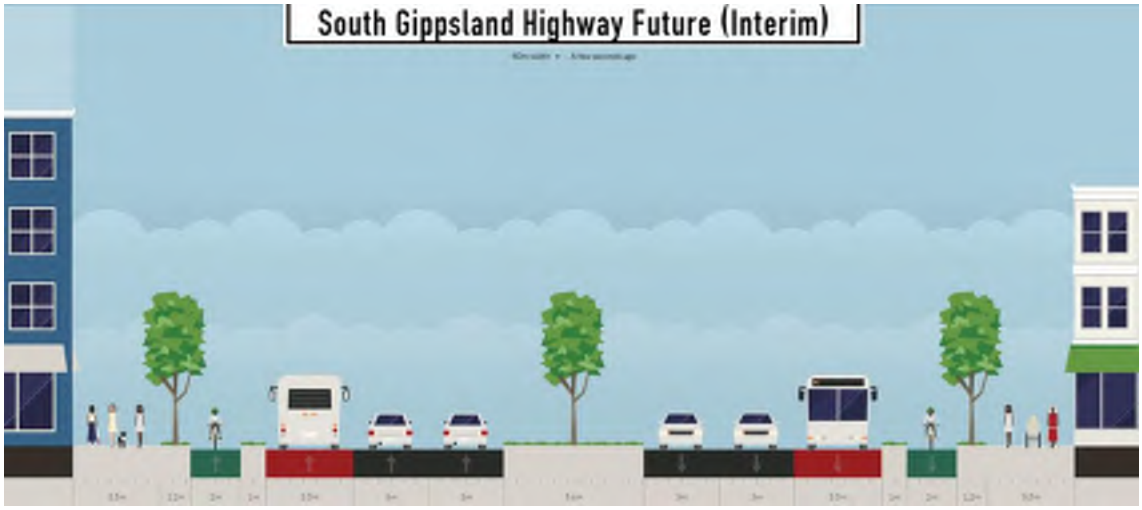
To balance the different mode share options on South Gippsland Highway, on-street bike (with landscaped separation between the footpath and road carriageway) and bus lanes could be provided in lieu of the third traffic lane and on-street parking on both sides of the carriageway. It is recommended that the bike lanes be 2m in width to allow more competent cyclist (commuter) to safely pass a recreational cyclist in this area.

It should also be noted that this future option does not propose to amend the footpath widths or median (therefore continuing to allow right hand turns in the median). Two traffic lanes in each direction is considered to be satisfactory, given that this is the traffic throughput north and south of the Cranbourne Town Centre and is appropriate future (interim) option prior to the construction of the Cranbourne Bypass.

Various discussions at the transport working group[12] regarding a reduction in traffic lanes on South Gippsland Highway to assist other transport modes in the study area were generally accepted, subject to a detailed traffic assessment at a later date.

For reference, the future (interim) cross-section opportunity for South Gippsland Highway (in Cranbourne Town Centre) is shown in Figure 6.4

Figure 6.4: South Gippsland Highway Future (Interim) Cross-Section



It is recommended that the cross-section of South Gippsland Highway be modified in the immediate future to assist other transport modes accessing the Cranbourne Town Centre and act as a catalyst in transforming this area to a great public space that begins to reduce the east-west barrier that is evident through Cranbourne.

It is noted that reducing this cross-section may have an impact on the surrounding network and the testing of the impact of this is provided in Section 7 of this report.

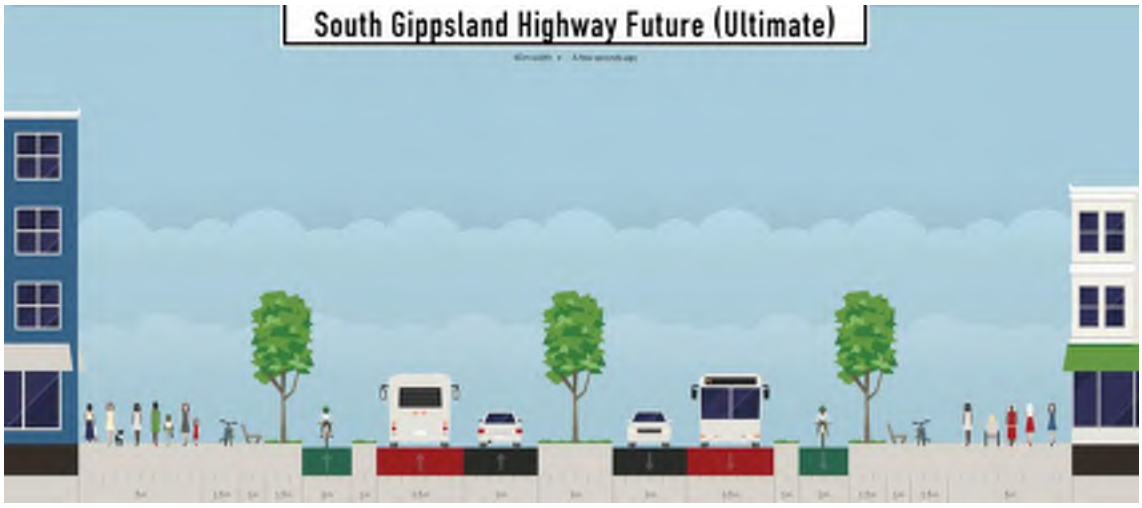
Future Cross-Section (Ultimate)

The construction of an interim future South-Gippsland Highway cross-section (shown in Figure 6.7) could be undertaken immediately, however this design is not considered to achieve the placemaking objectives shown in Figure 6.1.

As such, the future (ultimate) cross-section opportunity for South Gippsland Highway (in Cranbourne Town Centre) is shown in Figure 6.5.

[12] Consisting of representatives at Casey City Council, Transport for Victoria, VicRoads and PTV

Figure 6.5: South Gippsland Highway Future (Ultimate) Cross-Section



The following summarises of the key characteristics noted regarding the future (ultimate) South Gippsland Highway cross-section design option shown in Figure 6.8:

- Provision of a 3m median to allow right turns if VicRoads consider these to be absolutely necessary, however provides a reduction to the existing median and allows tree planting opportunities
- One traffic lane in each direction (assumes construction of the Cranbourne Bypass)
- One dedicated bus lane in each direction (assumes bus service upgrades and frequency)
- Provision of 2m wide bicycle lanes in each direction (to allow more competent cyclist to safely pass a recreational cyclist)
- A total of 4m on each side of the carriageway for verge upgrades such as street trees, seating areas and on-street bicycle parking
- Provision of 5m wide footpaths on each side of the carriageway for not only pedestrian movement, but also street activation and placemaking opportunities.

Having regard to the above, it is recommended that the cross-section of South Gippsland Highway be modified following the completion of the Cranbourne Bypass to transform this area to a great public space and reduces the east-west barrier that is evident through Cranbourne.

6.3.3 Other South-Gippsland Highway Considerations

Example Road Improvement Projects

Whilst no two roads are ever the same (in terms of traffic volumes, adjoining land uses, public transport proximity, cyclists and pedestrian volumes, location, etc), it is important to note that there have been a couple of other example road improvement projects in Metropolitan Melbourne recently.

These projects have been primarily coordinated by VicRoads and the local Council to achieve outcomes that seek to satisfy all modes of transport and subsequently improve amenity of the area, placemaking and movement. Aerial images of 'before' and 'after' outcomes for both Maroondah Highway, Ringwood and Princes Highway, Dandenong are provided in Figures 6.6-6.7 and Figures 6.8-6.9, respectively.

Figure 6.6: Ringwood Before

Figure 6.7: Ringwood After

Figure 6.8: Dandenong Before

Figure 6.9: Dandenong After

The above figures illustrate the effectiveness of the removal of traffic lanes and on-street for the provision of bicycle lanes, wider pedestrian laneways, tree planting and narrower crossing widths.

Both the above road improvement projects enjoy bypass options for utilisation by non-local traffic, which reiterates the importance of the Cranbourne Bypass to the community to allow the modification of South Gippsland Highway.

Speed Limit

Both previously mentioned examples of Maroondah Highway, Ringwood and Princes Highway, Dandenong are subject to a (recently reduced) posted speed limit of 40km/hr, with Princes Highway having a variable speed limit sign.

To begin the transformation of South Gippsland Highway to a great public space that will be more conducive to pedestrians, it is recommended that the speed limit be reduced from 60km/hr to 40km/hr, between Clarendon Street to Sladen Street. This should be in the form of a variable speed sign.

Tree Planting

VicRoads has recently amended their Tree Planting Policy, providing guiding principles for consideration of tree retention or new tree planting in road reserves. VicRoads recognise that trees provide significant benefits to the community including encouraging active travel, air pollution reduction, improved amenity and intangible benefits to public health.

Within the policy, restrictions apply to planting trees within the road reserve for speed limits above 50kmh. For this reason, the provision of street trees on South Gippsland Highway will be far more flexible subject to a reduced speed limit of 40kmh.

6.3.4 Cranbourne Park Shopping Centre

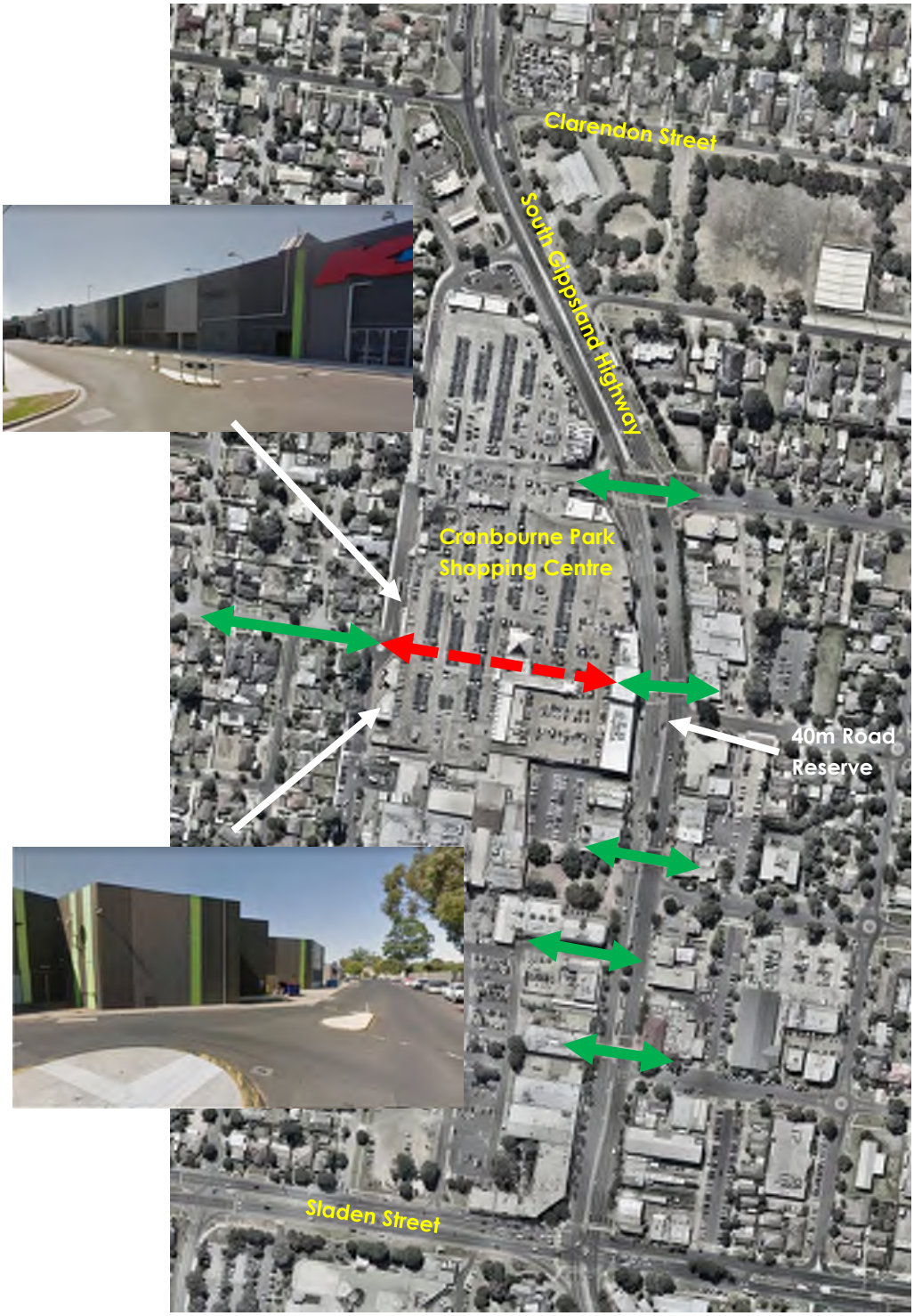
Cranbourne Park Shopping Centre is owned and operated by The Cranbourne Park Shopping Centre owners. It is located along the western side of South Gippsland Highway and contains approximately 65,000sqm of floor space comprising of tenants such as Woolworths, Coles, Kmart, Target and Harris Scarfe. Additionally, approximately 1,700 car parking spaces are provided within the shopping centre.

Based upon on-site observations and subsequent key stakeholders, the following are considered key factors to the east-west connectivity barrier in respect to Cranbourne Park Shopping Centre:

- The extensive back of house area along the western boundary
- The decommission of Stawell Street due to the shopping centre expansion
- The circuitous east-west pathways within the shopping centre between Lyall Street and Cranbourne Drive
- The width of the shopping centre.

For reference, an aerial image of South Gippsland Highway (between Sladen Street and Clarendon Street) and Cranbourne Park Shopping Centre within Cranbourne Town Centre is shown on Figure 6.10 to illustrate the above key factors in the east-west pedestrian barrier.

Figure 6.10: South Gippsland Highway/Cranbourne Park Shopping Centre Aerial Image



Source: Nearmap

It is understood that future development of Cranbourne Park Shopping Centre is likely to be in approximately 5-10 years' time. As such, it is recommended that Council provide objectives for The Cranbourne Park Shopping Centre owners to achieve this in conjunction with future development to achieve connectivity within the Shopping Centre that strengthens Lyall Street and improves connectivity with Cranbourne Drive to the west.

7. Option Testing

7.1 Background

To understand the broad-level impact of future land use projections and interventions on the transport network within the Cranbourne study area, three transport options have been analysed as follows:

- Options 1: 'Business as usual' (the likely transport network, for a given land use)
- Options 2: 'Basic interventions' (some further changes to the transport network to support the outcomes of the Town Centre)
- Options 3: 'Connected Cranbourne' (more significant changes to the transport network to support the outcomes of the Town Centre and the wider outer south east).

The above transport options have been tested for land use projections in the future years 2021, 2031 and 2046 using VITM modelling.

7.2 Option Testing Options

Having regard to the above transport options, several initiatives are included to achieve the desired transport improvement outcome. Table 7.1 provides details on the initiatives contain within each proposed option. The three transport options combined with the five land use projections creates a total of 15 options.

Table 7.1: Option Testing

Initiative	Name	2021		2031		2046	
		Existing density	Enhanced density	Existing density	Enhanced density	Existing density	Enhanced density
Option 1. Business as usual							
A	Reference Case	X	N/A	X	X	X	X
Option 2. Basic Interventions							
A	Reference Case	X	N/A	X	X	X	X
*D**	Regional PT connections Lite	X		X	X	X	X
B	New / revised parking controls	X		X	X	X	X
C	Rail extension to Cranbourne East and Clyde	-		-	-	X	X
G	Northern road bypass	X		X	X	X	X
*I**	Strategic pedestrian network Lite	X		X	X	X	X
Option 3. Connected Cranbourne							
A	Reference Case	X	N/A	X	X	X	X
B	New / revised parking controls	-		X	X	X	X
C	Rail extension to Cranbourne East and Clyde	X		X	X	X	X
C*	Dandenong National Employment Cluster Station	-		-	-	X	X
D	Regional PT connections	-		X	X	X	X
*D**	Regional PT connections Lite	*X*		-	-	-	-
E	Local PT connections	X		X	X	X	X

Initiative	Name	2021		2031		2046	
		Existing density	Enhanced density	Existing density	Enhanced density	Existing density	Enhanced density
F	Southern road bypass	-		X	X	X	X
H	Strategic cycling network	X		X	X	X	X
I	Strategic pedestrian network	-		X	X	X	X
J	Policy incentives	X		X	X	X	X

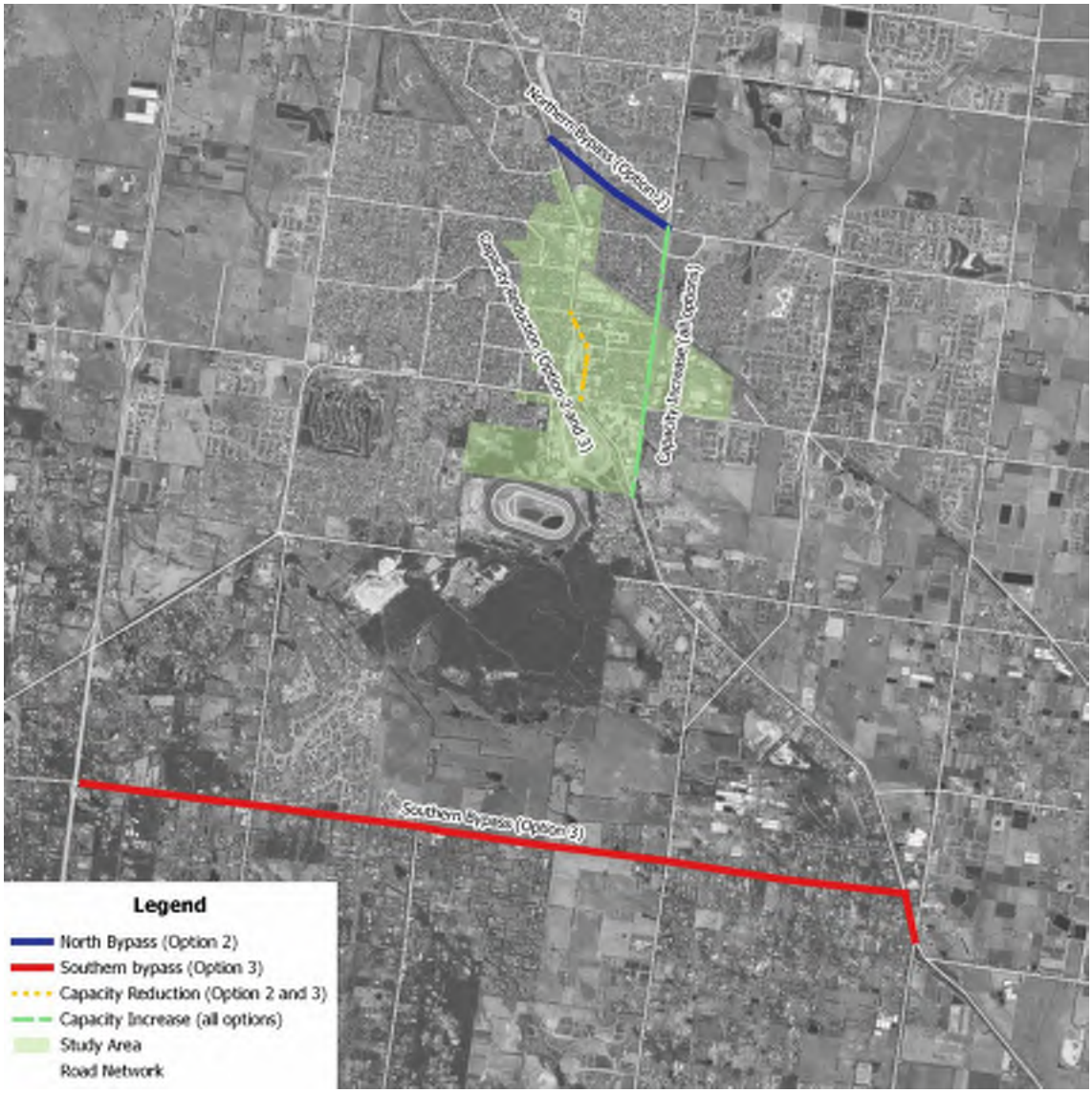
For further information, Appendix C provides an expanded form of Table 7.1, with a description of each proposed option within the three options, as well as what each option is responding to within the learnings discovered in this study listed throughout this report.

Additionally, Figure C1 to Figure C5 and Table C1 within Appendix C provide further information relating to a number of description items within Table 7.1.

Road Network Changes

The changes to the road network outlined in the respective Options in Table 7.1 relate to a number of treatments that have the potential to shift through traffic away from the town centre. In particular, the Northern and southern bypasses are aimed at facilitating this shift. Figure 7.1 shows the location of the two bypasses tested in the model as well as other items included to support the shift.

Figure 7.1: Road Network Change and Locations



Public Transport

For public transport services, projects like the Melbourne Metro, the Caulfield to Dandenong line upgrade, and limited bus service improvements have been included in all options. Option 2 and Option 3 include a substantial bus network that seeks to provide better connections to the broader area in the aim of facilitating modal shift. Figure 7.2 shows the bus network used for Option 1 whilst Figure 7.3 shows the coverage of the bus network in Option 3.

Figure 7.2: Option 1 Case Bus Network Coverage (2046)

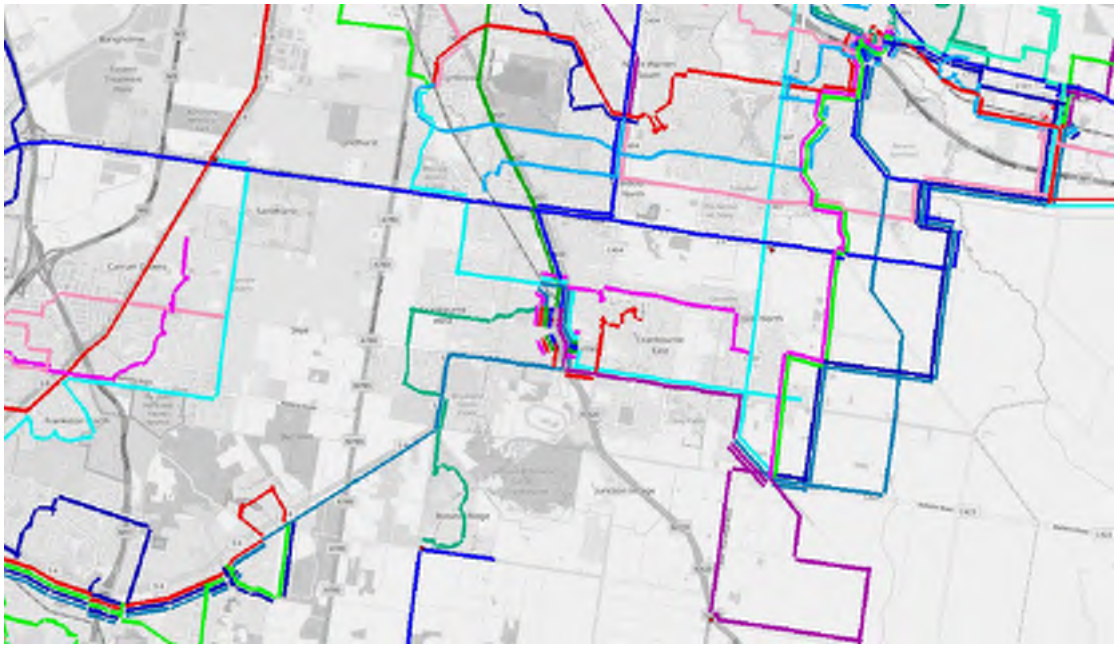
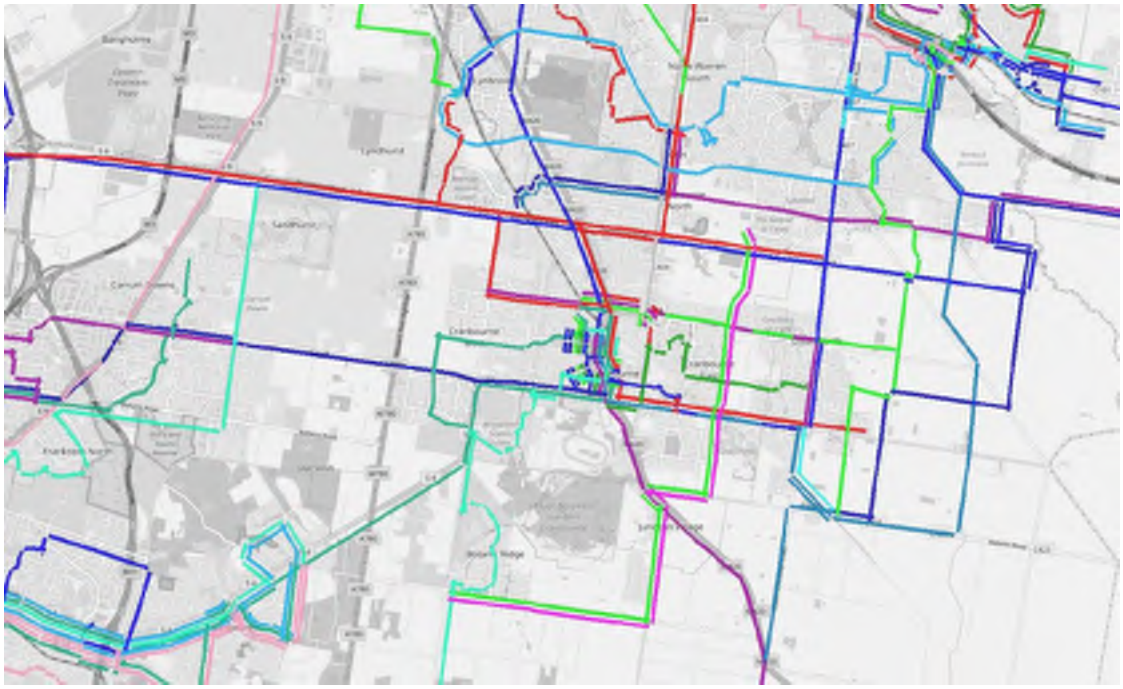


Figure 7.3: Option 3 Bus Network Coverage (2046)



7.3 Land Use

The Existing Density land use projections utilising the VITM reference case, which are aligned to the Victoria In Future forecasts. The Enhanced Density builds on the Existing Density by incorporating the work contained in the SGS Economics and Planning report, which has higher land use yields in the Town Centre.

Table 7.2 shows the land use projections used as part of the assessment options., with increases in the Town Centre jobs and residents.

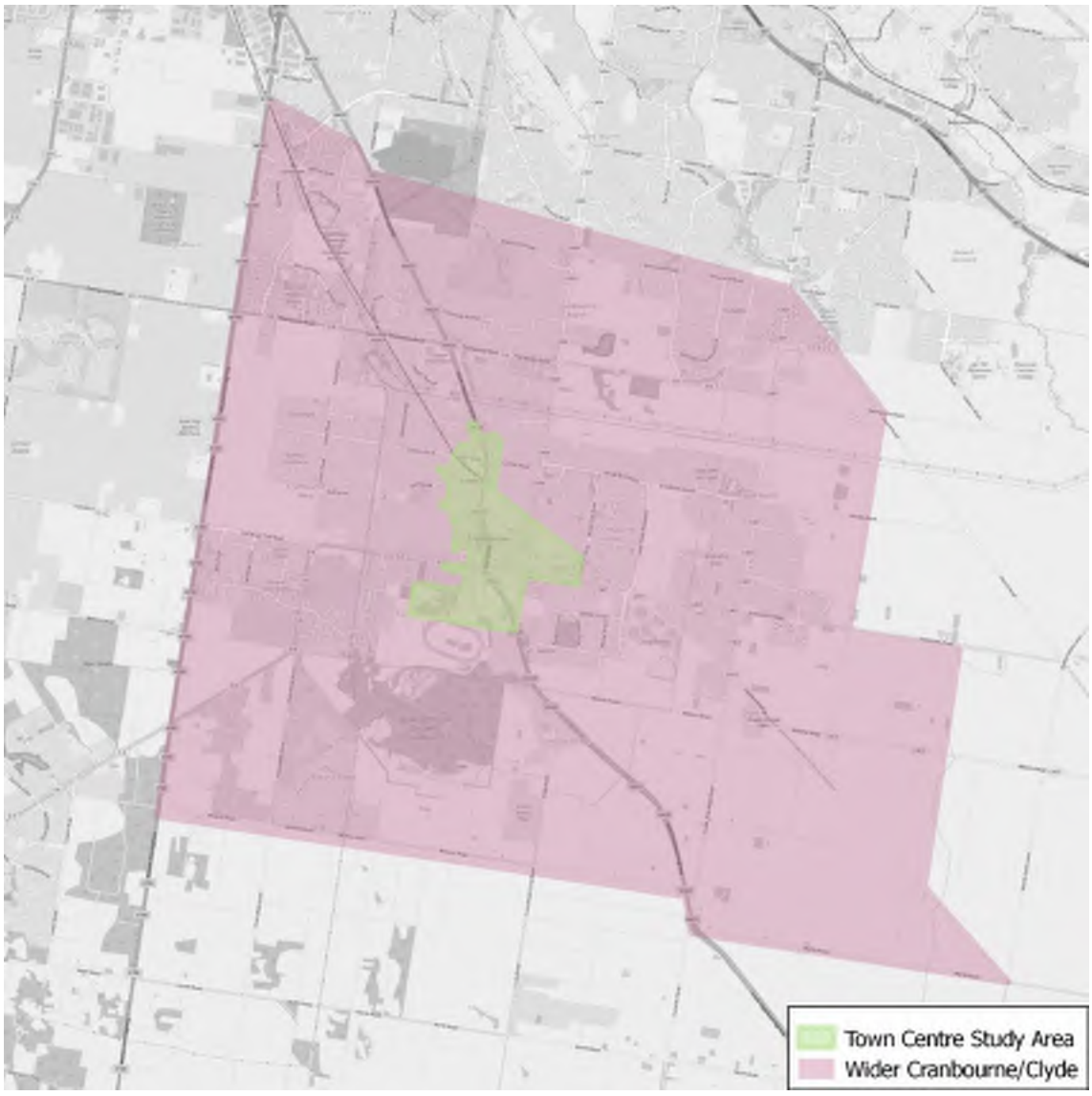
Table 7.2: Land Use Projections – Cranbourne and surrounds

Location/Area	Existing density			Enhanced density		
	Population (no. of people)	Household (no. of dwelling)	Employment (no. of jobs)	Population (no. of people)	Household (no. of dwelling)	Employment (no. of jobs)
2016						
Town Centre Study Area	3,570	1,250	5,560	-	-	-
Wider Cranbourne / Clyde (excl Study Area)	84,130	29,480	8,510	-	-	-
Total	***87,700***	***30,730***	***14,070***	**-**	**-**	**-**
2021						
Town Centre Study Area	3,590	1,270	6,300	-	-	-
Wider Cranbourne / Clyde (excl Study Area)	114,420	40,450	10,030	-	-	-
Total	***118,010***	***41,720***	***16,330***	**-**	**-**	**-**
2031						
Town Centre Study Area	4,700	1,900	7,340	7,900	3,230	7,540
Wider Cranbourne / Clyde (excl Study Area)	158,350	56,570	13,060	158,350	56,570	13,060
Total	***163,050***	***58,470***	***20,400***	***166,250***	***59,800***	***20,600***
2046						
Town Centre Study Area	5,400	2,000	8,130	27,850	10,320	9,640
Wider Cranbourne / Clyde (excl Study Area)	196,510	72,830	18,260	196,510	72,830	18,260
Total	***201,910***	***74,830***	***26,390***	***224,360***	***83,150***	***27,900***

The enhanced density projections show that Cranbourne has the potential to provide in the order of 3,200 extra dwellings in the town centre if delivered. All of this population will put pressure on the local and regional transport networks, and are elaborated on further in the following sections.

For completeness, the town centre and wider area extent referred to in Table 7.2 are shown spatially in Figure 7.1.

Figure 7.4: Town Centre and Study Area Extent



7.4 Option Outcomes

A full suite of outputs has been extracted from the model and are located within Appendix D. These include the following:

- Road network characteristics including link class and number of lanes
- Two-hour link volumes for AM and PM peak by direction
- Daily link volumes by direction
- Volume to capacity plots for the two-hour AM and PM peak periods

With a significant amount of information that can be extracted from the modelling, we will focus the analysis on 2031, which corresponds to the medium-term timeframe in the recommendation section.

7.4.1 Network Statistics

Based on the outcomes of the VITM modelling, this section presents the Vehicle Kilometres Travelled (VKT), Vehicle Hours Travelled (VKT) and the average speed of vehicles of the network for each option for the respective time period. The area that these are calculated for represents

the Cranbourne and Clyde area (refer to Figure 7.4) and provides an indication of the impact of each of the options as it relates to the way people travel, and are shown in Table 7.3.

Table 7.3: 2031 Options – Private Vehicles Travel Statistics - Wider Cranbourne and Clyde

2031 Option	AM Peak			PM Peak		
	Vehicle Kilometres Travelled (VKT)	Vehicle Hours Travelled (VHT)	Average Speed (km/hr)	Vehicle Kilometres Travelled (VKT)	Vehicle Hours Travelled (VHT)	Average Speed (km/hr)
Existing density – Option 1	1,358,000	33,730	40.3	1,477,900	37,550	39.4
Existing density – Option 2	1,357,900	33,650	40.4	1,477,900	37,520	39.4
Existing density – Option 3	1,355,300	33,350	40.6	1,474,400	37,210	39.6
Enhanced density – Option 2	1,364,000	33,880	40.3	1,481,100	37,660	39.3
Enhanced density – Option 3	1,362,500	33,600	40.6	1,479,900	37,460	39.5

The results show that the Option 3 transport network performs better Option 2, with lower vehicle VKT and VHT's resulting in a higher average speed. The Enhanced Density land use projections, result in higher total VKT and VHT than the Existing Density which is expected due to more people and jobs in the area.

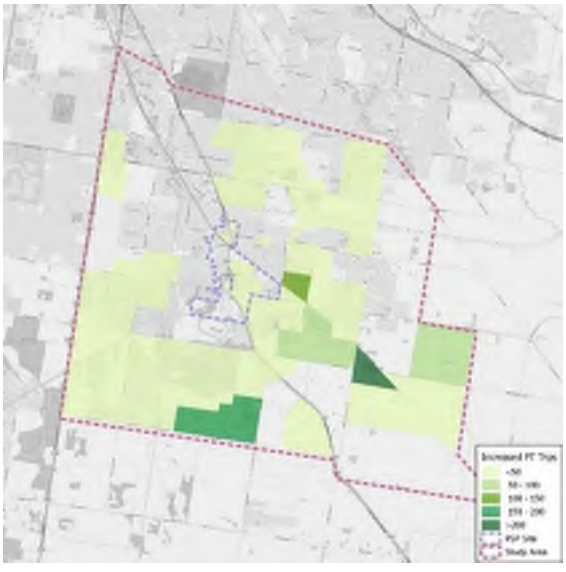
A positive for the initiatives and land use is that the Enhanced Density Option 3 and Existing Density Option 3 have the same average speed meaning that increased densities should not impact on the network.

7.4.2 Public Transport Statistics

To understand the impact of the transport options on public transport usage, the model the changes in trip behaviour by local area have been extracted and are shown in Figure 7.5 and Figure 7.6.

Figure 7.5: Percentage Change in Public Transport use by area from Option 2 to Option 3 (2031 Daily - Enhanced Density)

Figure 7.6: Change in number of Public Transport trips by area from Option 2 to Option 3 (2031 Daily - Enhanced Density)



Both figures show the growth along the rail extension to Clyde, and the positive impact of the regional PT connections initiatives with additional bus services south west and north east of the Cranbourne town centre.

7.5 Basic Intervention (Option 2) Outcomes

Basic Intervention Option (2) builds on Business as Usual Option (1), as such a comparison between the two options has been undertaken to demonstrate the impact of the treatments. The Volume to Capacity Ratio (VCR), which also correlates to a degree of road saturation metric, is a good indicator as to the operation of the network at the specific link locations.

Figure 7.7 and Figure 7.8 show the Volume to Capacity Ratios on the network for Option 1 and Option 2 respectively.

Figure 7.7: Volume Capacity Ratios – AM Peak – 2031 – Business As Usual (Option 1)

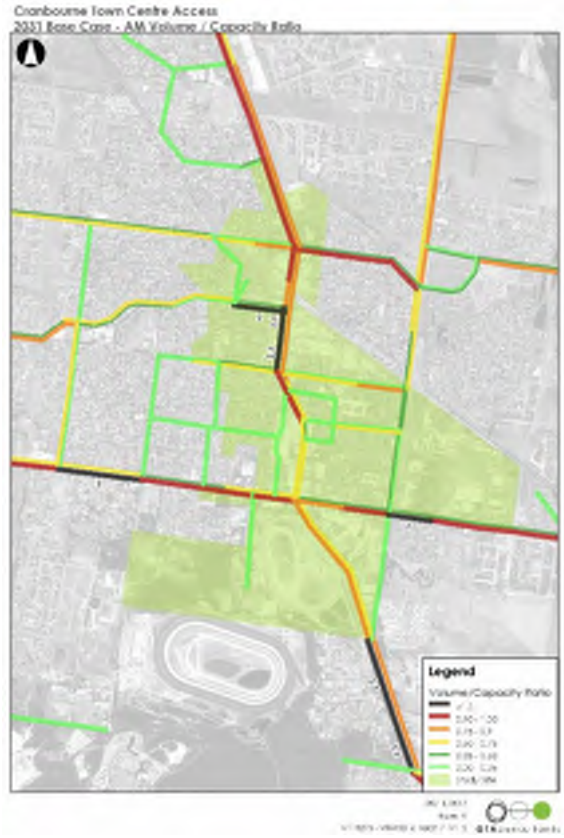
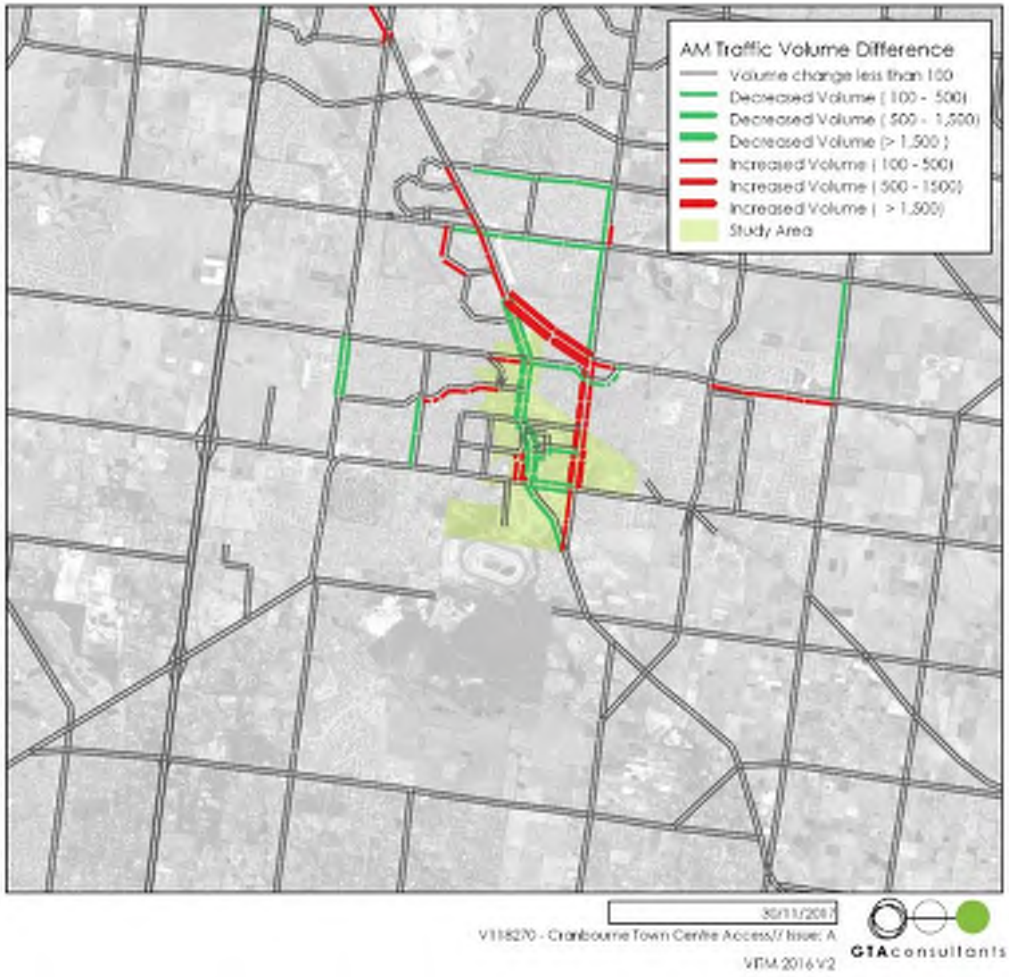


Figure 7.8: Volume Capacity Ratios – AM Peak – 2031 – Basic Interventions (Option 2)

The plots show that even with the reduced capacity provided through the town centre on the South Gippsland Highway the introduction of the capacity increases on Narre Warren Road will attract away the through traffic and result in the benefit of reducing congestion through the town centre.

Figure 7.9 has also been prepared to show the difference in volumes during the AM peak between Option 1 and Option 2 during the two-hour AM peak period, where green represents a reduction in volume and red represents an increase in volume.

Figure 7.9: Difference Plot between Option 1 and Option 2 (AM Peak 2031)



The objective of the network changes in Option 2 appear to be achieved in that they are able to encourage trips reduction in travel on the South Gippsland Highway through the town centre. Of note, the Cranbourne Town Bypass (Northern initiative) between Narre Warren Cranbourne Road and South Gippsland Hwy is not heavily utilised.

When demonstrating the impact of the initiatives on public transport, extracting the boardings on services is the most useful way. Table 7.4 summarises the boardings at railway stations on the Cranbourne line at the stations of Cranbourne Merinda Park and Lynbrook.

Table 7.4: Station Boardings of Cranbourne Merinda Park and Lynbrook in 2031

Option	AM Peak	PM Peak	Daily
	Boarding	Boarding	Boarding
Option 1 – Existing density	8,450	1,270	18,180
Option 2 – Existing density	9,470	1,410	22,020

From this we see an increase in boardings in the AM Peak of around 1,000, and across the day of about an additional 4,000 passengers. This highlights that the network improvements service both peak and non-peak travel.

The value of the Regional PT connections initiative is by having a similar number of daily boardings as the Cranbourne line. Usages of these buses also marginally increased with the enhanced density, with an additional 50 boardings in the AM Peak on the Regional PT connections initiative routes to 4,750, and across the day an increase of 250, to 21,000

7.6 Connected Cranbourne (Option 3) Outcomes

Connected Cranbourne Option (3) builds on Business as Usual Option (1) and a comparison between the two in 2031 has also been undertaken. As previously mentioned, the Volume to Capacity Ratio (VCR), which also correlates to a degree of road saturation metric, is a good indicator as to the operation of the network at the specific link locations.

Figure 7.10 and Figure 7.11 show the Volume to Capacity Ratios on the network for Option 1 and Option 2 respectively.

Figure 7.10: Volume Capacity Ratios – AM Peak – 2031 – Business As Usual (Option 1)

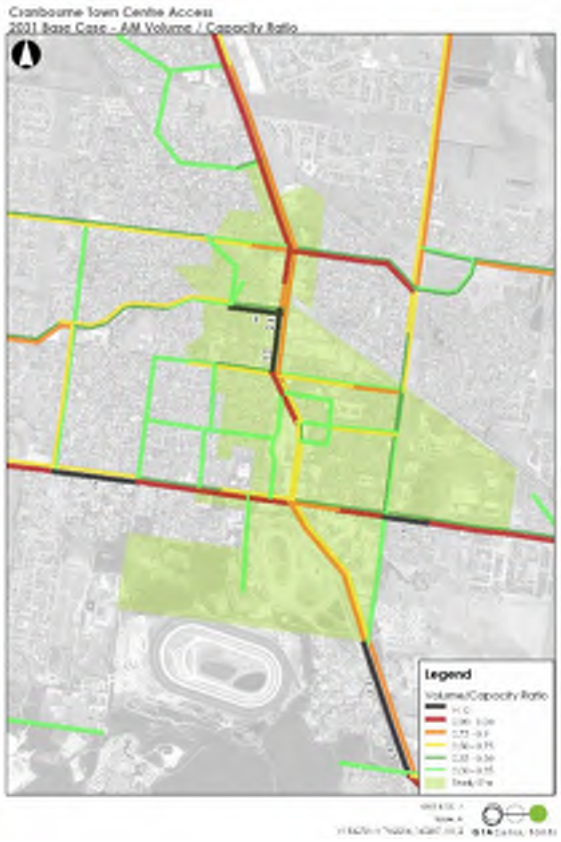
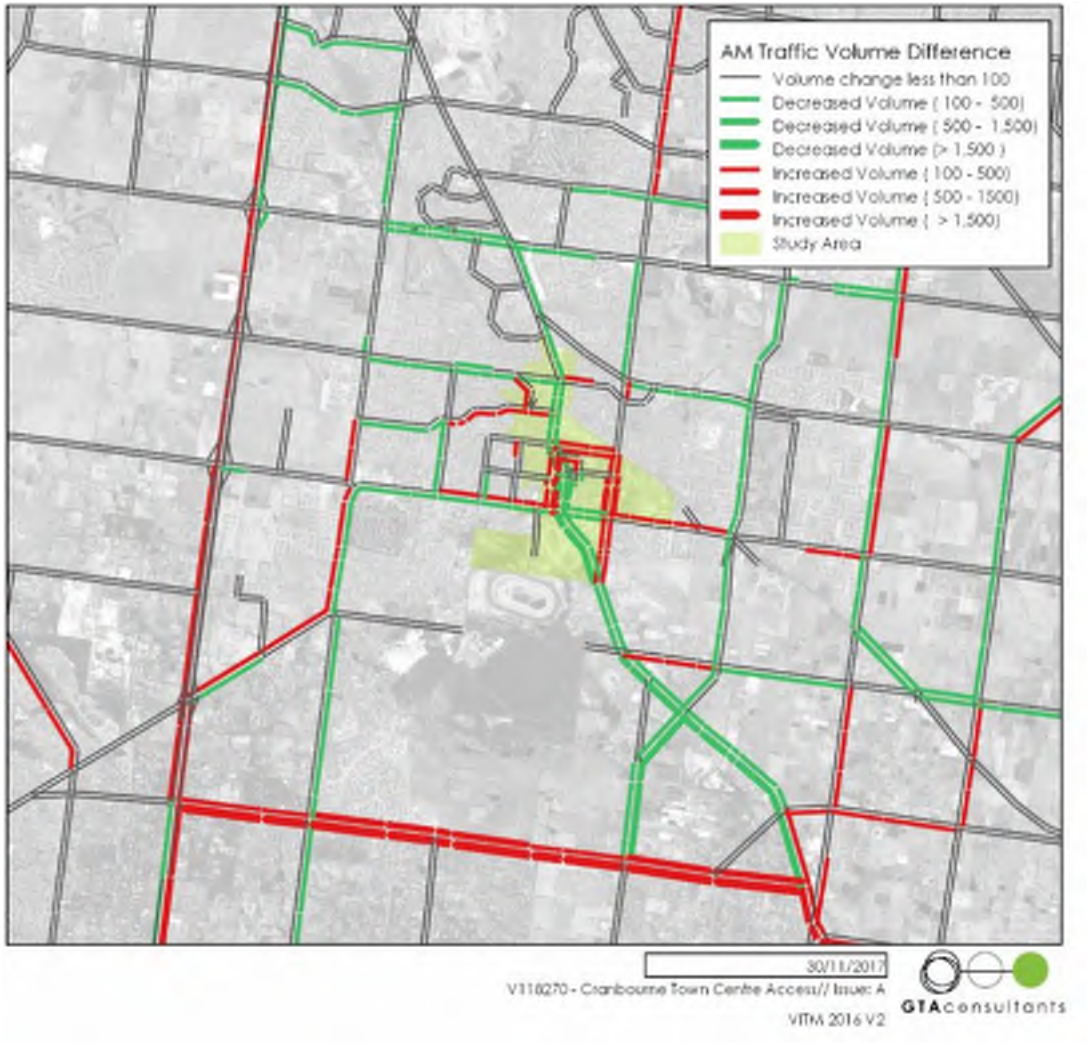


Figure 7.11: Volume Capacity Ratios – AM Peak – 2031 – Connected Cranbourne (Option 3)

The model outputs show a significant improvement in the level of congestion through the town centre as a result of the interventions for a Connected Cranbourne. In particular the low levels of congestion on the South Gippsland Highway in the town centre would result in significant increases in freedom for people to travel and move accordingly.

Figure 7.10 has also been prepared to show the difference in volumes during the AM peak between Option 1 and Option 3 during the two-hour AM peak period, where green represents a reduction in volume and red represents an increase in volume.

Figure 7.12: Difference Plot between Option 1 and Option 3 (AM Peak 2031)



The changes in Option 3 have reduced traffic is additional population and jobs seems to encourage some local trips in the Town Centre with the northern parts of the South Gippsland Highway. The Cranbourne Town Bypass (Southern initiative) between Narre Warren Cranbourne Road and South Gippsland Highway is not in itself adding new traffic. Instead, it acts as an attractor to redistribute traffic from other parts of the network, providing a net improvement to overall operational efficiency.

Table 7.5 summarises the boardings at railway stations on the Cranbourne line at the stations of Cranbourne Merinda Park and Lynbrook.

Table 7.5: Station boardings of Cranbourne Merinda Park and Lynbrook in 2031

Option	AM Peak	PM Peak	Daily
	Boarding	Boarding	Boarding
Option 1 – Existing density (3 stations)	8,450	1,270	18,180
Option 3 – Existing density (5 stations)	10,800	2,210	25,960

The value of the Regional PT connections initiative is by having a similar number of daily boardings as the Cranbourne line. Usages of these buses is around 5,100 boardings in the AM Peak on the Regional PT connections initiative routes and 22,100 across the day. This is an increase of around 1,300 persons.

Option 3 Regional PT connections initiatives also included using potentially available land to build additional lanes dedicated for buses.

Table 7.6 provides a summary of the reductions in travel time in minutes as a result of these lanes. The travel times are compared to Option 2 in this assessment.

Table 7.6: Improvement (Reduction) in Travel Time (mins) from Option 3 to Option 2, 2031 Enhanced Density

Line No.	Route Name	AM Peak	PM Peak
9001	CARRUM TO CLYDE NORTH	1.14	53.05
9001R	CLYDE NORTH TO CARRUM	40.19	6.66
9002	CLAYTON TO DANDENONG SOUTH	6.89	41.32
9002R	DANDENONG SOUTH TO CLAYTON	40.18	9.03
9003	DANDENONG TO MENTONE	4.01	4.01
9003R	MENTONE TO DANDENONG	-0.48	8.52
9004	CHELTENHAM TO NOBLE PARK	1.83	3.95
9004R	NOBLE PARK TO CHELTENHAM	3.24	2.2
9005	SEAFORD TO CRANBOURNE	7.34	38.13
9005R	CRANBOURNE TO SEAFORD	33.63	11.19
9006	CRANBOURNE WEST TO CLYDE	3.51	11.66
9006R	CLYDE TO CRANBOURNE WEST	6.56	4.29
9007	BERWICK TO CRANBOURNE	3.95	7.83
9007R	CRANBOURNE TO BERWICK	6.46	7.96
9008	NARRE WARREN TO CLYDE	5.47	23.93
9008R	CLYDE TO NARRE WARREN	18.41	11.82

The results show that there are some significant time savings for the buses, which has been supported by increase in boardings on these routes. Further work is recommended around the value of these priority measures and the impact on patronage.

8. Key Recommendations

Based on the analysis and discussions presented within this study, many recommendations have been made regarding both the existing transport characteristics of Cranbourne, as well as necessary improvements to accommodate future growth of the study area.

In this regard, Table 8.1 has been prepared to summarise the recommendations and nominate the relevant stakeholders / authorities for each Option.

Table 8.1: Cranbourne Movement and Access Recommendations

Recommendation	Timeframe			Key Stakeholder/ Authority Responsible [1]
	Short Term (0-5 years)	Medium Term (5-15 years)	Long Term (15-30 years)	
Reduce car parking provision and access arrangements for both retail and residential developments to promote walking and cycling.	✓	✓	✓	Council
Council to implement each of the key actions themes (with the assistance of others) for the Infrastructure Options depending on the status of the two key projects out of Council's control.	○	○	✓	Council, VicRoads, Transport for Victoria, PTV
Advocate for the construction of the Cranbourne bypass and the extension of the Cranbourne railway line to East Cranbourne and Clyde.	✓	✓	✓	Council
Council to develop objectives for the future expansion of Cranbourne Park Shopping Centre which achieved improvements in connectivity from Lyall Street to Cranbourne Drive.	○	✓	✓	Council
The cross-section of South Gippsland Highway be modified in the immediate future (two lanes in each direction).	✓	✓	✓	Council, VicRoads
The cross-section of South Gippsland Highway be modified following the completion of the Cranbourne Bypass (one lane in each direction).	○	✓	✓	Council, VicRoads
Amend the current speed limit of 60km/hr on South Gippsland Highway (between Clarendon Street to Sladen Street) to 40km/hr to improve pedestrian amenity and assist with better street tree outcomes. This should be in the form of a variable speed sign.	✓	✓	✓	Council, VicRoads
Develop a strategic cycling network, supported through infrastructure such as cycling lanes, head start boxes and lights, wayfinding signage and end-of-trip facilities. Ensure that all four roads in the vicinity of the study area that make up part of the VicRoads Principal Bicycle Network include these dedicated facilities.	✓	✓	✓	Council
Develop a strategic pedestrian network, supported through infrastructure such as footpaths, pram ramps, street furniture, wayfinding signage and street lighting.	○	✓	✓	Council
Implement several regional bus routes (high frequency with dedicated bus lanes) along primary arterial roads to connect to railway stations activity centres and regions with higher job rates.	○	✓	✓	Council, PTV, VicRoads

Implement several local bus routes within Cranbourne between key areas (such as Cranbourne station, Cranbourne Park Shopping Centre, schools and Casey RACE).	✓	✓	✓	Council

[1] Any Council responsibility could be assisted by GTA Consultants where required.

✓ - works recommended to be undertaken / completed ○ - works to be considered

Appendix A

Calibration and Validation Report

GTAconsultants

Cranbourne Movement and Access Study
Strategic Modelling Report
Calibration and Validation Report

Client // City of Casey
Office // VIC
Reference // V118270
Date // 06/09/17

Cranbourne Movement and Access Study

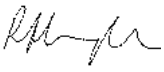
Strategic Modelling

Calibration and Validation Report

Issue: A 06/09/17

Client: City of Casey
Reference: V118270
GTA Consultants Office: VIC

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	06/09/17	Final	Darren Bayfield	Matthew Raisbeck	Reece Humphreys	

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1. Introduction

1.1 Background

Casey City Council has engaged GTA Consultants (GTA) to develop a Movement and Access strategy of the Cranbourne Town Centre. The aims of this strategy are:

- Establish a better understanding of traffic patterns, parking supply and demand as well as opportunities for a more pedestrian friendly movement strategy within the study area.
- Improve mobility and accessibility within the town centre in accordance with the sustainable transport hierarchy of pedestrians/cyclists as first priority, public transport second followed by private vehicles.
- Create a well-connected pedestrian orientated activity centre that can provide safe and clear connectivity to all key destinations.
- Review and improve the quality of public transport access with regards to the existing rail station and bus interchange, and create better linkages to access these public transport facilities.
- Assess the existing road network and intersections within the study area and enhance their functions without compromising on the pedestrian and public transport connectivity.
- Manage congestion and parking demand through appropriate parking controls for future density increase of housing and retail/commercial developments within the study area.
- Promote local area traffic management plans and traffic calming strategies that will enhance traffic safety and support active transport.

The Cranbourne Town Centre has a range of services that provides a range of transport choices for travellers, with good rail and bus provision. Internally, the challenge for the growth and viability of the Cranbourne Town Centre is being able to encourage and promote the movement of people rather than vehicles to maintain strong growth into the future.

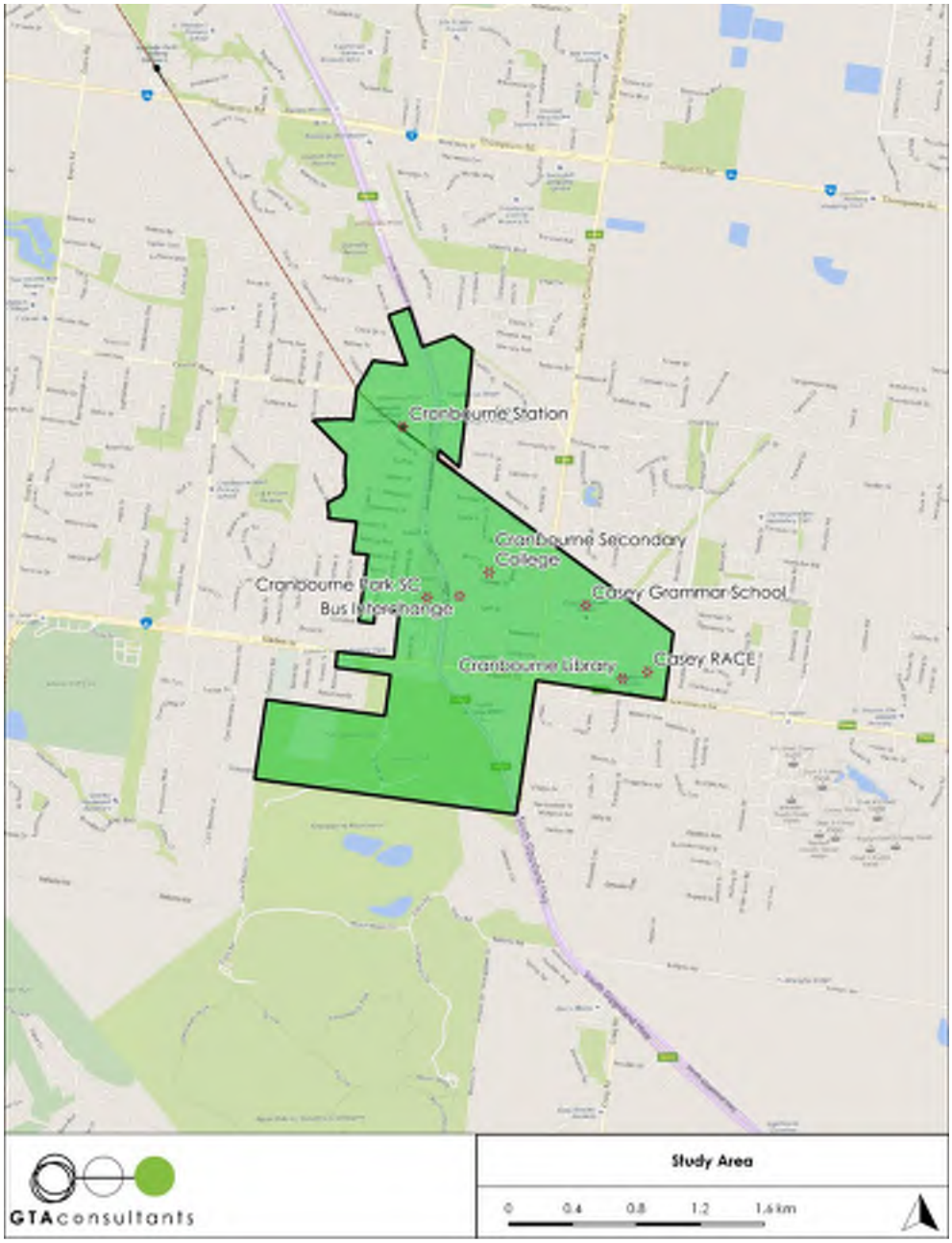
Significant transformation has occurred in Cranbourne, from a local town centre to a major activity centre servicing the growing population and employment demands of the City of Casey. This growth has resulted in a significant transformation of the precinct and its surrounding areas.

From a transport perspective, these changes have resulted in an increase in the number of trips for people wishing to travel to the retail and commercial core. The land use mix enables some trips purposes to be contained within the town centre, whilst more broadly encourage more trips from locally based catchments.

We recognise the importance of understanding the travel patterns both broadly and locally, and have undertaken transport modelling using the Victorian Integrated Transport Model (VITM) to understand the existing travel behaviour and to predict future changes in travel patterns.

The Study area for the movement and access strategy is illustrated is illustrated in Figure 1.1.

Figure 1.1: Study Area



This report has been prepared to provide a summary of the existing conditions VITM modelling approach, and to document the outcomes of the model validation. Further, this report will eventually form a part of the overall VITM modelling assessment providing more detail of option testing of the future scenarios.

1.2 Overview Calibration and Validation Process

Model calibration is a process in which the model inputs are refined to reflect observed conditions. It allows the model to produce travel demands in line with actual measured traffic conditions and public transport usage.

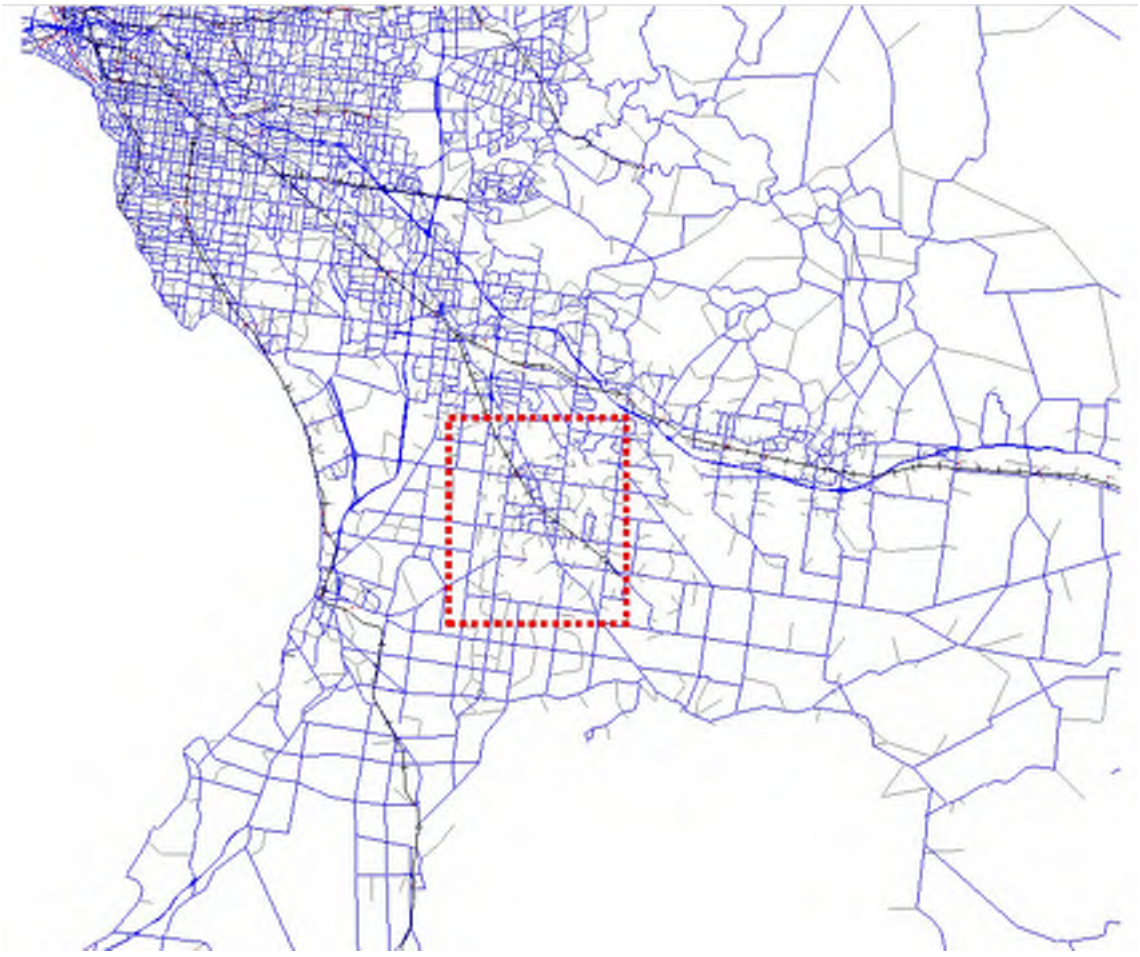
Existing traffic counts are compared to the corresponding modelled link volumes for a current year. Following any model adjustments, the model is rerun and modelled results compared to the traffic counts. This process is repeated until the model results come to a point where they meet a number of calibration criteria (called convergence).

Strategic network models are generally calibrated to reflect existing traffic counts across a wide corridor or regional area. Strategic network models are not expected to accurately match traffic counts at individual locations, instead model calibration is typically measured by comparing counts across a number of locations such as a screenline, and/or a group of counts at a regional level.

Model Calibration and Validation guidelines have been developed by VicRoads for use in strategic modelling work. The document entitled 'Transport Modelling Guidelines, Volume 2: Strategic Modelling (April 2012)' has been used as a reference in this case. This document outlines the model calibration targets for VITM modelled traffic volumes.

These guidelines have been retrofitted to suit the purpose and intention of the study for Cranbourne Movement and Access study. The study area used in the model is shown in Figure 1.2.

Figure 1.2: Strategic Model Area for Cranbourne Movement & Access Strategy



1.3 VITM Overview and Version

The model version that used for this project was obtained from Department of Economic Development, Jobs, Transport and Resources (DEDJTR) in June 2016, version VITM2016_160317_V1_2. This is the latest release of the model from the DEDJTR.

The land use projections incorporated in this model are based on the Victoria in Future 2014 (VIF) projections. The assessment scenarios that will be used in this are as follows:

- 2011 base case, which coincides with the most recent census data available and has been used to validate the model across the entire Melbourne metropolitan area using a comprehensive dataset including link volumes, public transport patronage, household trave survey data and census data. This scenario uses VIF land use and population data for 2011.
- 2016 reference case, this has been used to validate the model in the local area based upon surveys undertaken for the purposes of this project. This scenario uses VIF land use and population data for 2016.
- 2021, 2031 and 2046 future year reference case scenarios, with major highway projects as per the DEDJTR reference case scenarios, and land use and population projections based on VIF2014. These scenarios use VIF land use and population data for the relevant future year.

2. Model Structure

2.1 Methodology

2.1.1 Preamble

Our approach to delivering the strategic model for this study has regard for the technical inputs and broader requirements of the Movement & Access Strategy. It is recognised that an up to date and accurate model of the Cranbourne Town Centre and surrounding area is critical to understand the existing transport conditions. The purpose of the model is to understand the broad level impacts of the forecast land use and development at Cranbourne Town Centre on both the local and arterial road network.

2.1.2 Victorian Integrated Transport Model

The Victorian Integrated Transport Model (VITM) is a tool developed by the Department of Transport (DoT) (now Department of Economic Development Jobs, Transport and Resources (DEDJTR)) to assist in the planning of road and public transport infrastructure in Victoria. VITM is a multimodal strategic model that uses future population, employment and land use data projections to forecast travel behaviour and the impacts of changes to the road and public transport networks. VITM contains all major freeways, main arterials and connector roads within the Melbourne Statistical Division.

The model is a link-based traffic model which is implemented in the CUBE Voyager software environment (developed by Citilabs).

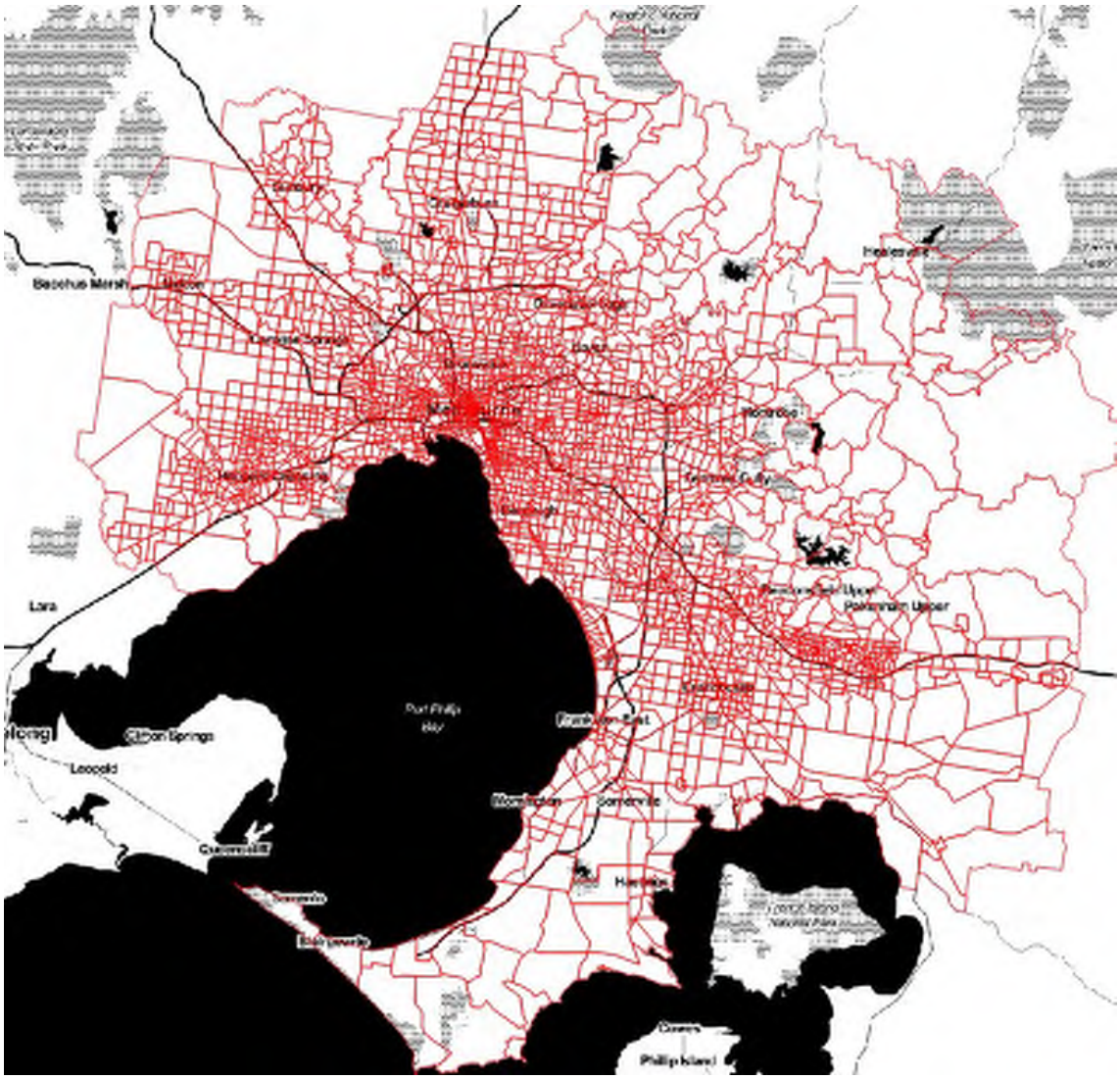
The extent of the VITM network is shown graphically in Figure 2.1

Figure 2.1: VITM Network Extent

2.2 Zone System Refinement

The VITM zone system contains a total of 3098 zones (excluding external zones) which have been developed based on Census Collector Districts (CCD), aggregated or disaggregated where necessary. The zone system for the strategic model study area in the content of the entire VITM extent is shown in Figure 2.2.

Figure 2.2: VITM Zone Structure



For the purpose of this study, zone refinements were undertaken to provide a finer level of detail in the traffic movements within the study precinct.

The zone refinements allow for an improved definition of land use within the study area, and therefore result in a more precise distribution of trips. A detailed map of zone refinements is shown in Figure 2.3 and Figure 2.4.

Figure 2.3: Existing VITM Zone Structure

Figure 2.4: VITM Zone Structure Refinements

The resultant changes to the zone structure are an additional three zones in the study area.

2.3 Road Network Refinement

For the purpose of this study, a full review of all links and zone connectors within the study area was conducted to ensure that they reflect existing road conditions in terms of number of lanes, speeds etc.

This review found that in general the existing network structure within the study area is suitable for the purposes of this study. However, some additional links have been coded to provide a more detailed representation of the highway network within the study area.

The existing and refined VITM highway networks are illustrated in the figures below.

Figure 2.5: Existing VITM road network and connectors

Figure 2.6: Refined VITM road network and connectors

Figure 2.7: Existing VITM Link Classes

Figure 2.8: VITM Link Classes Refinements

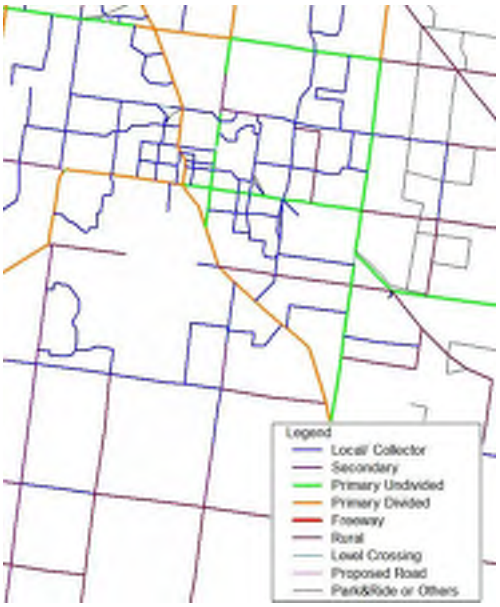


Figure 2.9: Existing VITM: Number of Road Lanes

Figure 2.10: Refined VITM: Number of Road Lanes

Figure 2.11: Existing VITM: Posted Speeds

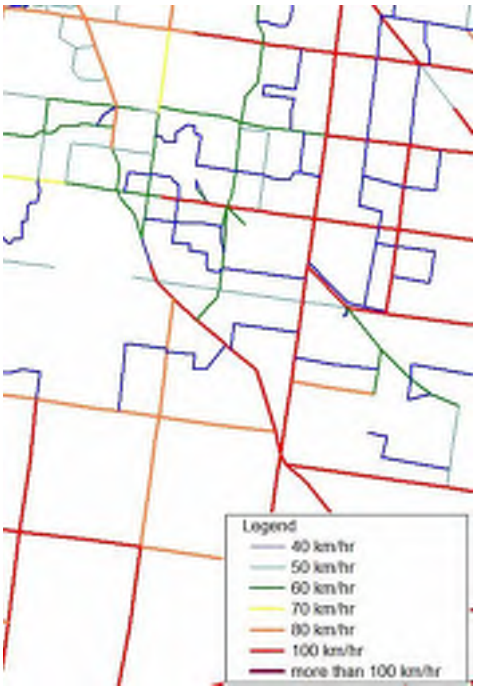
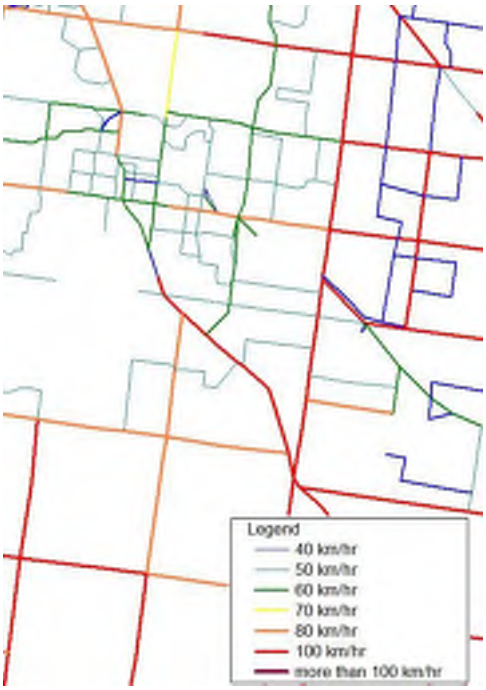


Figure 2.12: Refined VITM: Posted Speeds



2.4 Model Calibration and Validation

Model calibration is a process in which the model inputs are refined to reflect observed conditions. It allows the model to produce travel demands in line with actual measured traffic conditions.

Existing traffic counts are compared to the corresponding modelled link volumes after each model assignment. Following any link adjustments, the model demands are once again assigned and modelled results compared to the traffic counts. This process is repeated until the model results converge to a point where they meet a number of calibration criteria.

Strategic network models are generally calibrated to reflect existing traffic counts across a wide corridor or regional area. Strategic network models are not expected to accurately match traffic counts at individual locations, instead model calibration is typically measured by comparing counts across a number of locations such as a screen line, and/or a group of counts at a regional level.

For the purposes of this study a two-stage calibration and validation process has been undertaken:

- The validation of the full model is checked for the 2011 VITM base year to confirm the suitability of the model as a tool to assess travel behaviour across the whole Melbourne Statistical District, this year has been selected as it is the most recent year that a there is a consolidated set of traffic volumes available across the full modelled area and is the most recent year for which Census data is available; and
- A local validation has been carried out for the study area using the 2016 reference case model to ensure that the model accurately reflects the existing travel behaviour as observed in the surveys undertaken for this project.

3. Transport Data Collection

3.1 Data Sources

Extensive transport data collection has been undertaken to help with the existing conditions models prepared as part of this study accurately reflects the current operation of the road network. Table 3.1 summarises the transport data collected with the locations of the traffic counts illustrated in Figure 3.1 and Figure 3.2.

Table 3.1: Transport Data Collection Summary

Data Type	Source	Survey Date(s)	Survey Times	Description
Classified Turn Counts	MATRIX	Fri 17 and Sat 18 March 2017	Peak Periods	Surveys at key locations shown in Figure 3.1 and 3.2.
SCATS Traffic Volumes	VicRoads	Mon 13 to Sat 18 February 2017	24 hours data	SCATS traffic volume data requested at all signalised intersections within the wider study area. It is noted that some data is missing as a result of faults at some sites.
Car parking demand surveys	MATRIX	Fri 24 and Saturday 25 March	AM Peak, PM Peak. Interpeak and Saturday Peak periods	Car parking demand surveys (broken up into various zones) and development of an existing car parking demand model for each dominant land use specified in the SGS Economic Assessment.
Site Inspection	GTA	February 2017	AM Peak, PM Peak. Interpeak and Saturday Peak periods	Site inspection to get an enhanced understanding of existing traffic and transport travel behaviours and any exiting issues

Figure 3.1: Transport Data Collection Locations – AM Traffic Volumes (Two-Hours)

Figure 3.2: Transport Data Collection Locations – PM Traffic Volumes (Two-Hours)

4. Full VITM 2011 Base Case Calibration and Validation

4.1 2011 Base Case Calibration and Validation

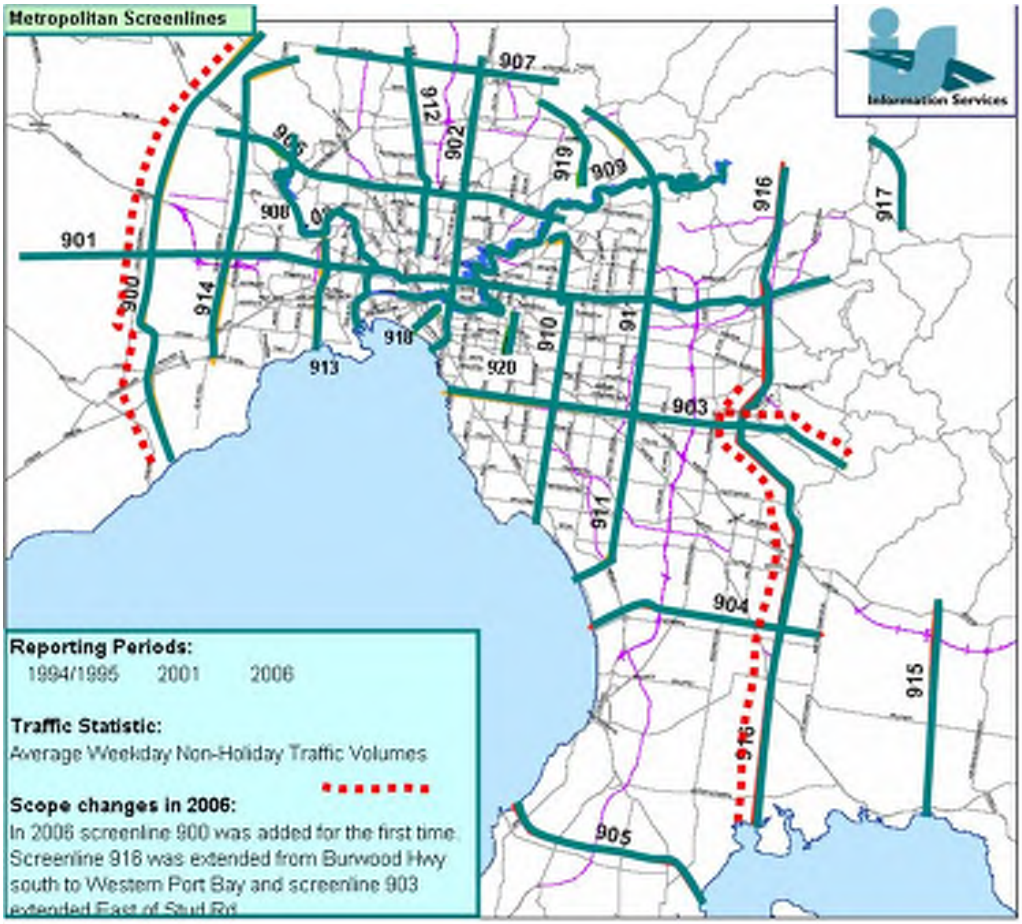
This section of the report describes the model validation results which are used to assess whether the model can satisfactorily represent the observed traffic patterns for 2011. The criteria and checks adopted have been based on those recommended in the VicRoads guidelines titled the VicRoads Guidelines: 'Transport Modelling Guidelines- Strategic Modelling – Volume 2'. The model validation checks that have been undertaken included comparisons of surveyed and modelled Screenline traffic volumes, assignment convergence, tip length distribution and Traffic volumes for individual road links. This base case validation has been carried out for the full Melbourne Statistical District (MSD) using historical 2011 consolidated traffic count data set for the purposes of validation and calibration of the model, historic traffic count data was obtained from VicRoads.

This section has been included as the VITM model used is the full metropolitan model, that is no sub area model had been developed for this project. This approach reflects that based on Census data and household travel surveys, a significant number of people the travel beyond the Council boundaries each day for work. Therefore, the model is needs to be suitable for planning and assessing potential transport options to get residents to their destination. However, as this is outside the projects immediate study area and project scope, there has not been a review of the network outside Cranbourne.

4.2 Screenline validation

VicRoads have previously developed a number of Screenlines within the MSD that have been used to validate the 2011 Base Case. These Screenlines are illustrated in Figure 4.1.

Figure 4.1: VicRoads Screenline Locations



The VicRoads screenline traffic volumes have been compared to the modelled traffic volumes in VITM. A comparison of the observed volumes and the VITM 2011 base case modelled volumes are summarised in Table 4.1.

Table 4.1: Surveyed Traffic Count Data and Modelled Data Summary

Assessment Measure	Observed Screenline Volume	VITM Modelled Screenline Volume	Difference
Screenlines Volumes (all Screenlines) 2hr AM peak	1,561,149	1,559,301	-0.1%
Screenlines Volumes (all Screenlines) 2hr Interpeak period	3,546,025	3,403,407	-4.0%
Screenlines Volumes (all Screenlines) 2hr PM peak	2,479,653	2,462,356	-0.7%
Screenlines Volumes (all Screenlines) 2hr Off-peak period peak	3,140,731	2,902,478	-7.6%

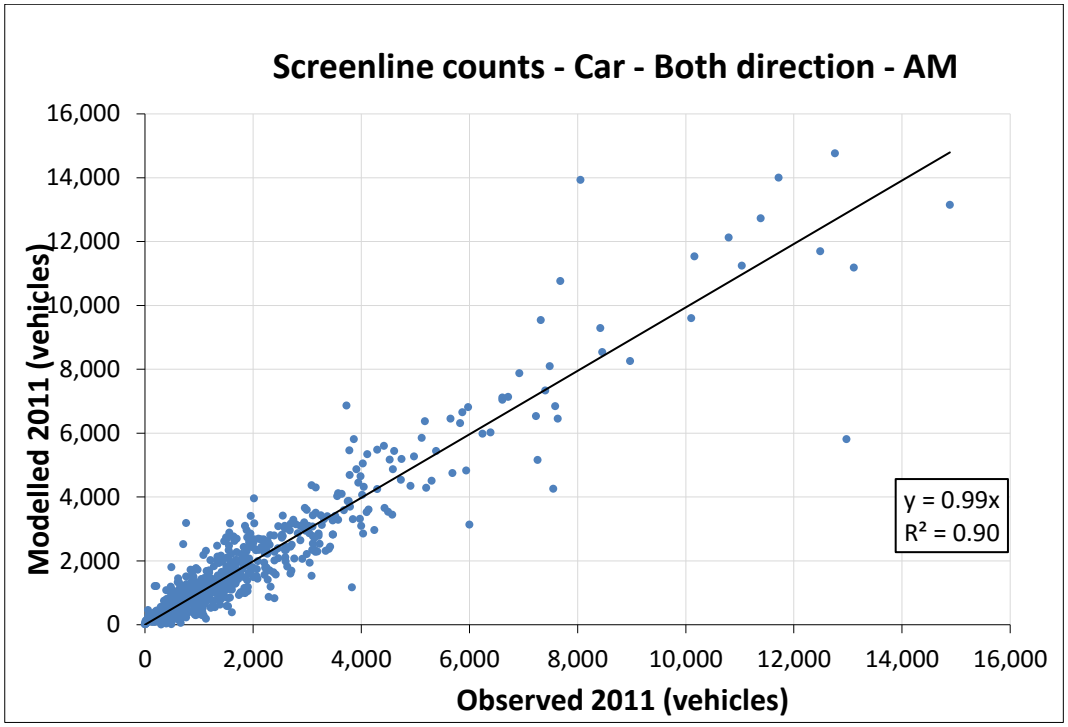
This demonstrates that all peak periods in the 2016 VITM version compare well to the surveyed screenline volumes for the 2011 base year.

The screen line volumes for the AM peak period and the Scatter plots for the observed and modelled link volumes are presented in Table 4.2 and Figure 4.2 respectively.

Table 4.2: AM Peak Period Screenline Volume Analysis

Screenline	Observed inbound	Basecase inbound	Difference	Observed outbound	Basecase outbound	Difference
899	6,942	8,201	18%	3,689	5,460	48%
900	32,865	33,838	3%	16,616	20,890	26%
901	93,596	92,524	-1%	66,547	76,104	14%
902	80,632	80,161	-1%	50,526	53,872	7%
903	64,525	59,612	-8%	48,820	46,461	-5%
904	25,402	21,354	-16%	14,751	15,878	8%
905	9,493	8,212	-13%	6,704	5,544	-17%
906	73,765	75,908	3%	55,146	56,952	3%
907	23,007	22,606	-2%	18,412	17,247	-6%
908	41,965	49,279	17%	28,836	31,704	10%
909	70,364	80,240	14%	63,682	58,095	-9%
910	70,408	62,083	-12%	44,336	40,584	-8%
911	98,491	86,130	-13%	54,650	54,947	1%
912	29,777	23,584	-21%	25,828	24,240	-6%
913	29,320	33,127	13%	19,444	18,246	-6%
914	49,770	54,587	10%	24,691	28,236	14%
915	11,004	10,990	0%	6,971	8,473	22%
916	56,964	51,113	-10%	30,563	33,070	8%
917	2,773	2,209	-20%	1,361	1,296	-5%
918	22,161	18,798	-15%	12,246	13,782	13%
919	19,055	15,323	-20%	7,838	8,758	12%
920	29,741	24,825	-17%	17,472	15,888	-9%
Total	**942,020**	**914,706**	**-3%**	**619,129**	**635,726**	**3%**

Figure 4.2: AM Scatter Plot



These indicate that there is good correlation between the observed and modelled data during the AM peak period.

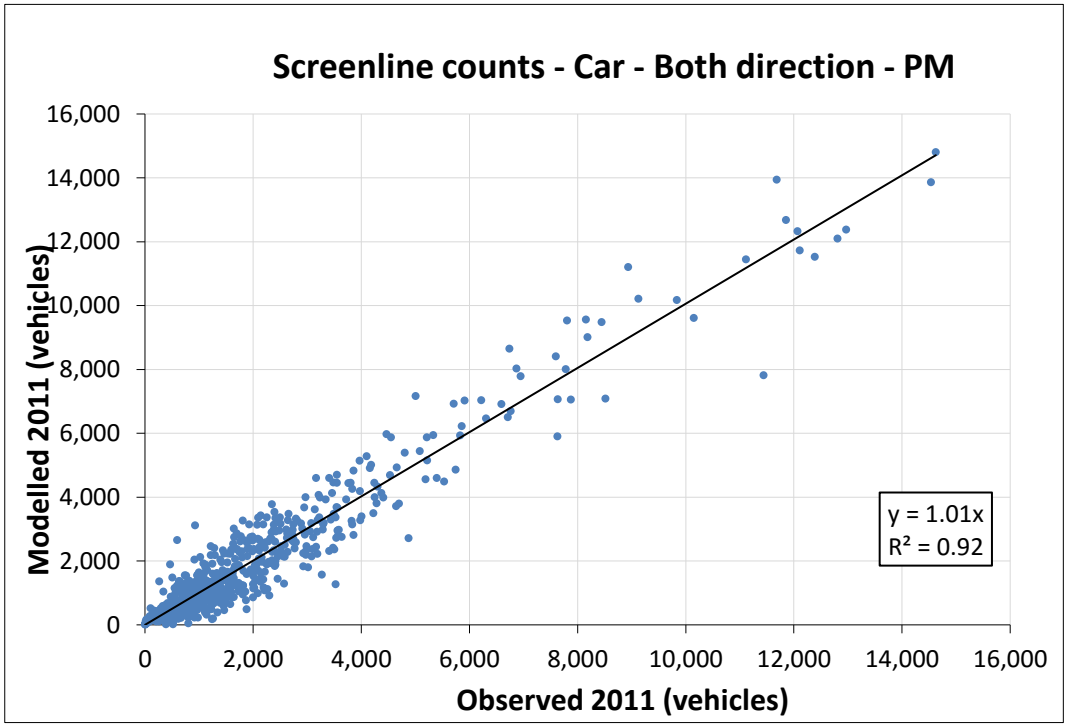
The screen line volumes for the PM peak period and the scatter plot for the observed and modelled link volumes are presented in Table 4.3Table 4.2 and Figure 4.3 respectively.

Table 4.3: PM Peak Period Screenline Volume Analysis

Screenline	Observed inbound	Basecase inbound	Difference	Observed outbound	Basecase outbound	Difference
899	6,608	8,252	25%	11,325	12,878	14%
900	29,111	35,229	21%	53,477	52,256	-2%
901	119,153	123,250	3%	144,507	144,274	0%
902	81,385	87,596	8%	116,059	120,127	4%
903	80,901	77,878	-4%	93,674	89,915	-4%
904	25,315	26,384	4%	40,869	33,546	-18%
905	12,856	10,468	-19%	15,752	13,333	-15%
906	90,528	92,377	2%	114,737	114,274	0%
907	32,743	27,969	-15%	37,970	37,552	-1%
908	46,692	51,917	11%	70,683	76,212	8%
909	95,939	96,657	1%	105,054	114,531	9%
910	76,556	71,464	-7%	97,987	91,177	-7%

Screenline	Observed inbound	Basecase inbound	Difference	Observed outbound	Basecase outbound	Difference
911	94,121	95,010	1%	144,633	132,644	-8%
912	41,317	37,942	-8%	47,761	38,513	-19%
913	36,056	31,311	-13%	46,783	47,472	1%
914	44,316	50,756	15%	78,964	80,660	2%
915	13,274	14,588	10%	18,615	18,580	0%
916	60,097	59,222	-1%	90,459	79,965	-12%
917	2,868	2,392	-17%	4,402	3,400	-23%
918	20,026	21,869	9%	27,337	27,145	-1%
919	17,080	17,307	1%	22,765	18,220	-20%
920	29,497	27,559	-7%	39,401	34,926	-11%
Total	**1,056,439**	**1,067,397**	**1%**	**1,423,214**	**1,381,599**	**-3%**

Figure 4.3: PM Scatter Plot



These demonstrate that there is a strong correlation between the observed and modelled traffic volumes.

The results of the screenline counts regression analysis against the targets set in the guidelines are shown in Table 4.4, and demonstrate that the criteria are met for the AM and PM peak periods

Table 4.4: AM & PM Peak Validation Summary – Scatter Plots

No	Parameter	GTA Model		Requirement	Within Criteria
		AM	PM		
1	The Slope of Best-Fit Regression Line	0.99	1.01	0.9 to 1.1	✓
2	Coefficient of Determination (R^2)	0.90	0.92	Greater than 0.9	✓

4.3 Assignment Convergence

The following criteria are required to be satisfied under the VicRoads guidelines:

- RGAP: Relative difference between the costs along the chosen routes and those along the minimum cost routes, summed across the whole network, and expressed as a percentage of the minimum costs (also referred to as 'Delta' or the Duality Gap).
- Average absolute difference in link flows between successive iterations.
- Relative average absolute difference in link flows between successive iteration.
- Pdiff: Percentage of links whose change in volumes between iterations is less than a set value.

The results of the assignment convergence validation against the targets set out in the guidelines are shown on Table 4.5, indicating that the criteria are met.

Table 4.5: AM & PM Peak Validation Summary - Assignment Convergence

No	Parameter	GTA Model		Requirement	Within Criteria
		AM	PM		
1	RGAP	1%	1%	<1%	✓
	And one of the following (stability)				
2	RAAD	0.5%	0.5%	<1%	✓
3	AAD	0.5	0.5	<1 Veh/h	✓
4	Pdiff	1	1	>95%	✓

4.4 Feedback Convergence

The VicRoads guidelines recommended either of the following two statistics to be used to test for feedback convergence:

- the percent root mean square error for travel time or link flow, or
- the maximum GEH for link flows.

Given that the guidelines do not require stopping criteria to be adhered to, Figure 4.4 illustrates the results of the convergence feedback process between assignment and distribution of the maximum GEH for link flows.

Figure 4.4: Test Convergence - Change of Max GEH with Feedback Cycle

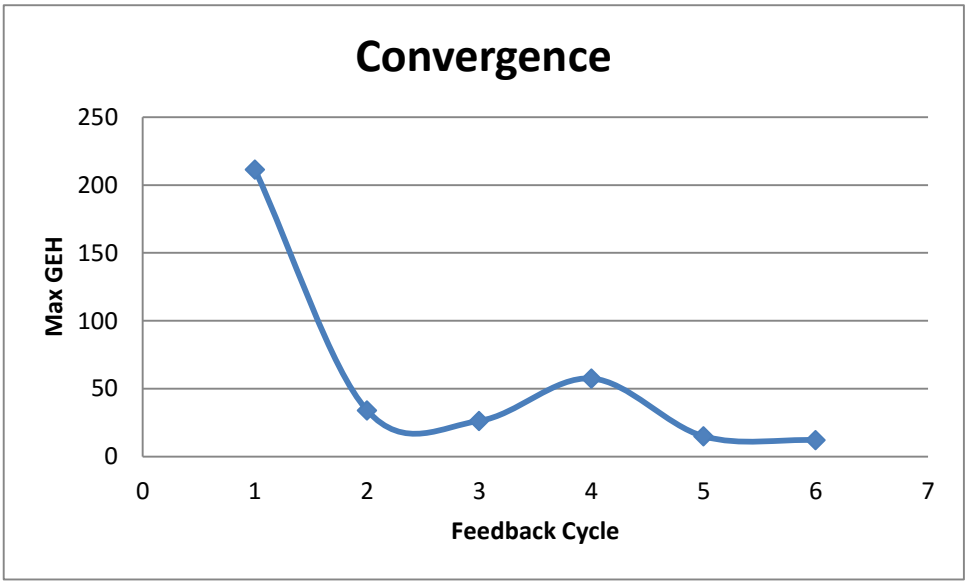


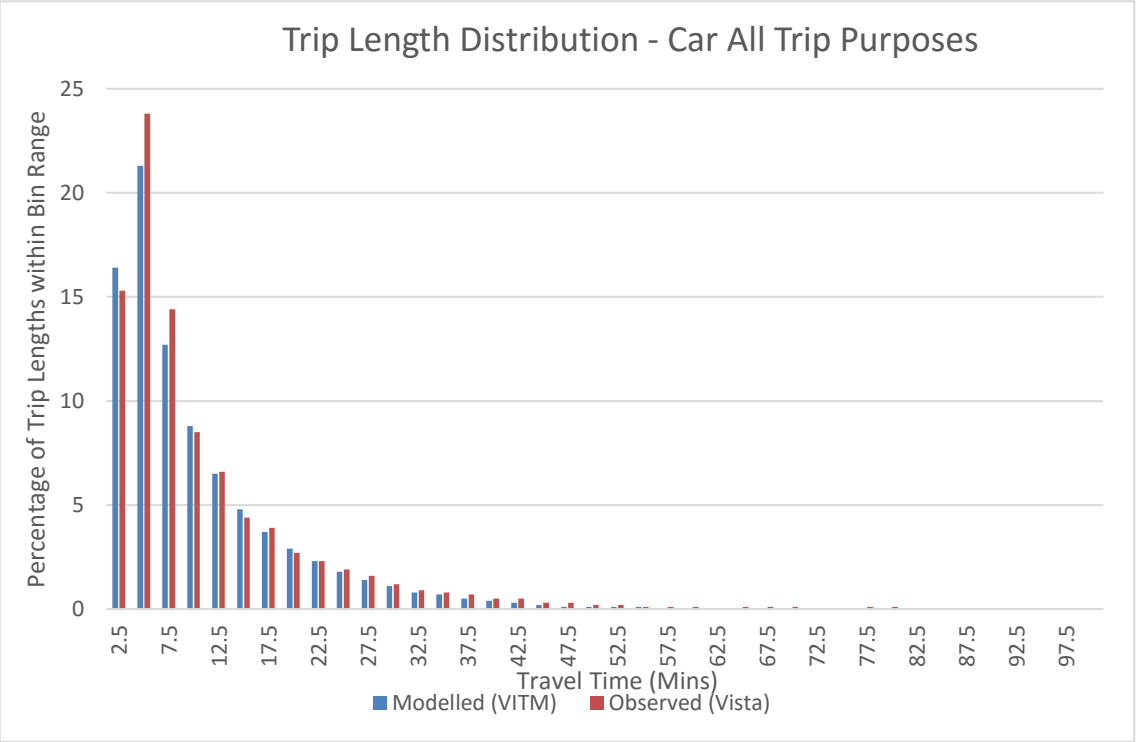
Figure 5.1 illustrates that the maximum GEH for link flows stabilises after the fourth feedback cycle and continues to reduce to the acceptable criteria.

The acceptance target in this criterion as stated in the **transport modelling guidelines from VicRoads**, page 4 "*Previous work has shown that convergence is very slow to achieve using these stopping criteria. Therefore VicRoads, at present requires no stopping criteria to be adhered to. However, a convergent feedback process between assignment and distribution is required, and reporting on one of the above convergence measures for each feedback cycle is required*".

4.5 Trip Length Distribution

The trip length distribution produced by VITM2016 have been extracted for car trips and compared to the Trip Length Distribution from the VISTA surveys. These are presented in Figure 4.5.

Figure 4.5: Trip Length Distribution – All Trip Purposes - Car



This figure demonstrates that there is a good correlation between the observed and modelled trip lengths.

4.6 Summary

The VITM model has been calibrated and validated satisfactorily across the network. The outcomes of the GTA calibration and validation checks show that VITM has been satisfactorily calibrated and validated at a network wide level and hence is suitable for use as the basis to proceed with a local validation for Cranbourne Town Centre.

5. Local Area Validation

5.1 Introduction

Whilst the model shows strong correlation at a regional level, it is important that the within the Cranbourne town centre the model has a strong correlation to the observed conditions. This section sets out the level of correlation (validation) for the study area for the 2016 reference case model to the observed conditions in the study area[1]. This validation assesses the peak periods and private vehicles, reflecting the project's focus.

5.2 VicRoads Validation Criteria

The VicRoads guidelines for the validation of strategic models require three main criteria to be met as follows:

- Percent Root Mean Square Error (%RMSE),
- Coefficient of Determination (R2),
- The Slope of Best-Fit Regression Line.

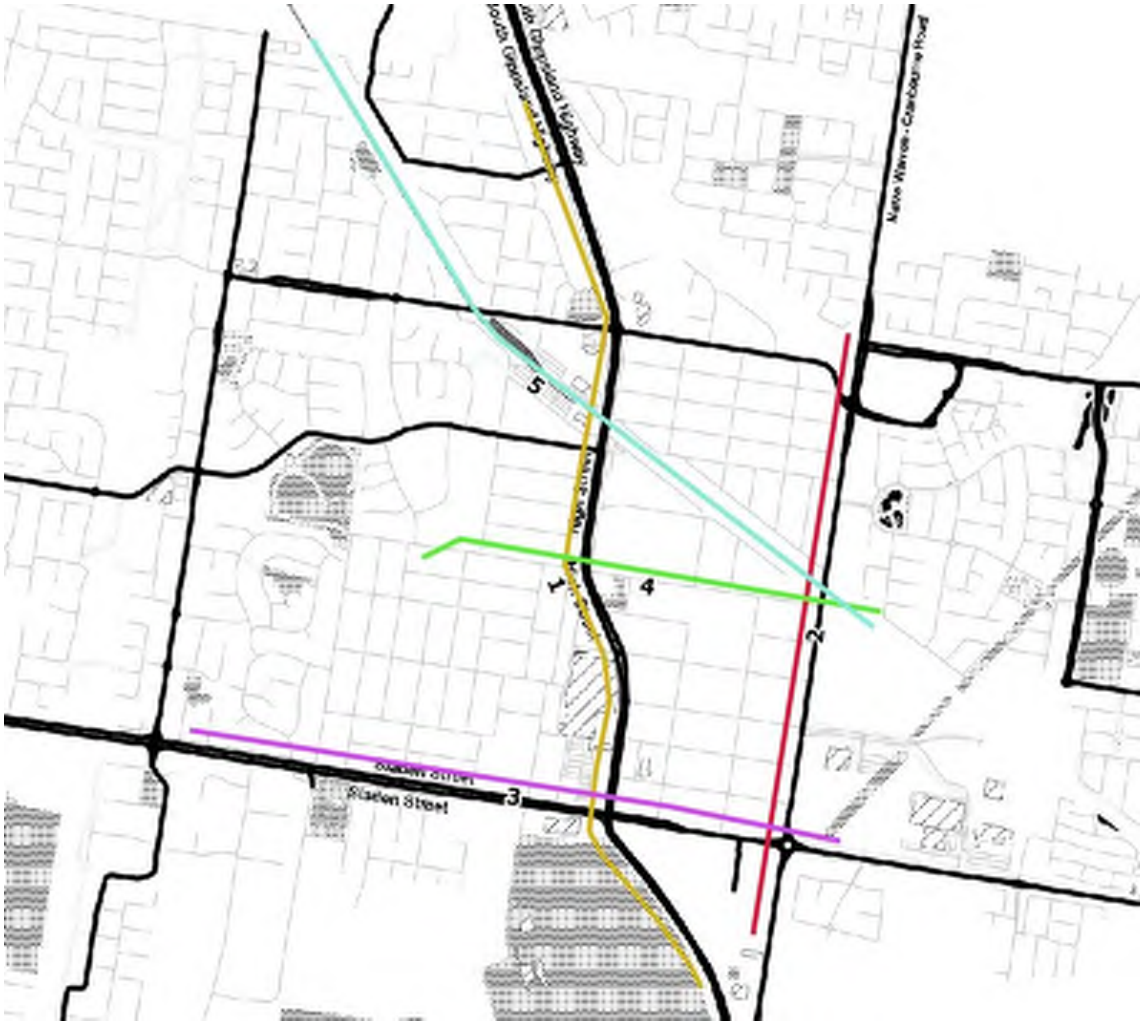
Further discussion on the criteria is set out in the following sub-sections

5.3 Local Screenlines

Screenlines represent imaginary lines which cross a number of roads in a traffic corridor. Two north-south screenlines and two east-west Screenlines, in addition to a screenline following the alignment of the Rail line were adopted for the purposes of model validation. The locations of the screenlines are shown in Figure 5.1.

[1] The road and PT network of 2016 reference case model has been updated to reflect current conditions.

Figure 5.1: Local Area Screenline Locations



A comparison of the AM and PM peak surveyed and modelled screenline traffic Inbound and Outbound volumes is shown in Figure 5.2 to Figure 5.5 respectively.

Figure 5.2: AM Peak Period Screenline Validation (Inbound Direction)

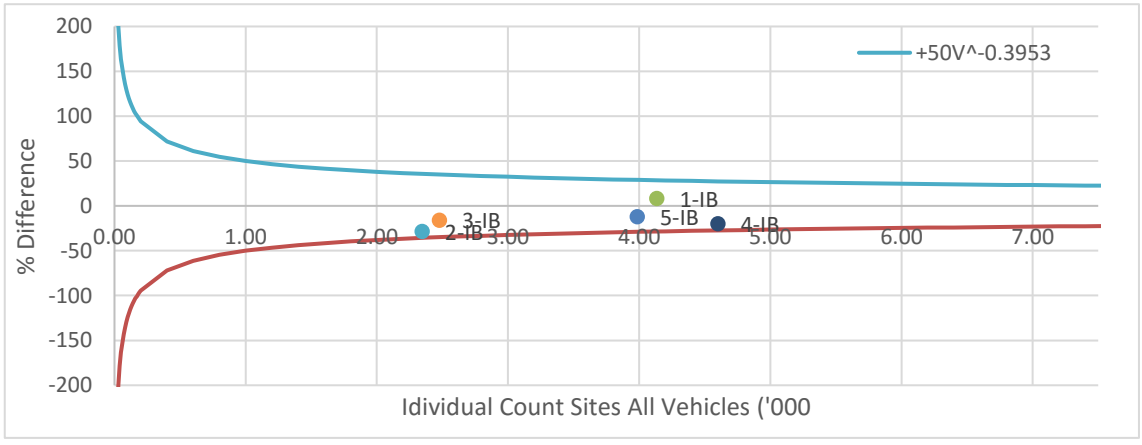


Figure 5.3: AM Peak Period Screenline Validation (Outbound Direction)

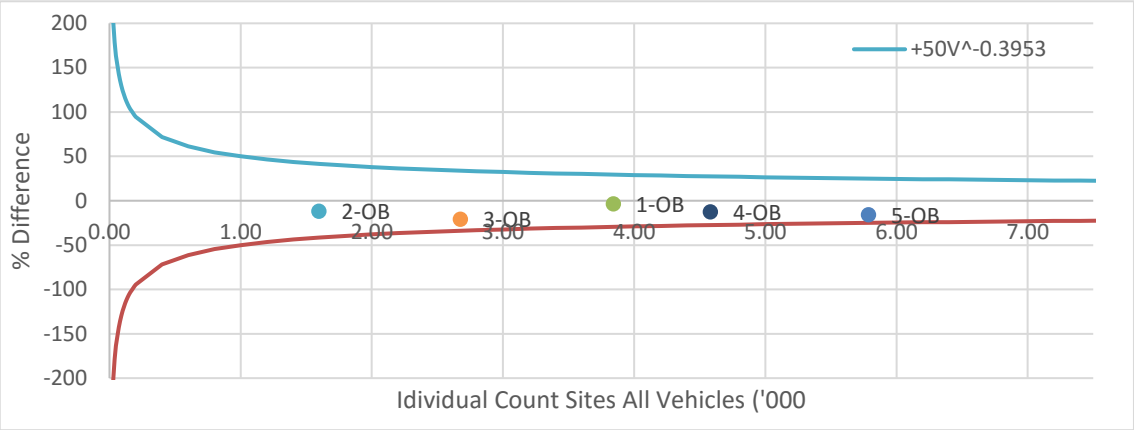


Figure 5.4: PM Peak Period Screenline Validation (Inbound Direction)

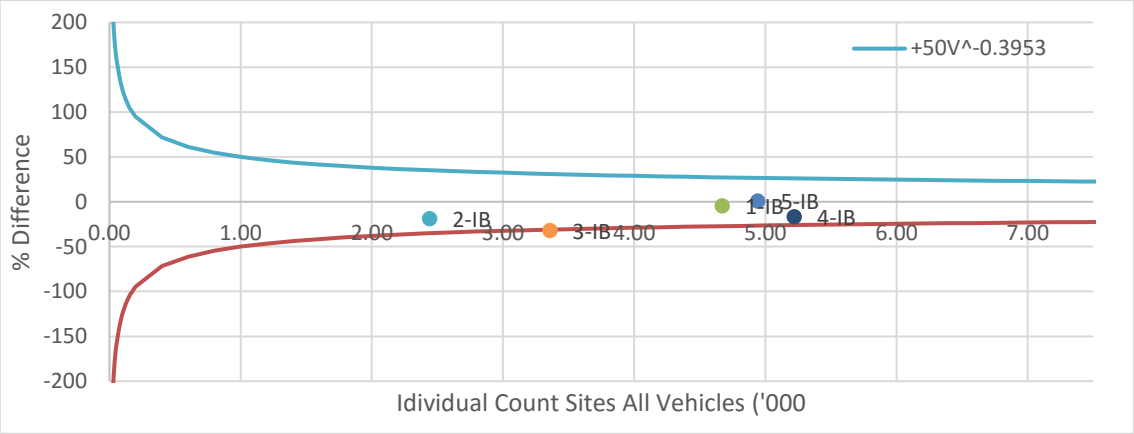
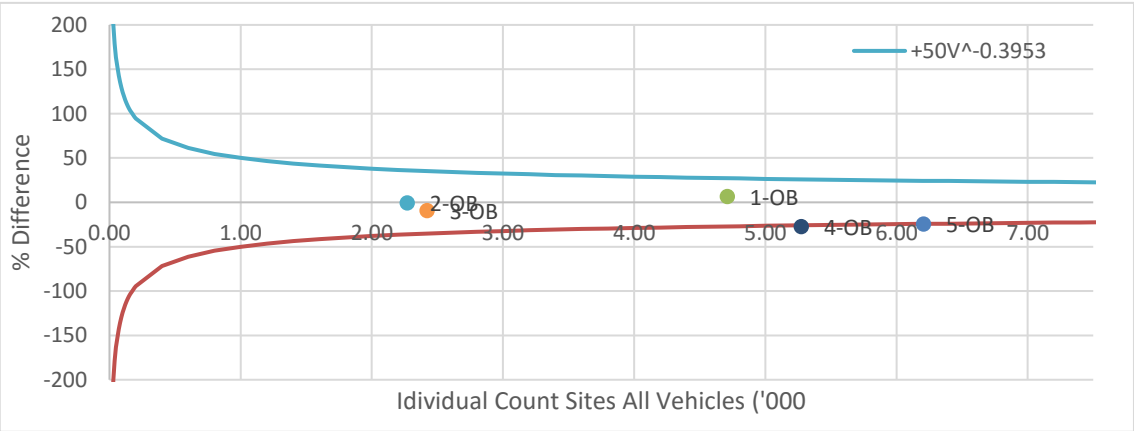


Figure 5.5: PM Peak Period Screenline Validation (Outbound Direction)



The transport modelling guidelines stipulate that the acceptable performance criteria for the two-hour peak periods should be within + or 1 * 50 $V^{-0.3959}$% of the observed volume on all screenlines. Where V is the two-hour volume crossing the screenline expressed in thousands. Figure 5.2 to Figure 5.5 demonstrate that the inbound and outbound flows for all of the screenlines are within the Power function parameters. Table 5.1summarises the performance of the model against the power function criteria.

Table 5.1: AM & PM Peak Validation Summary - Assignment Convergence

No	Parameter	GTA Model		Requirement	Within Criteria
		AM	PM		
1	Inbound Screenlines	5 of 5	5 of 5	All Screenlines within Powerfunction	✓
2	Outbound Screenlines	5 of 5	5 of 5	All Screenlines within Power function	✓

5.4 Individual Count Locations

5.4.1 Coefficient of Determination (R2)

The Coefficient of Determination (R-Squared) is used in the validation process as it is a measure of the correlation between modelled flows and count volumes in the form of a linear trend line. Although the R-Squared value is an efficient means of expressing correlation between two sets of data, it is not sufficient to use the R-Squared as the only method of validation as it is possible for the modelled flows to be well above or below measured counts and still produce a strong linear correlation. The R-Squared value is defined as:

$$r = \frac{\sum(C - \bar{C})(M - \bar{M})}{\sqrt{\sum(C - \bar{C})^2 \sum(M - \bar{M})^2}}$$

Where:

r is the Coefficient of Determination (R-Squared)

M is the modelled one-way link volume (peak period)

C is the observed one-way link volume (peak period)

Although the industry standard R-squared target for strategic models is a value above 0.88, the VicRoads guideline states that models should be validated to have an R-Squared value above 0.90.

5.4.2 Scatter Plots

Figure 5.6 and Figure 5.7 present AM and PM comparison between surveyed and modelled traffic volumes for all local traffic counts. Each plot shows the best fit regression line and the coefficient of determination (RSQ). The VicRoads guidelines set out targets for slope of the best fit regression line between 0.9 and 1.1 and greater than or equal to 0.90 for RSQ.

Figure 5.6: Modelled vs. Observed Traffic for all Traffic Counts (AM 2 hours)

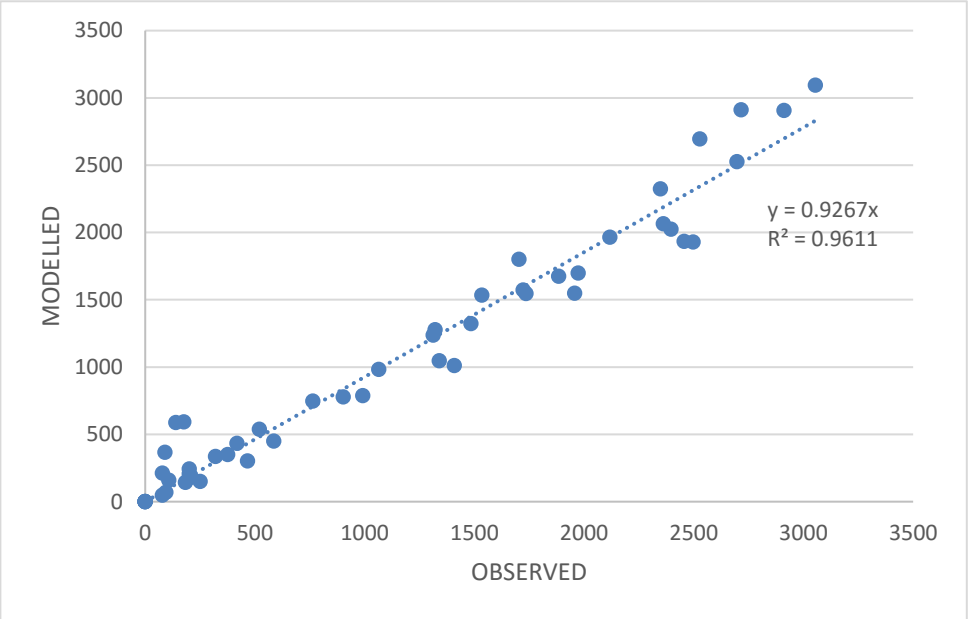
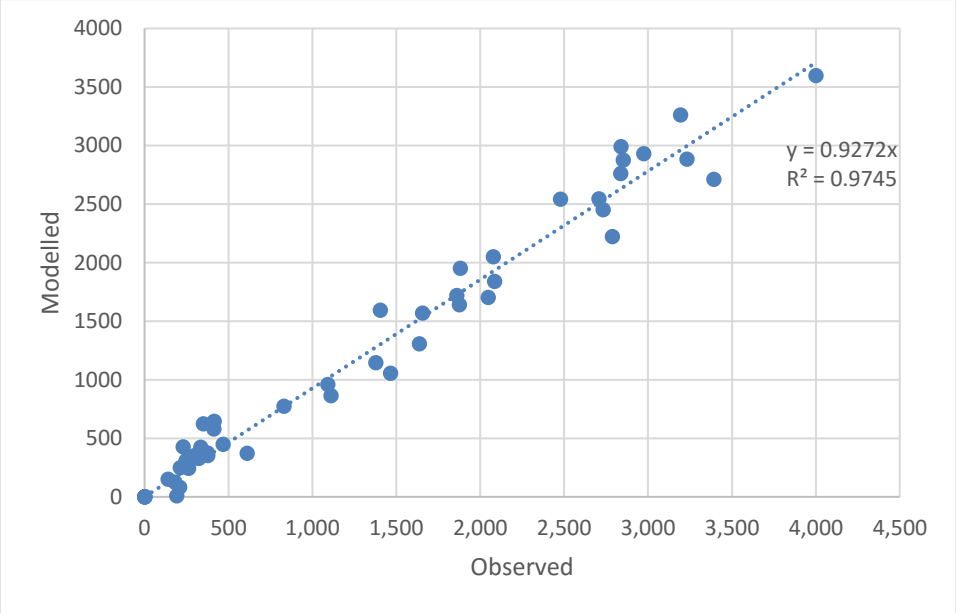


Figure 5.7: Modelled vs. Observed Traffic for all Traffic Counts (PM 2 hours)



The results presented in Figure 5.6 and Figure 5.7 illustrate that modelled traffic volumes meet the slope of best-fit regression criteria and the coefficient of determination (R-Squared) for both the AM and PM peak periods. This is summarised in Table 5.2.

Table 5.2: AM & PM Peak Validation Summary – Scatter Plots

No	Parameter	GTA Model		Requirement	Within Criteria
		AM	PM		
1	The Slope of Best-Fit Regression Line	1.003	0.972	0.9 to 1.1	✓
2	Coefficient of Determination (R^2)	0.970	0.983	Greater than 0.9	✓

5.5 Road Travel Times

For this project, no observed travel times were collected. Therefore, travel times from Google Maps were collected, over the time periods of the AM and PM Peak to reflect the multiple sampling required in the VicRoads guidelines. Reflecting this method, we have provided an observed range and made a value judgement on its fitness for purpose.

Table 5.3 shows the AM and PM Peak travel times observed and the modelled. For Berwick-Cranbourne Rd, the modelled travel times are within the range of observed travel times for all time periods and directions are. At Narre Warren - Cranbourne Rd three out of four are within the range observed travel time range. However, at South Gippsland Hwy one out of four are within the range observed travel time range. This potential reflects the pedestrian signals, parking bays and other road network features.

Table 5.3: AM & PM Peak Validation – Road Travel Times

Road	Start / End Point	Peak	Observed (mins) (by Direction)		Modelled (mins) (by Direction)	
South Gippsland HWY	Sladen St to Thompsons Rd		NB	SB	NB	SB
		AM	4-8	4-6	4.3	4.3
		PM	4-9	4-9	5.0	4.8
Narre Warren - Cranbourne Rd	Sladen St to Linsell Blvd		NB	SB	NB	SB
		AM	3	3-7	2.7	3.0
		PM	3-4	4	3.1	2.9
Narre Warren - Cranbourne Rd	Sladen St to Thompsons Rd		NB	SB	NB	SB
		AM	4-7	4-8	5.2	5.3
		PM	4-9	4-8	5.9	5.7
Berwick-Cranbourne Rd / Cranbourne-Frankston Rd	Casey Fields Blvd, to Monahans Rd		EB	WB	EB	WB
		AM	4-10	6-12	5.1	6.8
		PM	4-8	6-12	7.1	5.7

Note: NB: Northbound, SB, Southbound, EB: Eastbound, WB: Westbound

The results show that the modelled travel times match the observed and meet the requirements of the guidelines.

5.6 The Need For Further Refinements

As the results of the validation at a strategic and local level were reasonable, further refinements of the network were not required for the modelled demand flows, a process that is called matrix estimation. The outcome of not undertaking matrix estimation means that it allows the model to be used for future scenario testing without a step of refining the demand flows.

6. Summary of VITM Validation Results

6.1 Conclusions

The VITM model for the Cranbourne Movement and Access Study has been refined in an attempt to meet the VicRoads requirements. Indeed, the model has been calibrated and validated using sound modelling practice and process outlines within this report. The data used to validate the model was thoroughly analysed to ensure the quality of model inputs, however it is noted that there are some limitations on the sample size of data available.

The information presented in this report aims to inform the study team that the existing conditions model is considered to be suitable for use in testing future land use and network options for the study area.

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Appendix B

Car Parking Demand Per Zone – Friday

Figure B1: Zone 1 Parking Demand

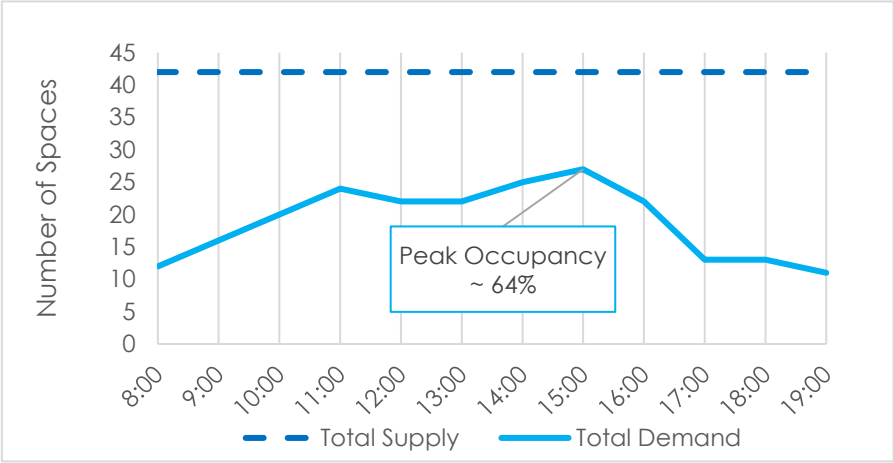


Figure B2: Zone 2 Parking Demand

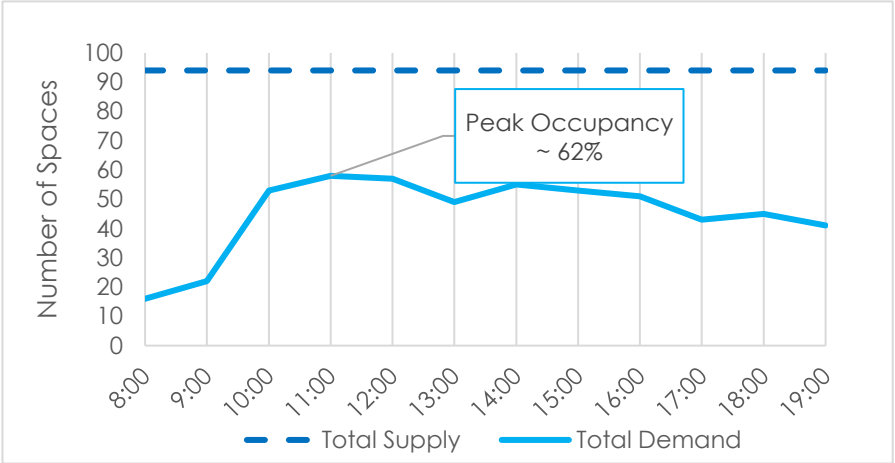


Figure B3: Zone 3 Parking Demand

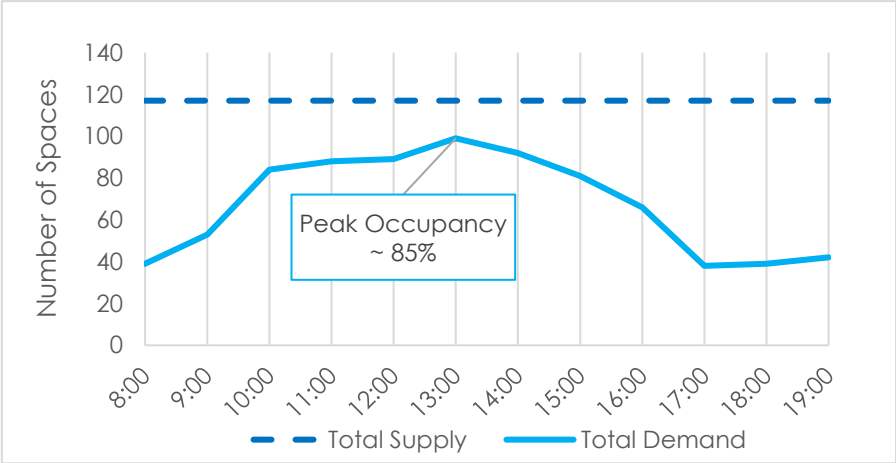


Figure B4: Zone 4 Parking Demand

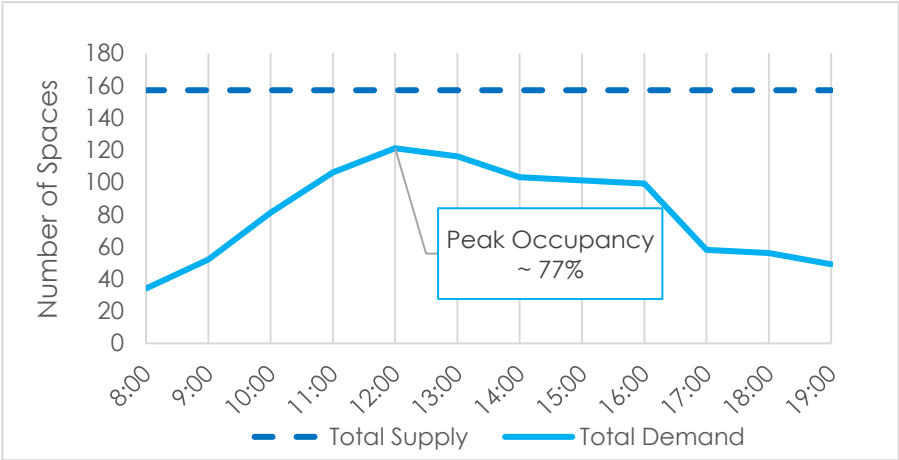


Figure B5: Zone 5 Parking Demand

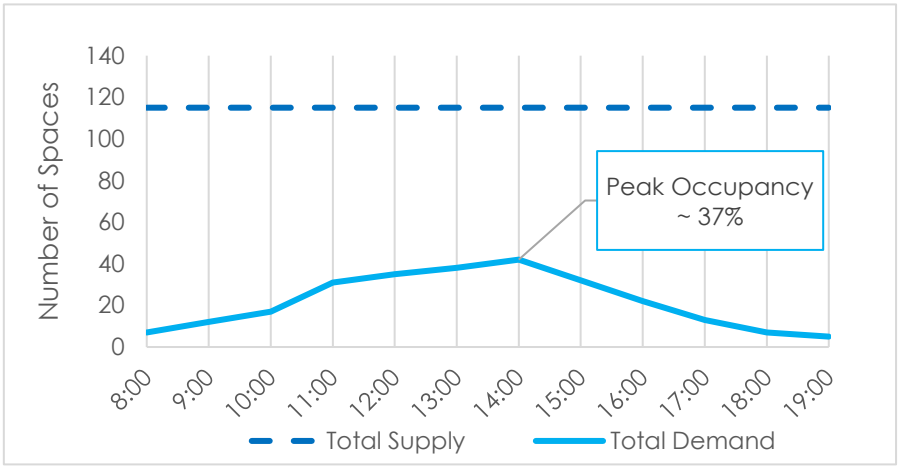


Figure B6: Zone 6 Parking Demand

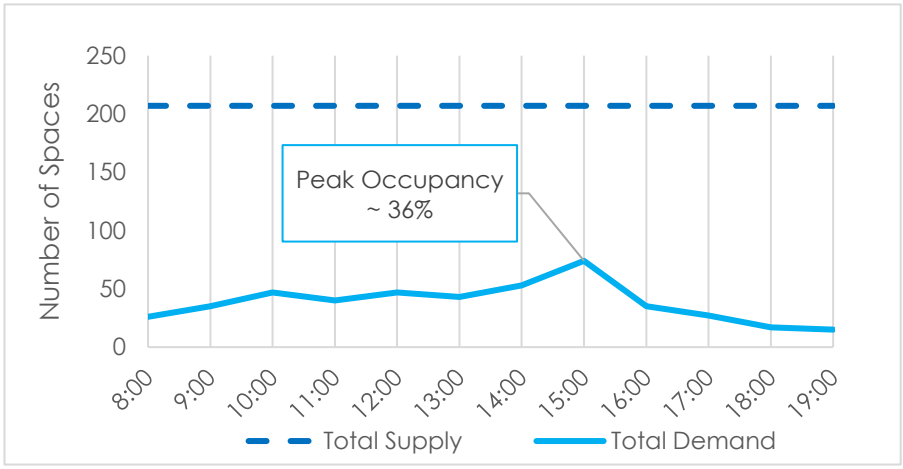


Figure B7: Zone 7 Parking Demand

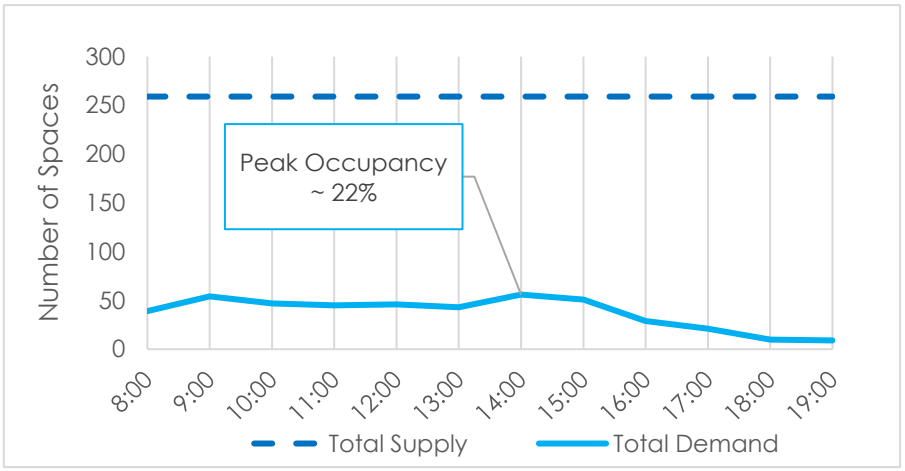


Figure B8: Zone 8 Parking Demand

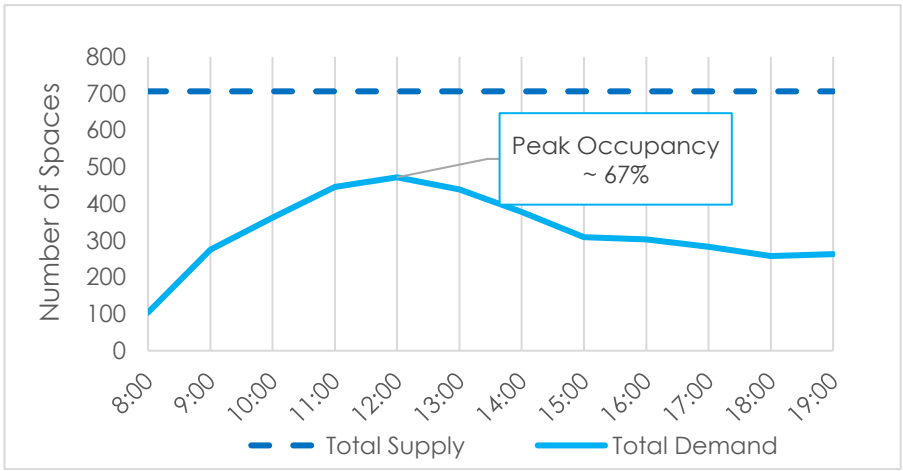


Figure B9: Zone 9 Parking Demand

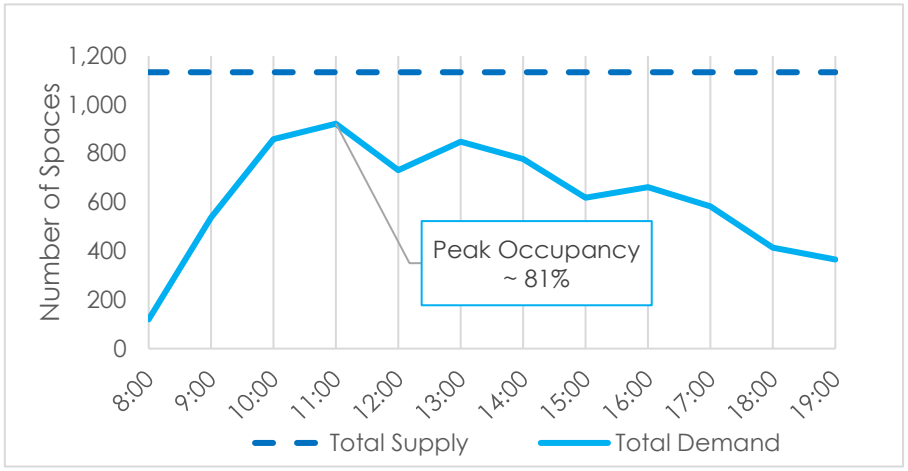


Figure B10: Zone 10 Parking Demand

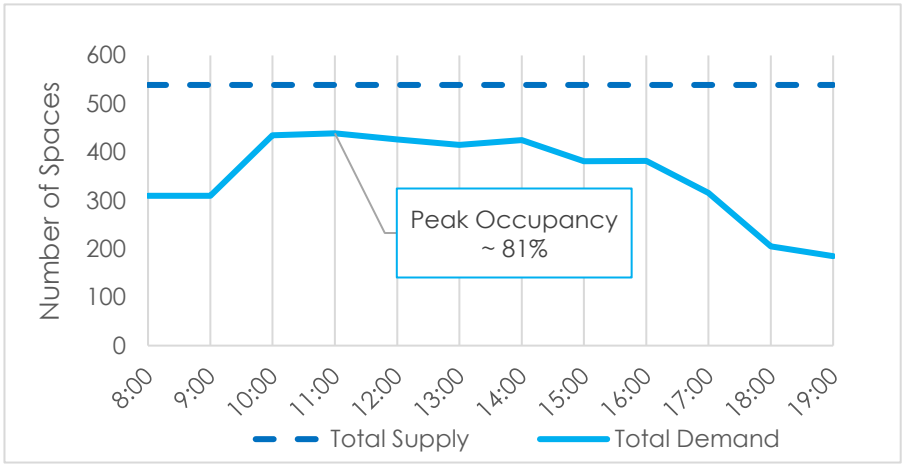


Figure B11: Zone 11 Parking Demand

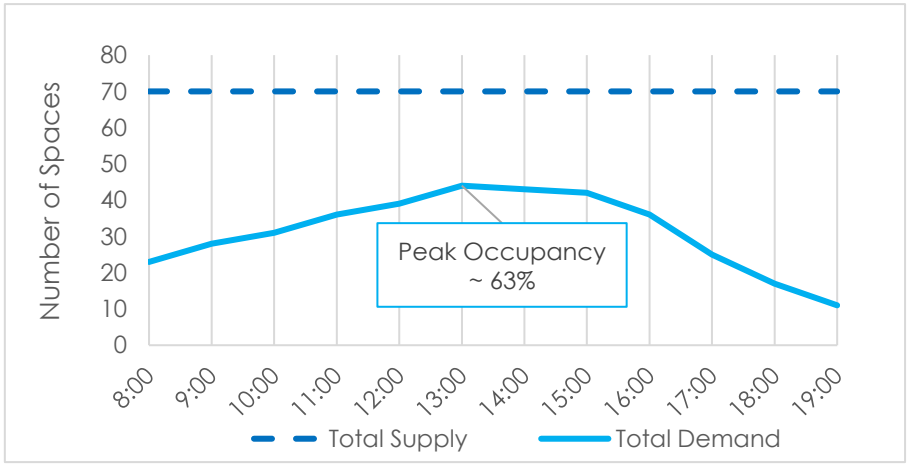


Figure B12: Zone 12 Parking Demand

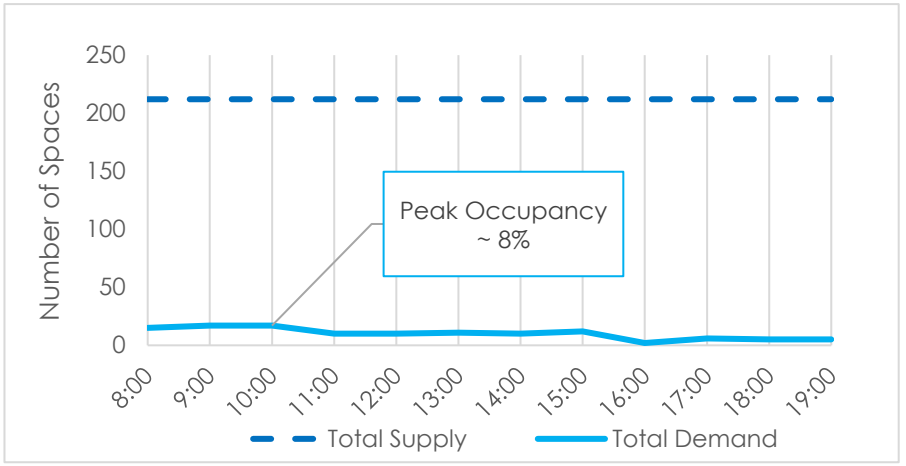


Figure B13: Zone 13 Parking Demand

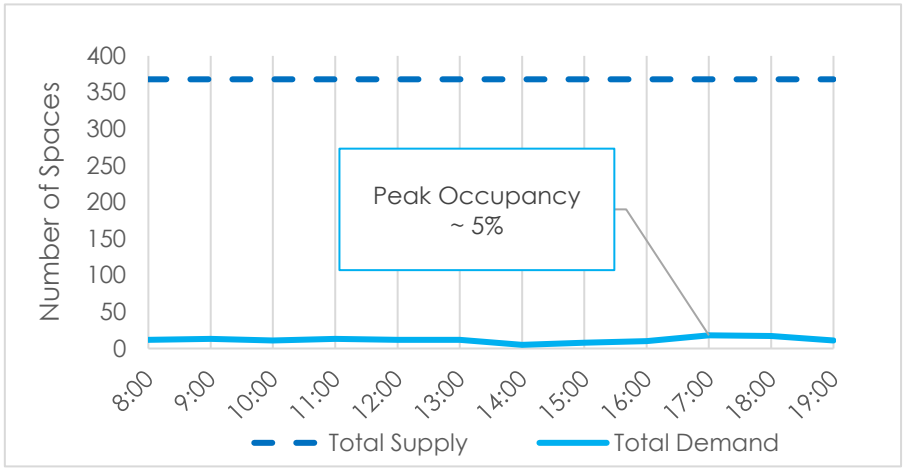


Figure B14: Zone 14 Parking Demand

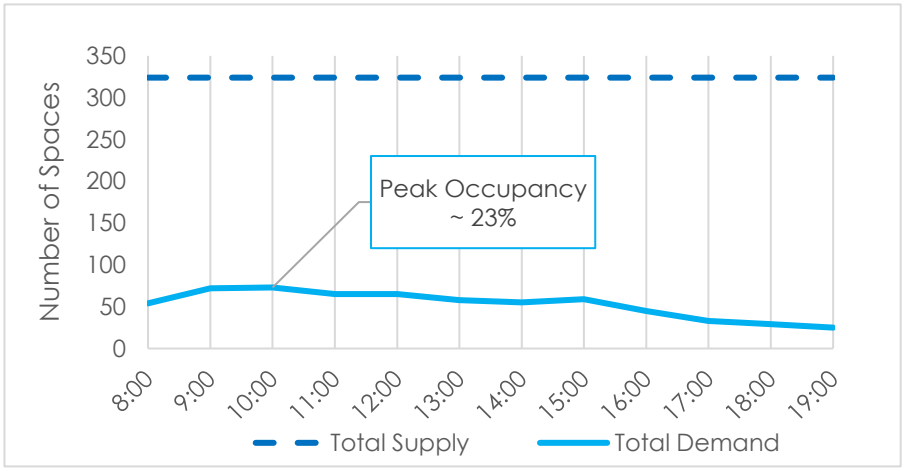


Figure B15: Zone 15 Parking Demand

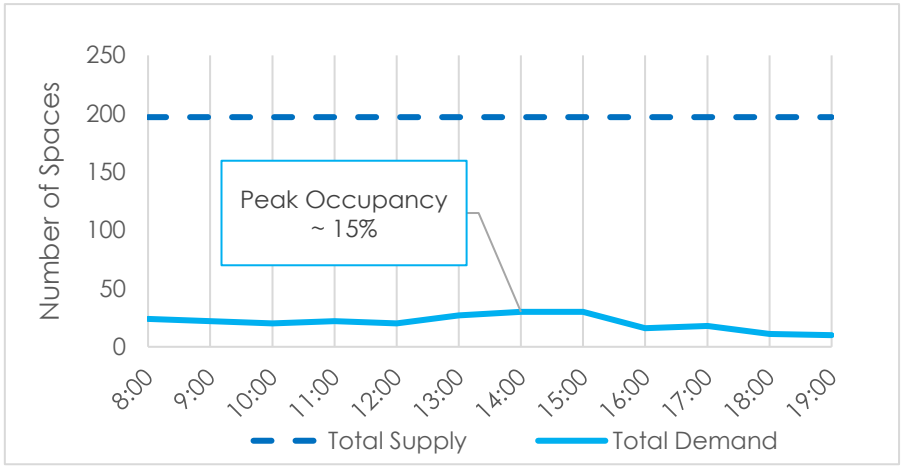


Figure B16: Zone 16 Parking Demand

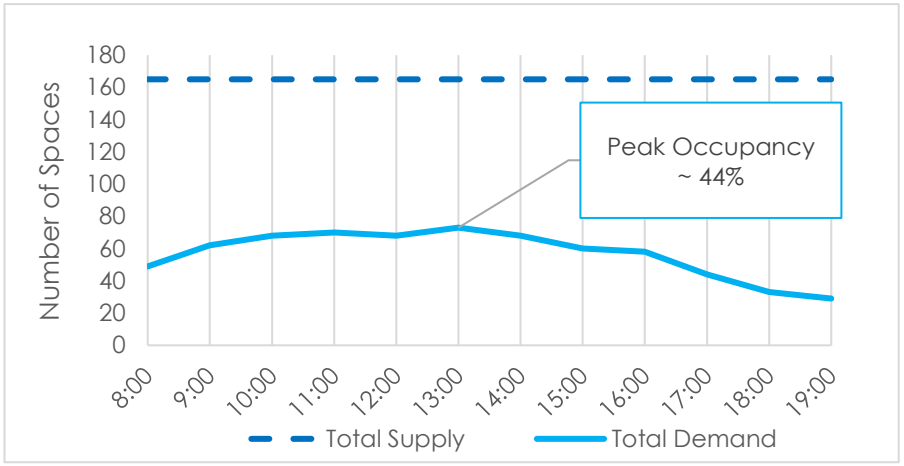


Figure B17: Zone 17 Parking Demand

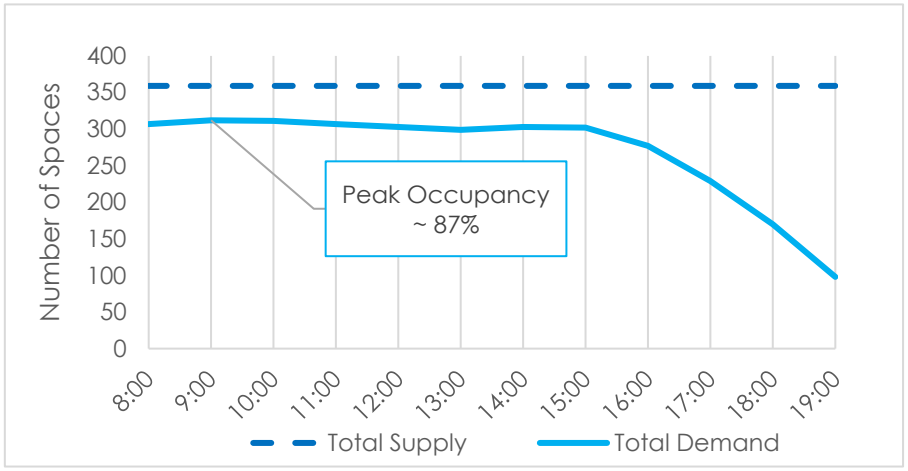
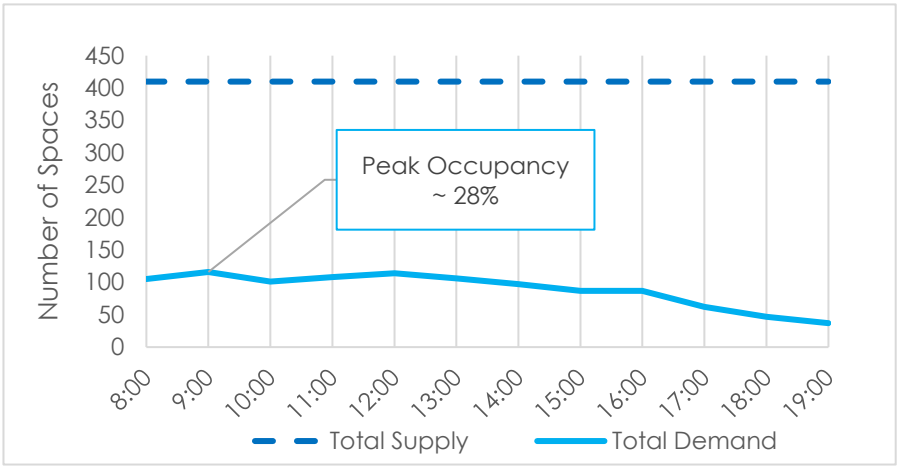


Figure B18: Zone 18 Parking Demand



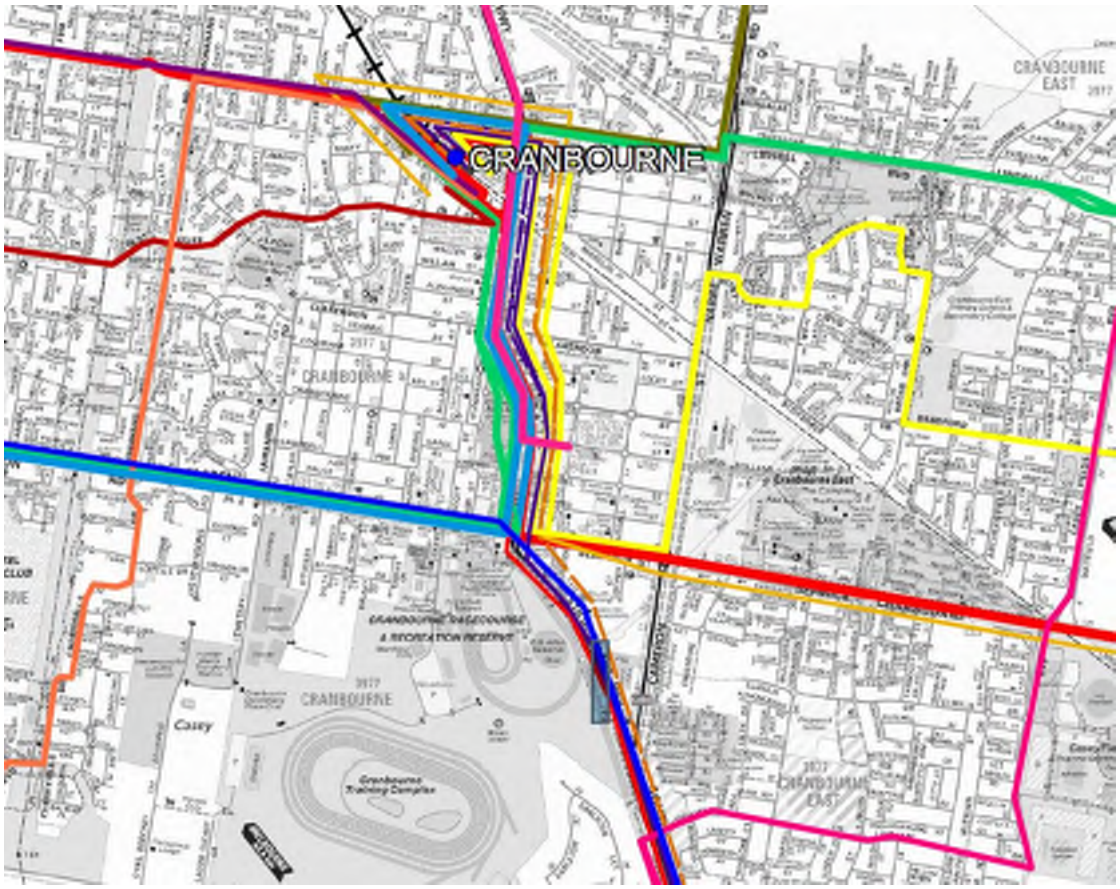
Appendix C

Option Testing

Option	Name	Description	Response to	2021		2031		2046	
				Existing density	Enhanced density	Existing density	Enhanced density	Existing density	Enhanced density
1. Business as usual									
A	Business as usual	Departmental land uses	*n/a*	X	N/A	X	X	X	X
2. Basic Interventions									
*D**	Regional PT connections Lite	Implement several regional bus routes along primary arterials to connect railway stations, activity centres and regions with higher job rates. The routes are proposed to be high frequency, supported by dedicated bus lanes. The proposed routes are as per Figure C1. The 'lite' version of this option includes the installation of new routes at high frequency, but without the support of bus lanes.	ABS data indicates that residents of Casey work to the west and north-west of Cranbourne, including Frankston and Dandenong.	X		X	X	X	X
B	New / revised parking controls	As detailed in Section 4.6 of this report.	To facilitate a mode shift away from the private car it is recommended to adopt revised parking controls to reduce the number of spaces available.	X		X	X	X	X
G	Northern road bypass	The northern road bypass alignment is proposed to start north of Camms Road and utilise Narre Warren – Cranbourne Road and reconnect with the South Gippsland Highway south of Sladen Street. Under this option, the South Gippsland Highway could contain a modified configuration as detailed in Figure 6.5 of this report. Refer Figure C3.	Land has been set aside (including being covered by a public acquisition overlay) along Narre Warren Road for a bypass of the Cranbourne Town Centre.	X		X	X	X	X
*I**	Strategic pedestrian network Lite	Develop a strategic pedestrian network. The network should be supported through footpaths, pram ramps, street furniture, wayfinding and street lighting. The 'lite' version of this option would be to install wayfinding signage without the support of upgraded infrastructure.	VicRoads' SmartRoads Road Use Hierarchy identifies a small network of pedestrian priority routes within the study area. However, a more fine-grained area would be identified through the development of a strategic pedestrian network. This would also assist in creating a mode shift away from the private car.	X		X	X	X	X
3. Connected Cranbourne									
B	New / revised parking controls	As detailed in Section 4.6 of this report.	To facilitate a mode shift away from the private car it is recommended to adopt revised parking controls to reduce the number of spaces available.	-		X	X	X	X
C	Rail extension to Cranbourne East and Clyde	Extend the railway line along the existing disused railway corridor and construct two new stations at Cranbourne East and Clyde.	Infrastructure Victoria Report indicating rail line should be extended to Cranbourne East and Clyde in 10-15 years.	X		X	X	X	X
D	Regional PT connections	Implement several regional bus routes along primary arterials to connect railway stations, activity centres and regions with higher job rates. The routes are proposed to be high frequency, supported by dedicated bus lanes. The proposed routes are as per Figure C1.	ABS data indicates that residents of Casey work to the west and north-west of Cranbourne, including Frankston and Dandenong.	-		X	X	X	X
*D**	Regional PT connections Lite	Implement several regional bus routes along primary arterials to connect railway stations, activity centres and regions with higher job rates. The routes are proposed to be high frequency, supported by dedicated bus lanes. The proposed routes are as per Figure C1. The 'lite' version of this option includes the installation of new routes at high frequency, but without the support of bus lanes.	ABS data indicates that residents of Casey work to the west and north-west of Cranbourne, including Frankston and Dandenong.	*X*		-	-	-	-
E	Local PT connections	Implement several local bus routes within the Cranbourne activity centre to support local movements between the railway station and other trip generators (e.g. schools, retail, residential). The proposed routes are as per PTV's future plan and shown in Figure C2.	There are significant gaps in public transport coverage in key parts of Cranbourne. The provision of new local bus routes connects these areas to trip generators and encourages mode shift away from the private car.	X		X	X	X	X
F	Southern road bypass	An alternative bypass alignment is proposed to the south of the Cranbourne Town Centre. The alignment would follow Western Port Highway, and Browns Road, as per Figure C3.	Given Narre Warren Road is located within the Cranbourne Town Centre boundary, an alternative bypass option has been provided, which completely bypasses the town centre.	-		X	X	X	X
H	Strategic cycling network	Develop a strategic cycling network. The network should be supported through cycling infrastructure like cycling lanes, head start boxes and lights, end of trip facilities at key destinations. Figure C4 provides an outline of potential strategic bicycle network upgrades.	VicRoads' SmartRoads Road Use Hierarchy and Principal Bicycle Network both identify key bicycle priority routes throughout the study area. There are gaps in this network, which would be filled by a strategic cycling network for the area. Additional cycling routes would also assist in creating a mode shift away from the private car.	X		X	X	X	X
I	Strategic pedestrian network	Develop a strategic pedestrian network. The network should be supported through footpaths, pram ramps, street furniture, wayfinding and street lighting. Figure C5 provides an outline of potential strategic pedestrian network upgrades.	VicRoads' SmartRoads Road Use Hierarchy identifies a small network of pedestrian priority routes within the study area. However, a more fine-grained area would be identified through the development of a strategic pedestrian network. This would also assist in creating a mode shift away from the private car.	-		X	X	X	X
J	Policy incentives	There are a range of policy measures that City of Casey could implement to incentivise Cranbourne residents and workers to utilise active and sustainable modes of transport. Refer Table C2.	There is a lack of existing municipal policy to encourage mode shift.	X		X	X	X	X

Figure C1: Possible Strategic Bus Network (Regional)

Figure C2: Future Local Area Bus Network (2022)



Source: Transport for Victoria

Figure C3: Possible Cranbourne Bypass Options

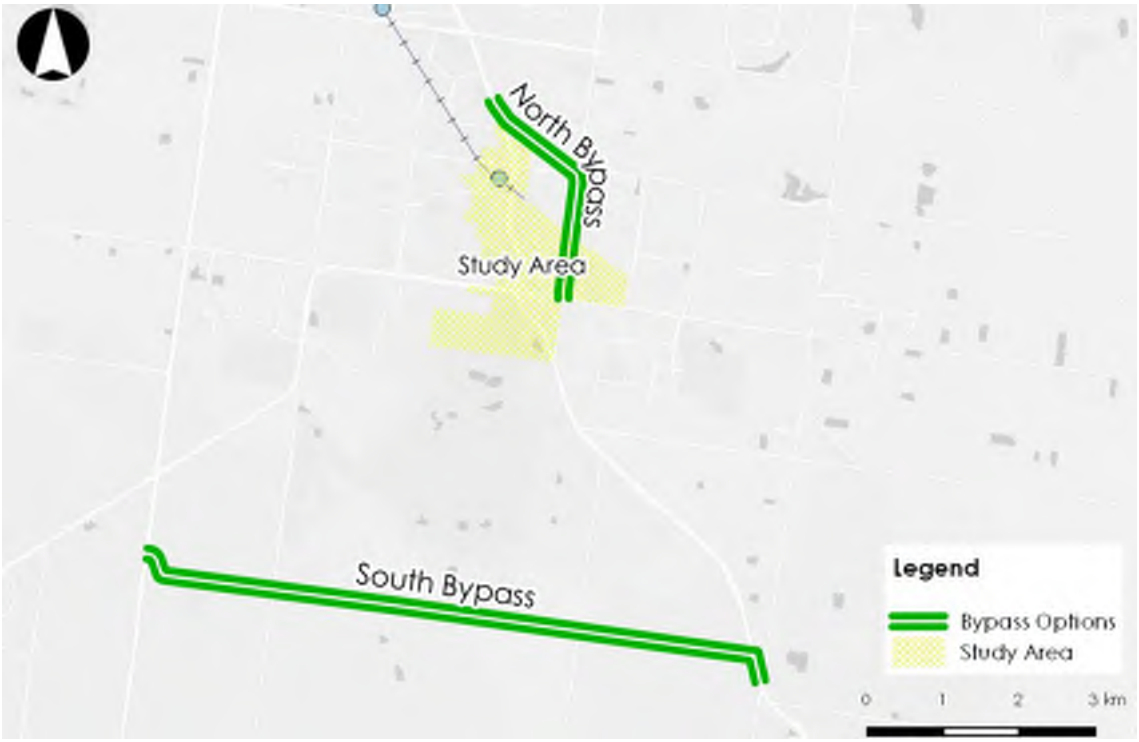


Figure C4: Potential Strategic Bicycle Network Upgrades

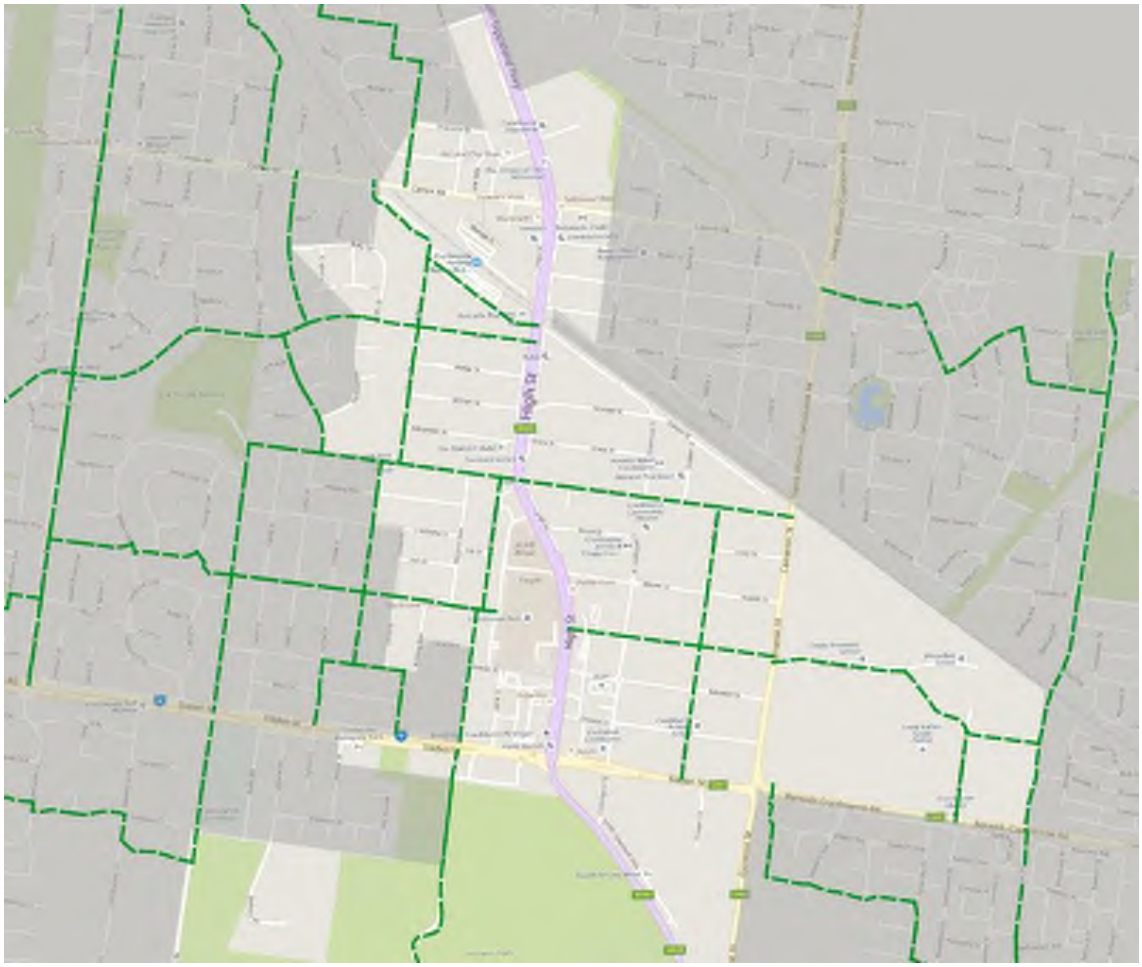


Figure C5: Potential Strategic Pedestrian Network Upgrades

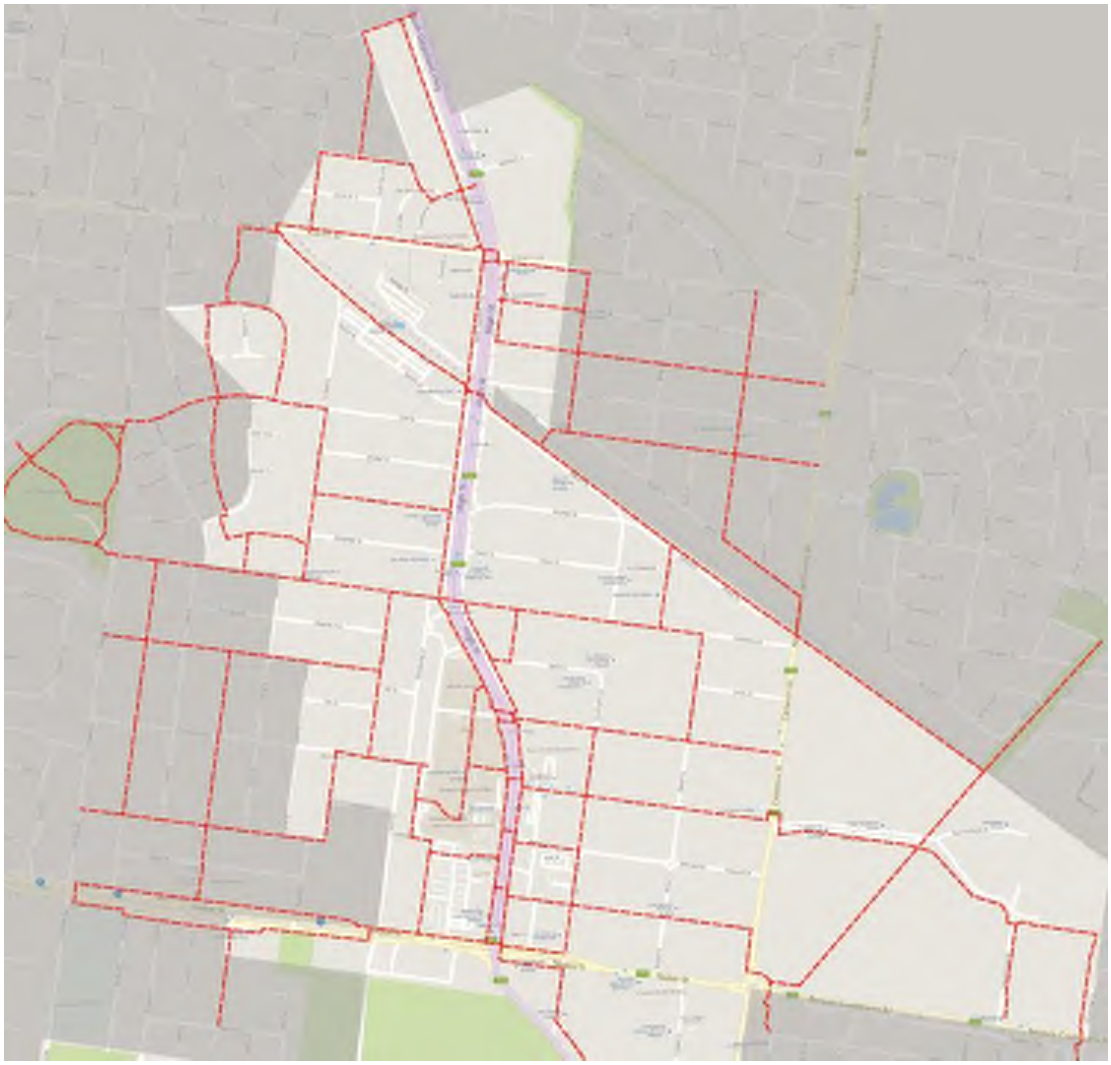


Table C1: Policy Measures

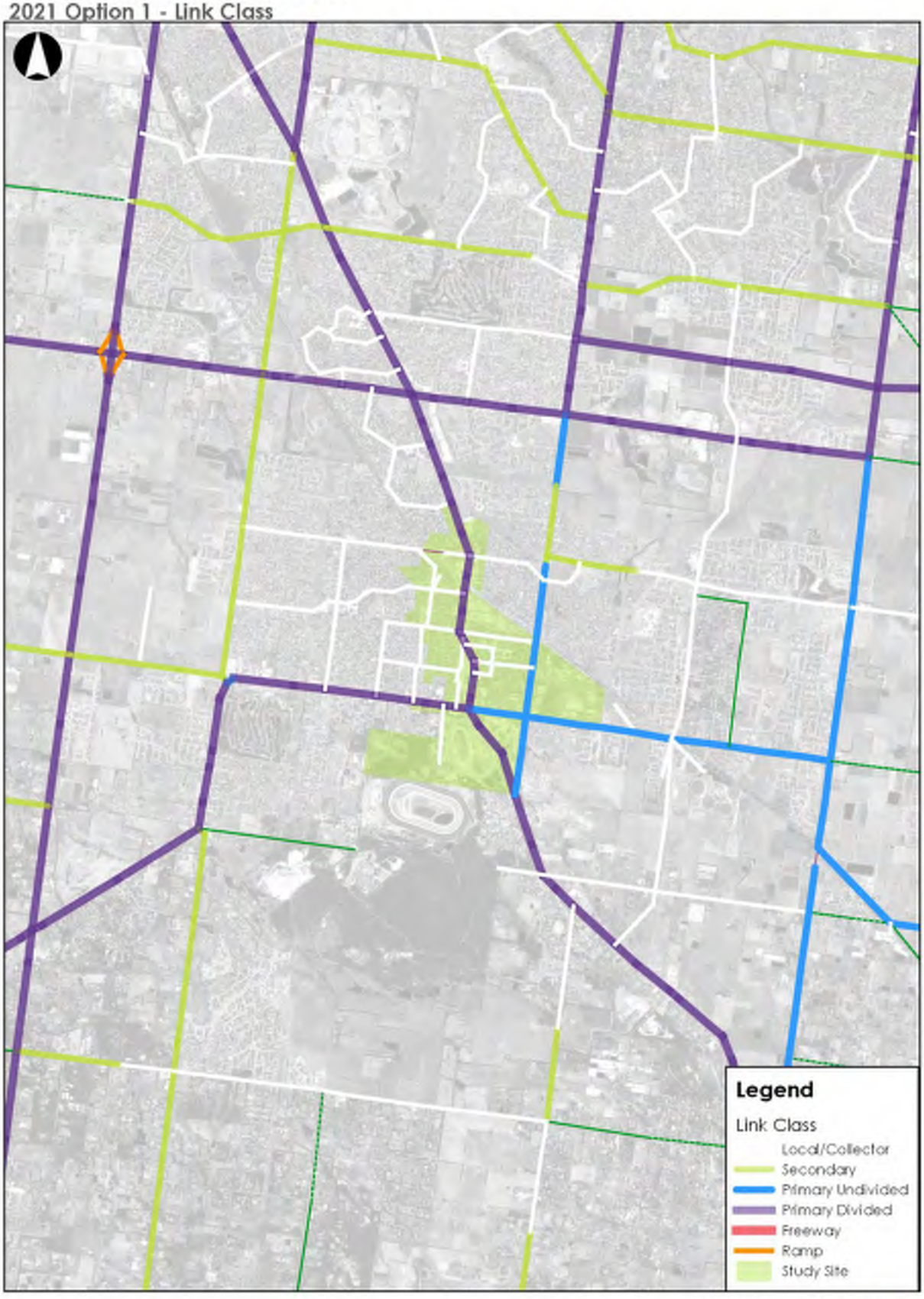
Mode	Description
General	Commence a 'commuter club' to enable Cranbourne residents to access discounted Myki tickets paid through their rates payments
	Provide new residents with a welcome pack outlining active and sustainable transport networks
Bus	Review the locations of bus stops and commit capital funding to construct footpaths to all stop locations
	Reallocate road space to implement bus lanes and jump starts
	Provide real time travel information at bus stops
	Implement a DCPO to provide a telebus service
Car	Implement parking permit schemes to limit the number of vehicles
	Support car share schemes through parking restrictions
Train	Advocate for extension of services and track duplication
	Advocate for increased frequency
	Improve pedestrian and cycling connectivity to the station through path upgrades, end of trip facilities and lighting
	Restrict the Cranbourne Station off-street car park to public transport users. Options could include installing a boom gate and linking access to Myki card
Cycling	Install end of trip facilities for bikes at Council facilities
	Support cycling training programs in schools and the wider community

Appendix D

Model Option Outputs

Model Inputs

Cranbourne Town Centre Access
2021 Option 1 - Link Class



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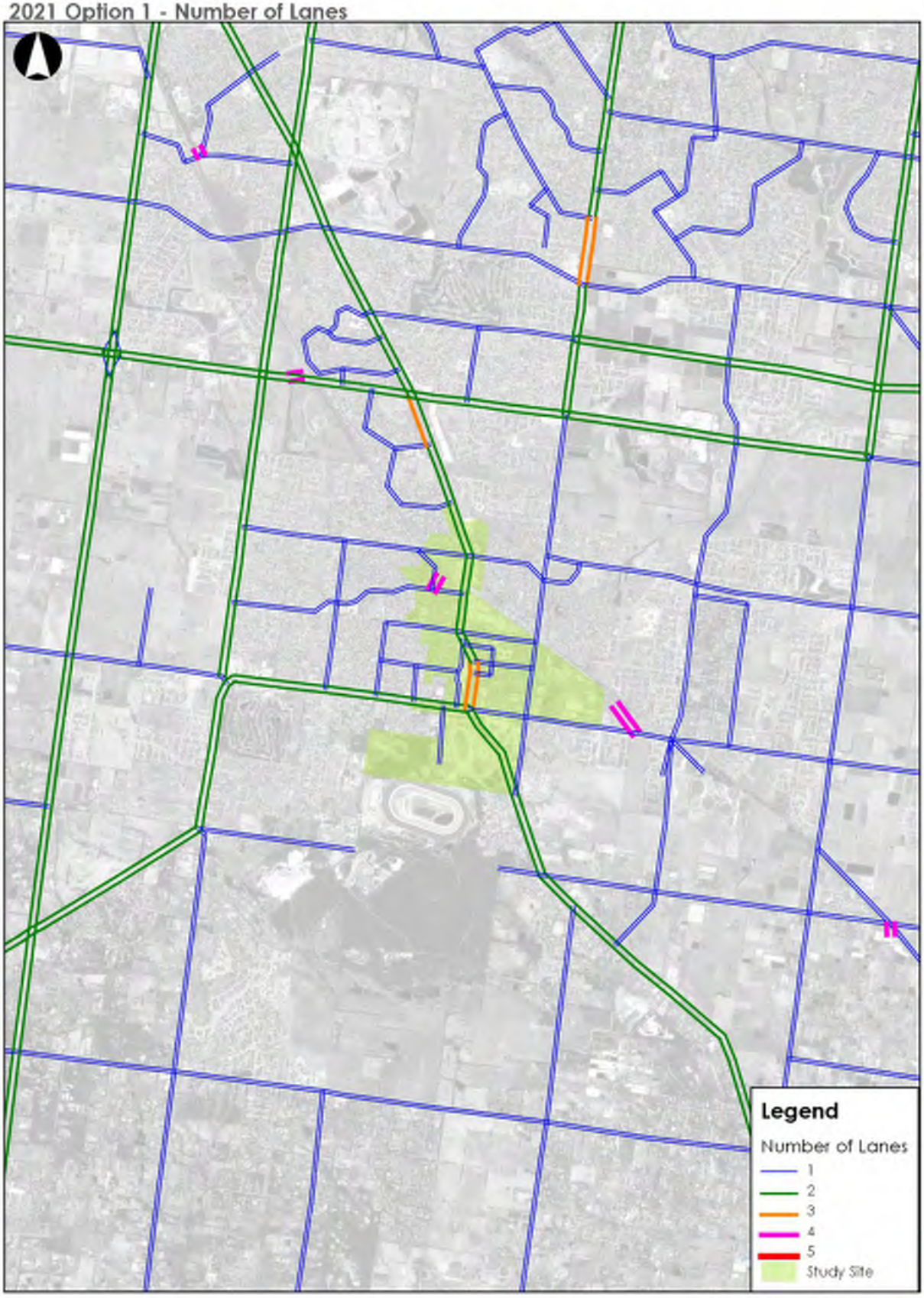
Cranbourne Town Centre Access
2021 Option 1 - Number of Lanes



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Cranbourne Town Centre Access
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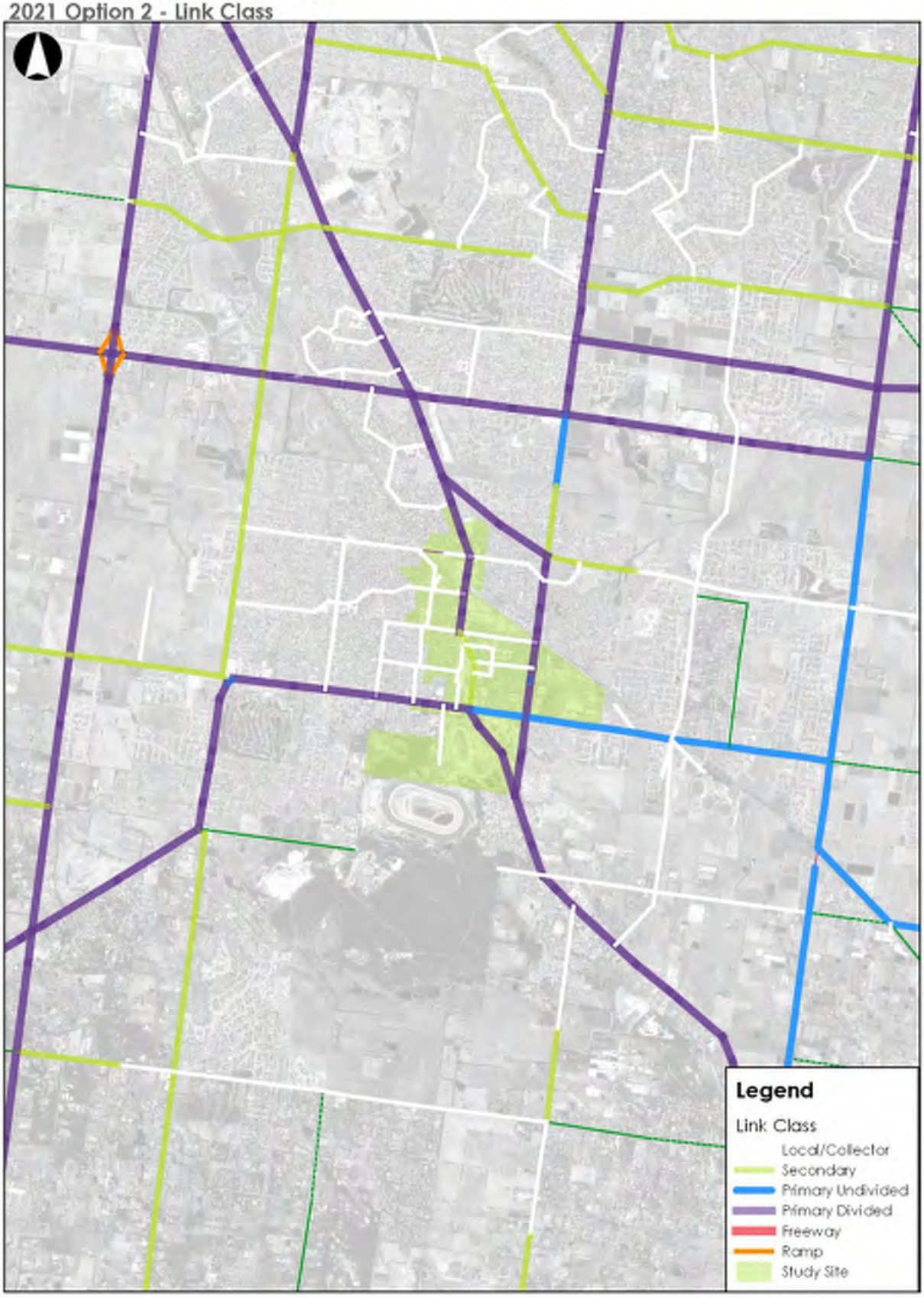

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Cranbourne Town Centre Access
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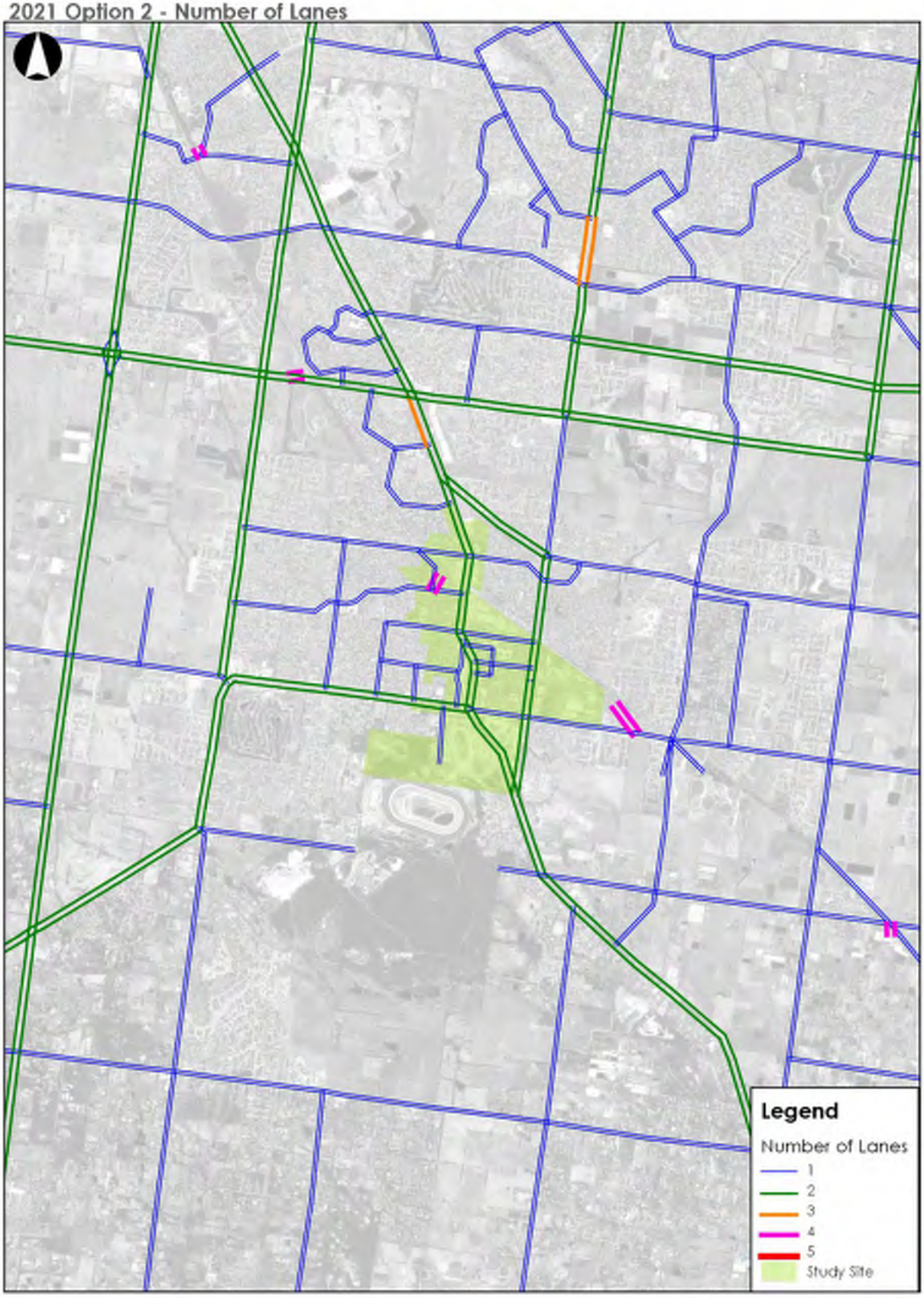

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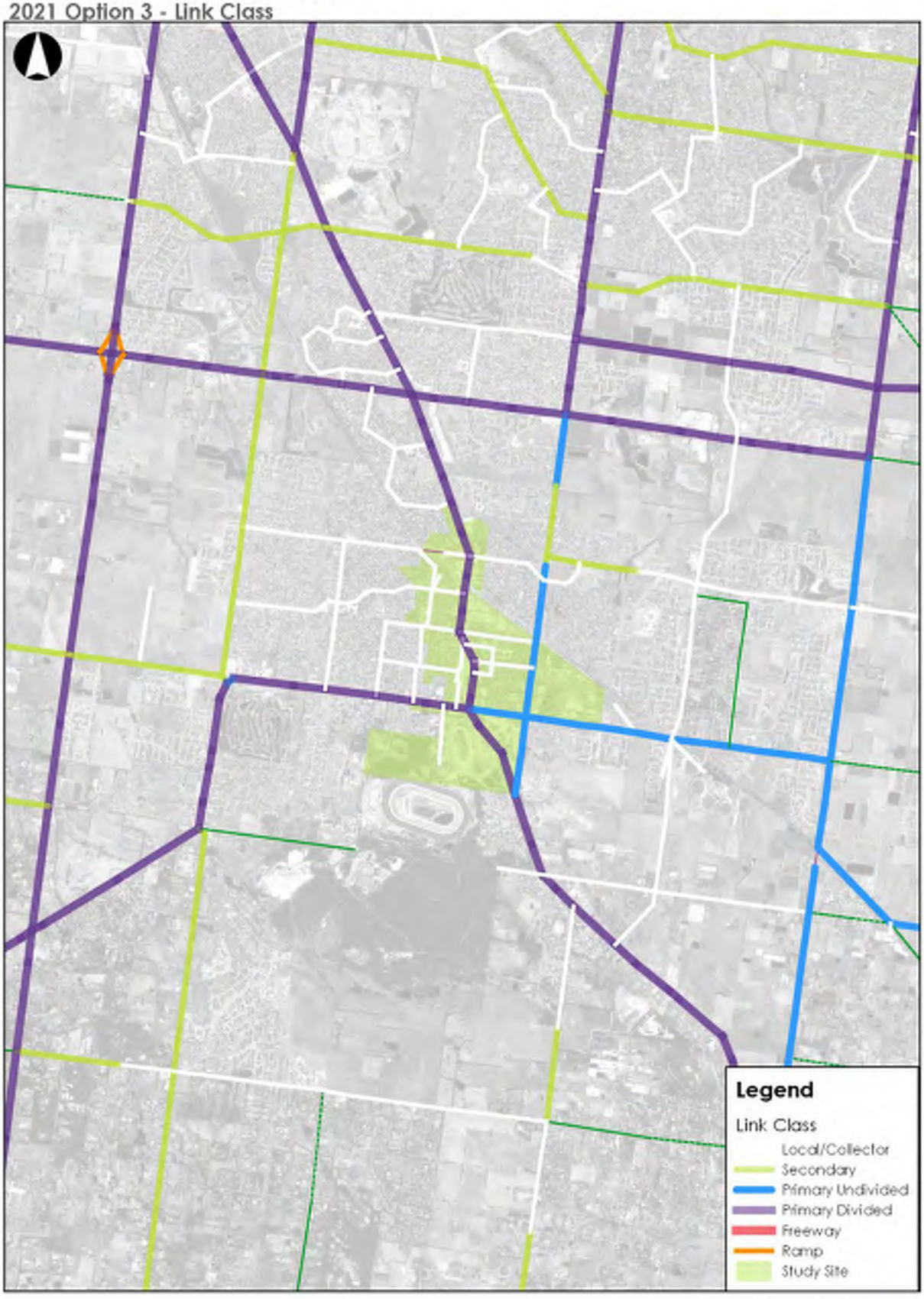

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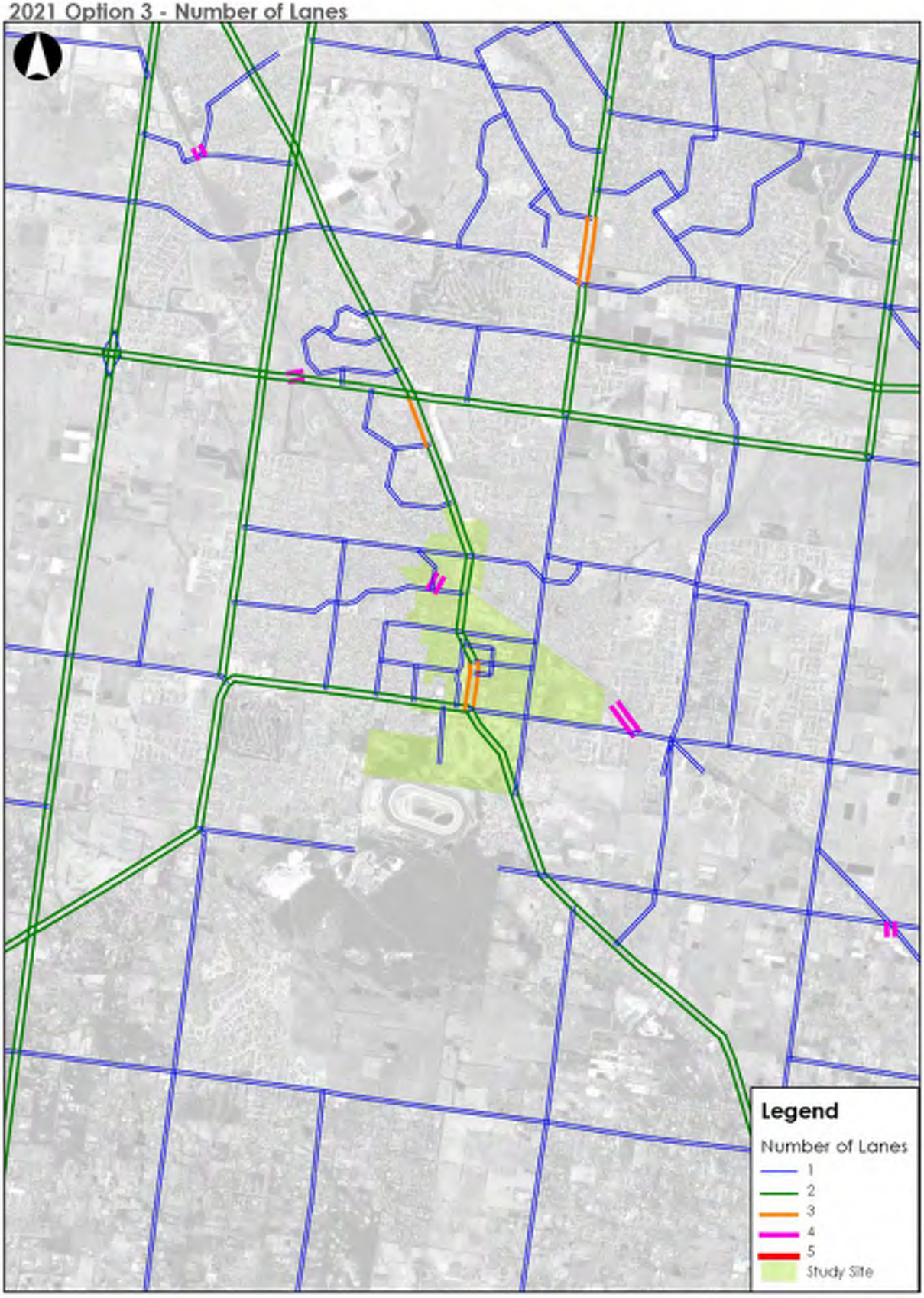

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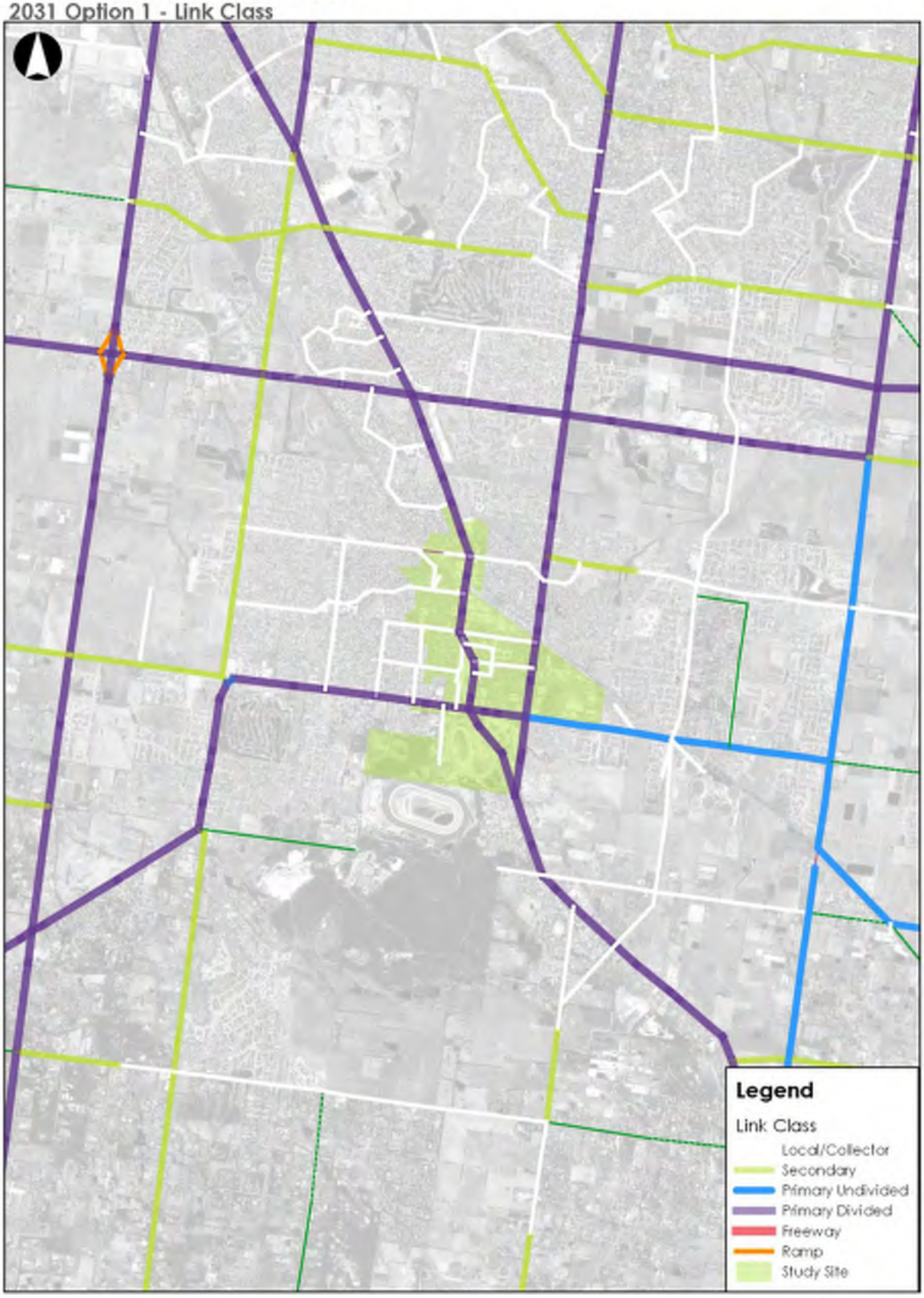

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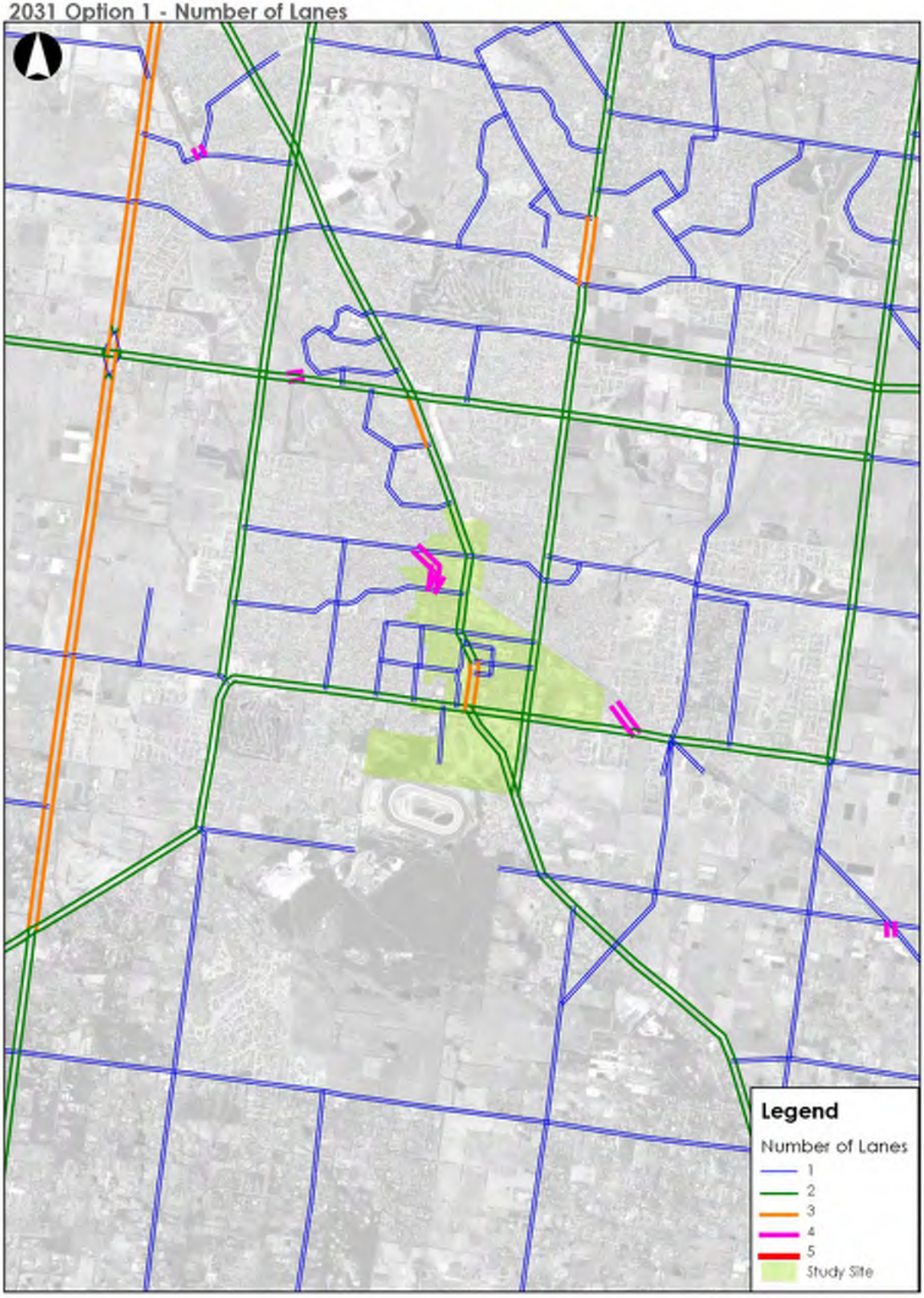

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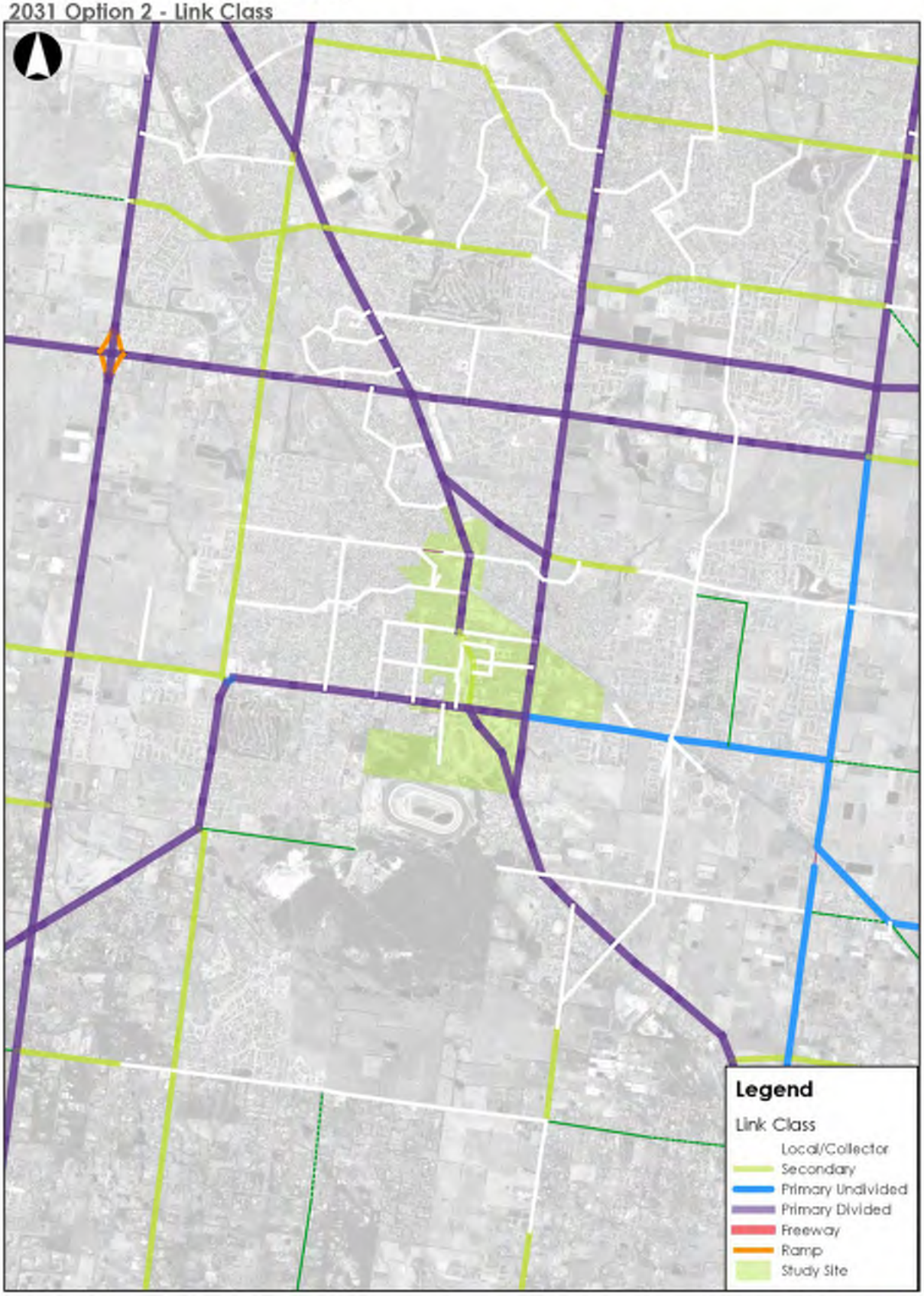

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Cranbourne Town Centre Access
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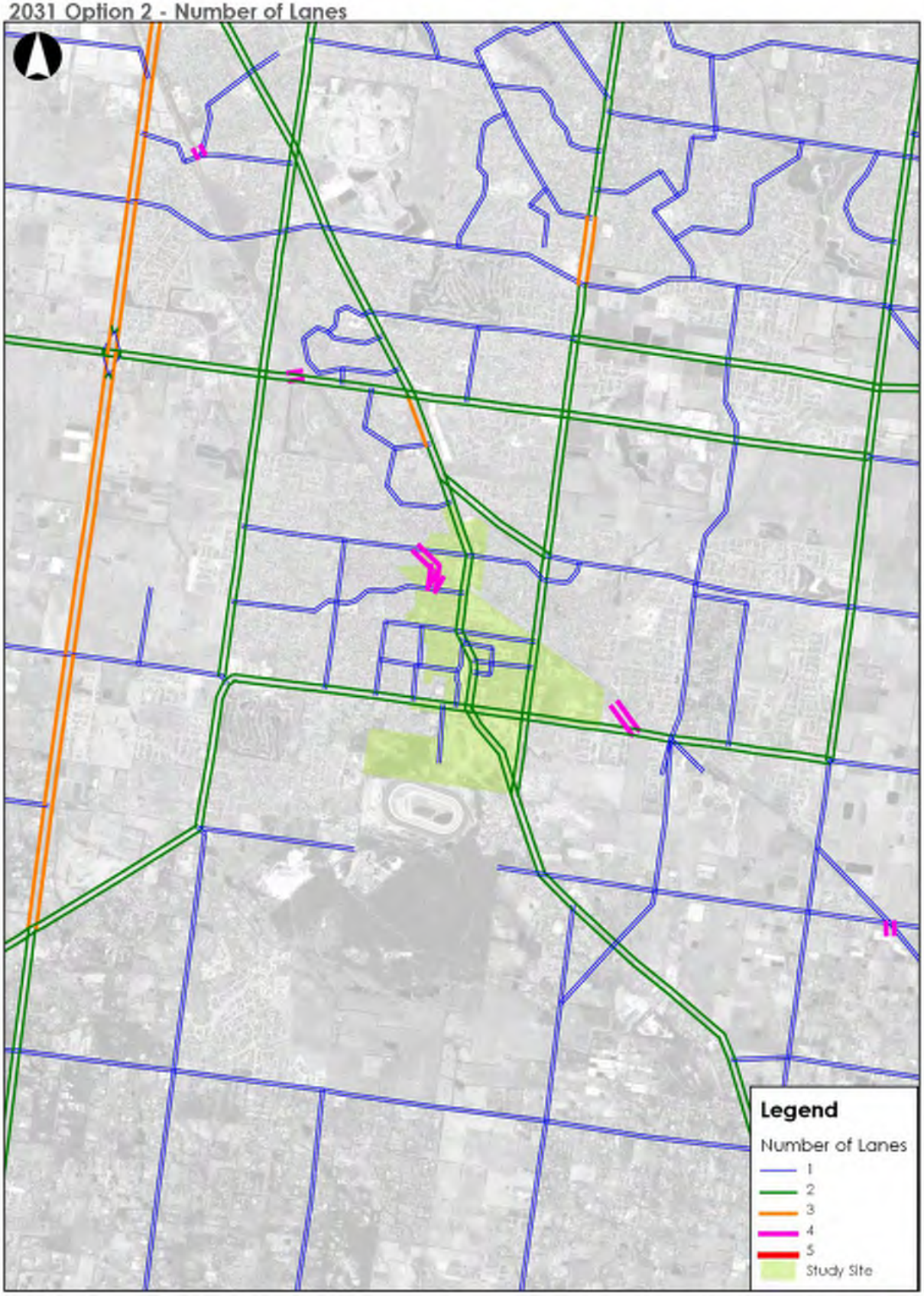

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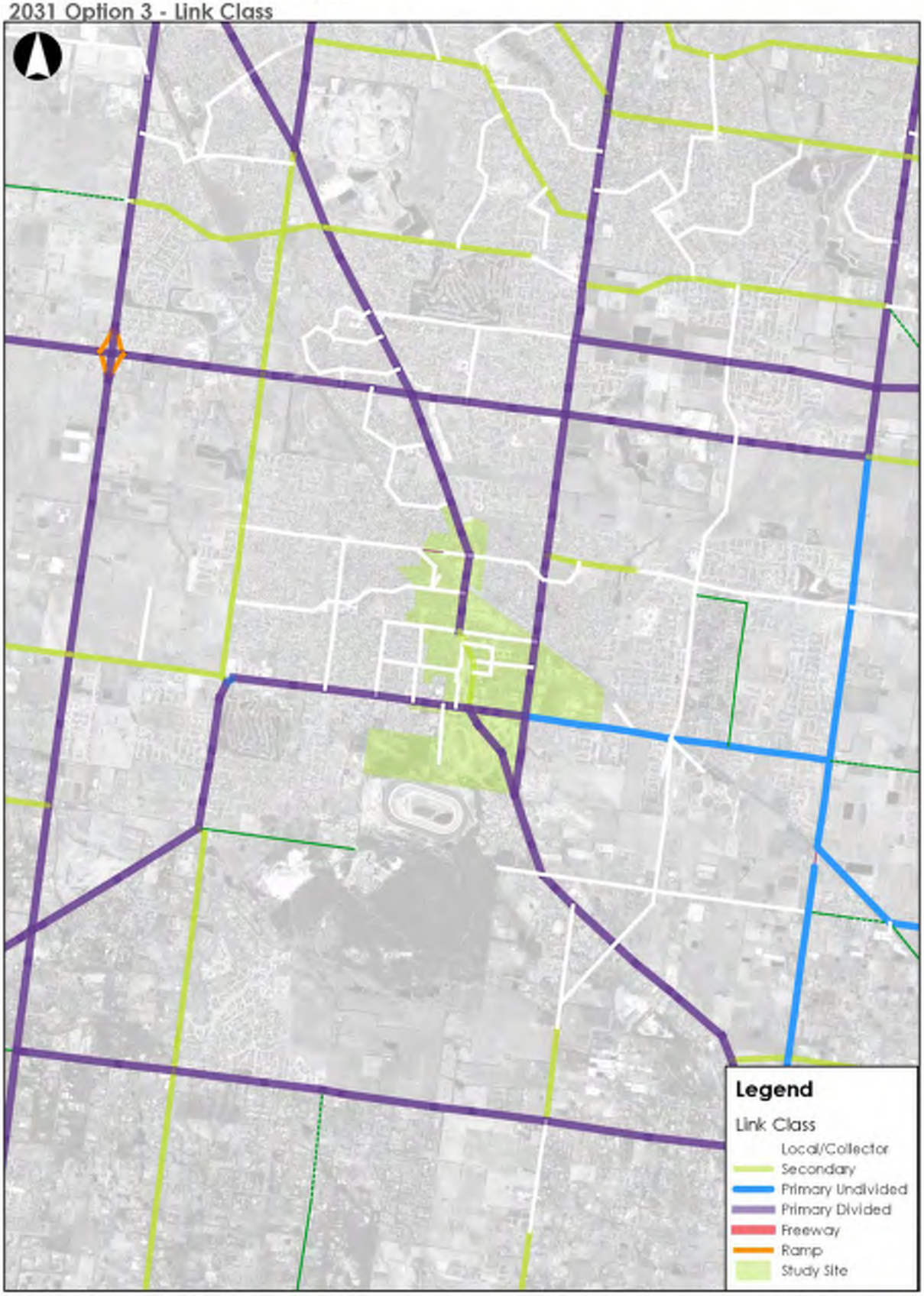

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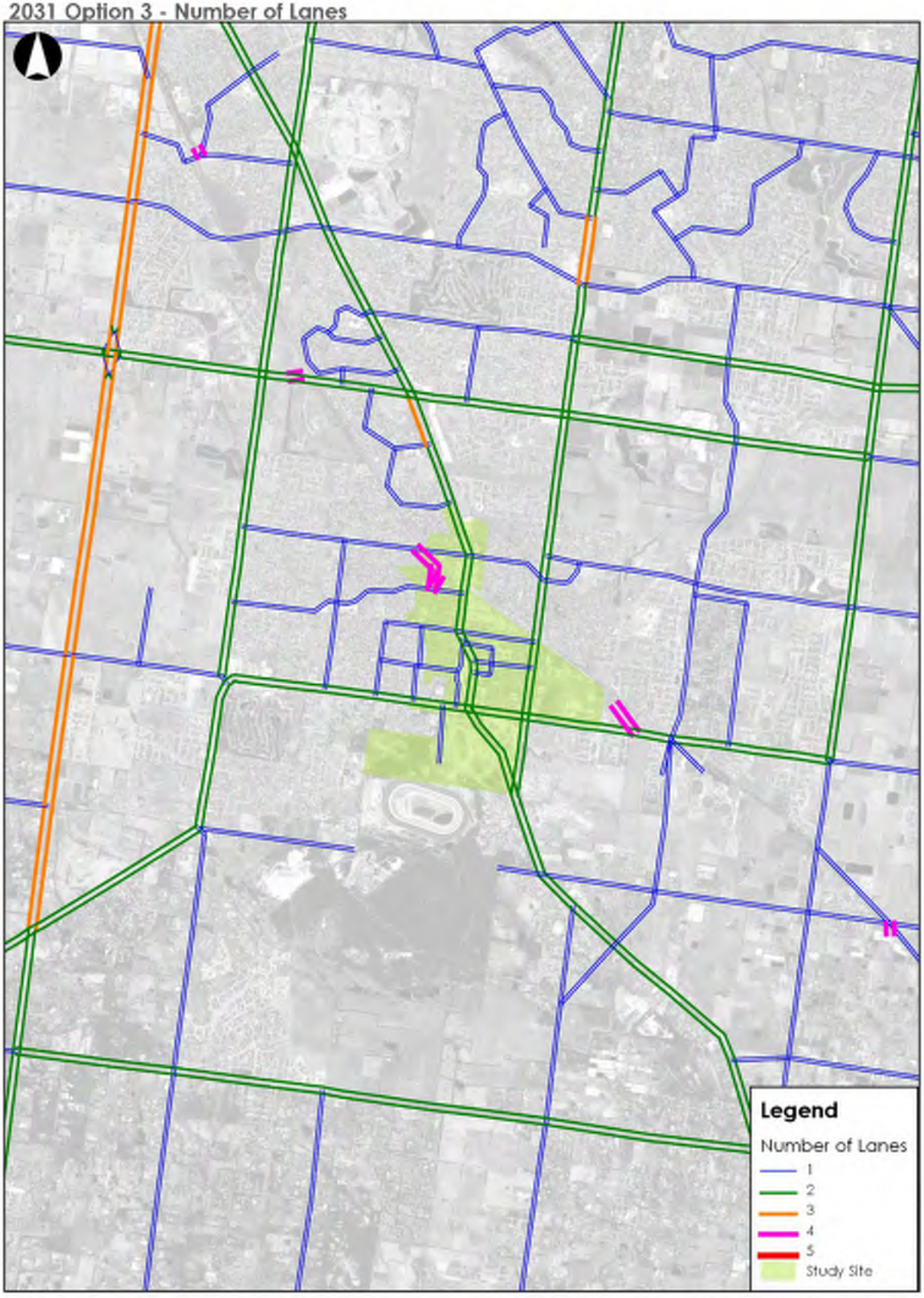

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Cranbourne Town Centre Access
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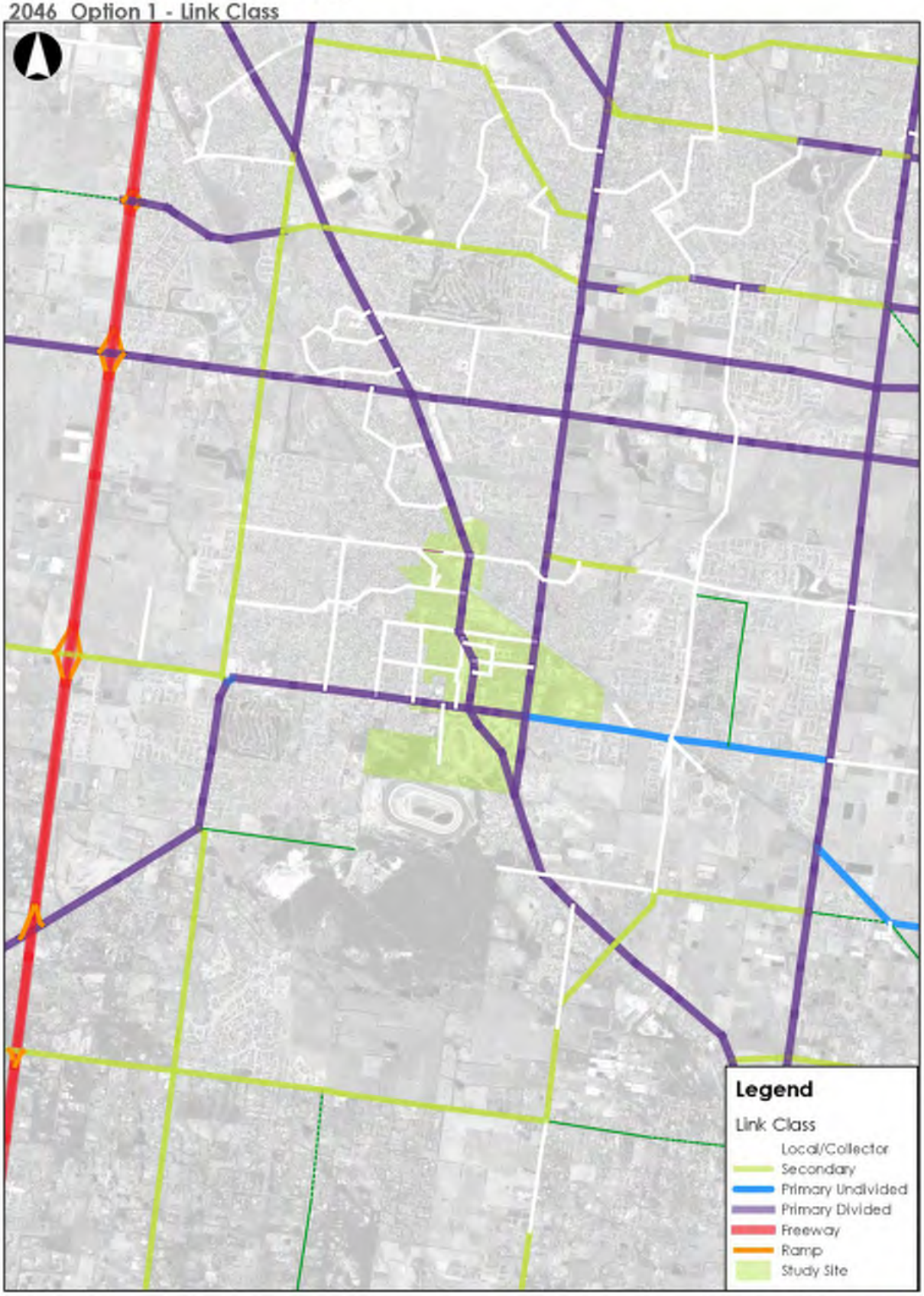

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Cranbourne Town Centre Access
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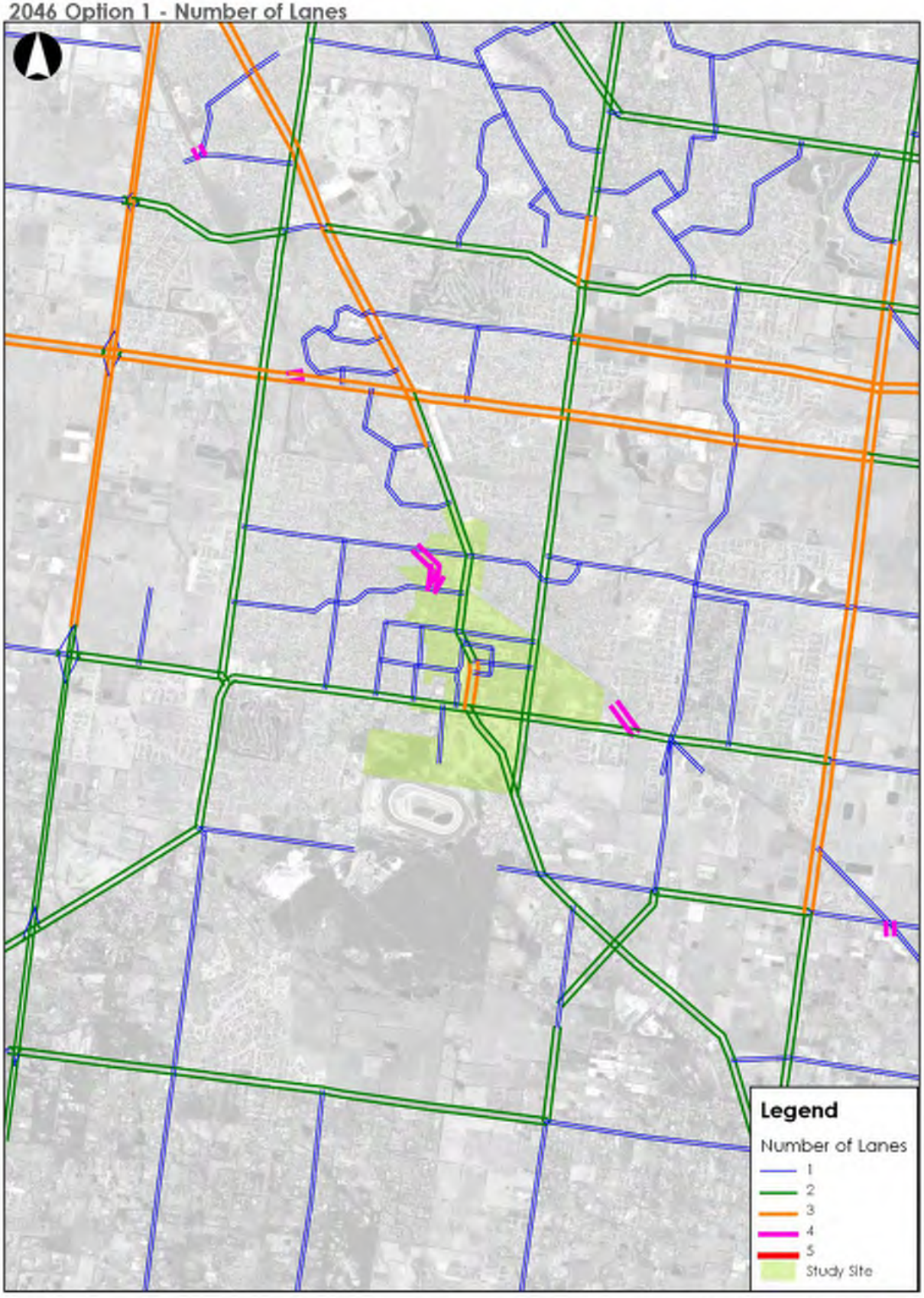

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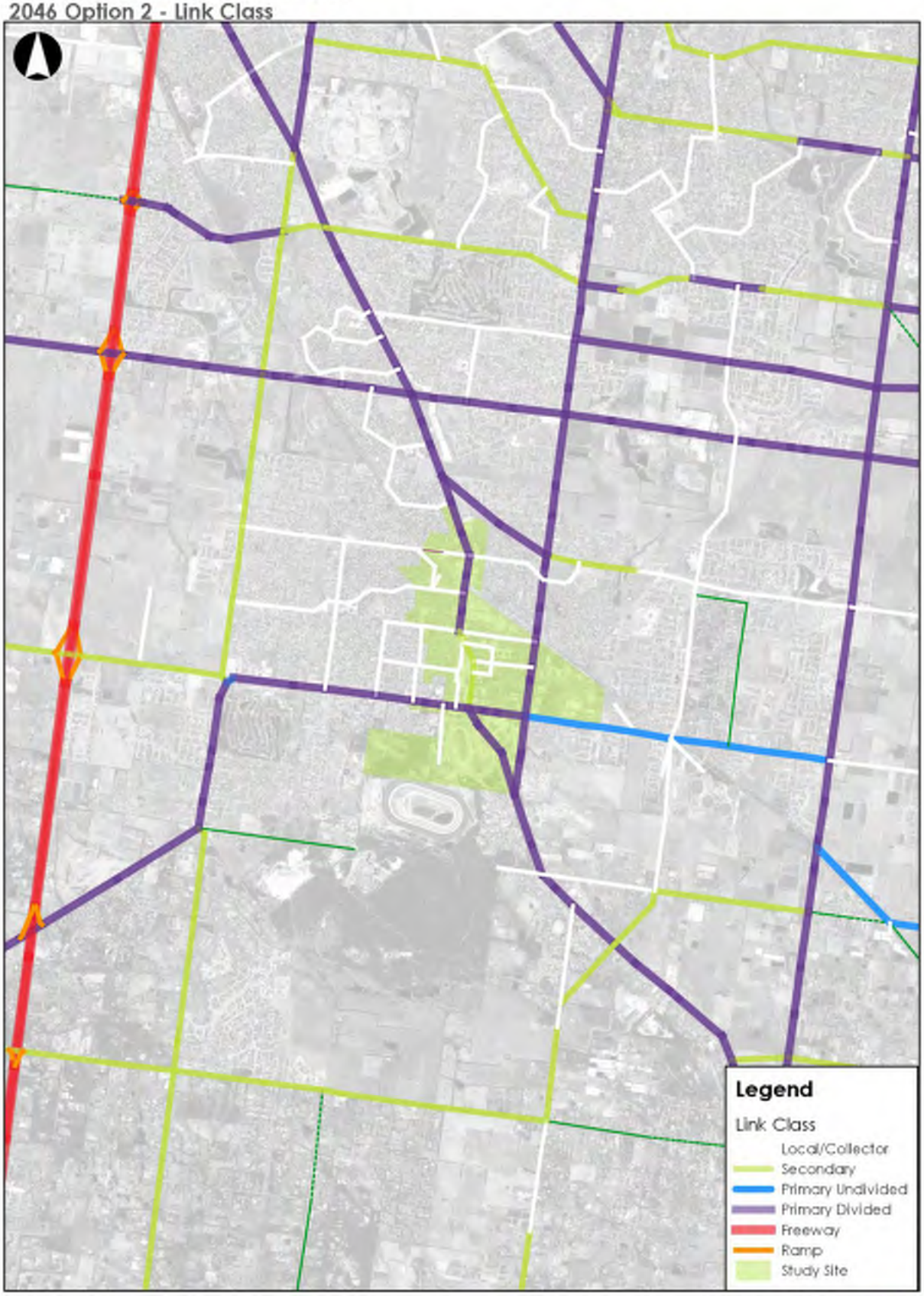

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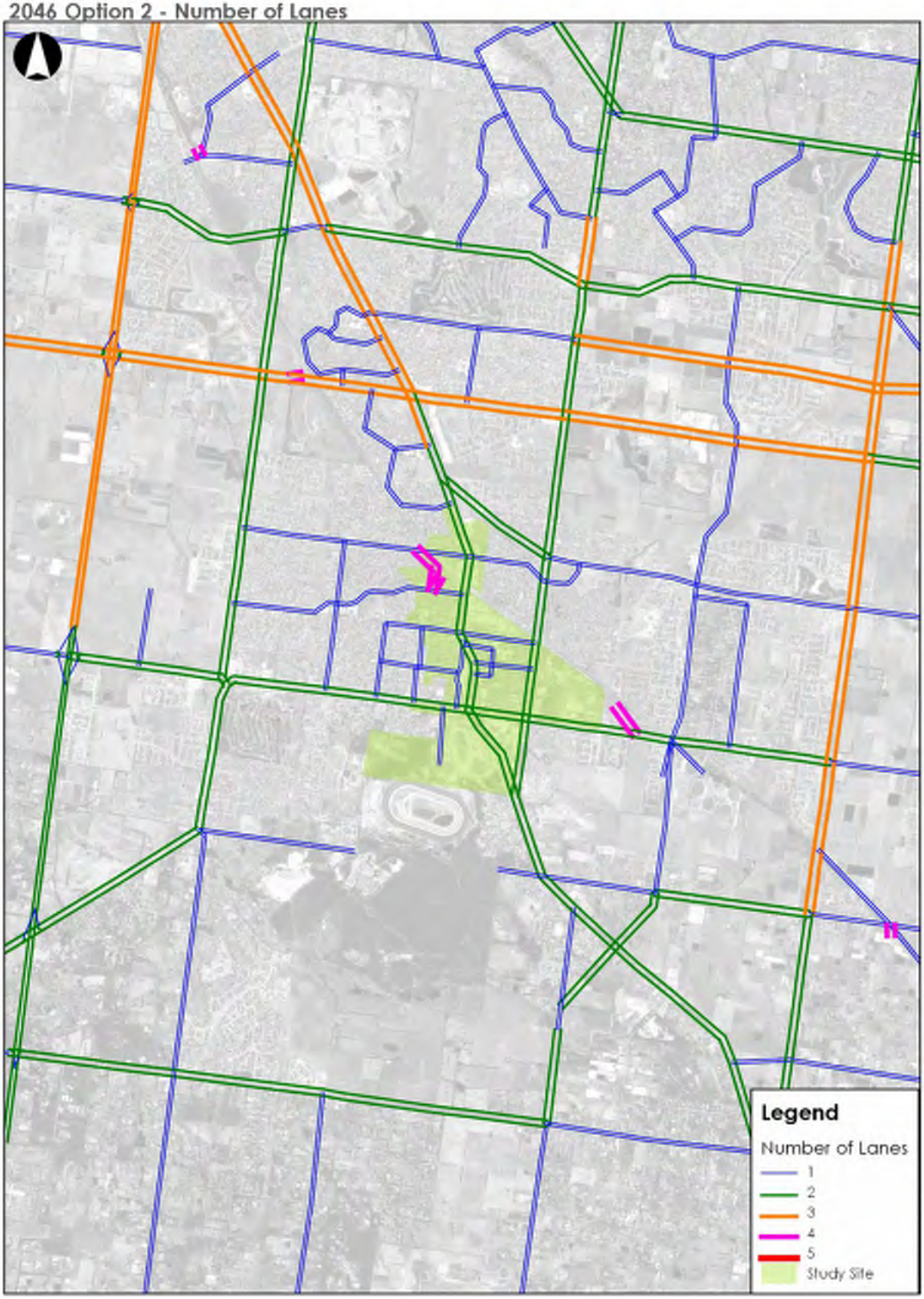

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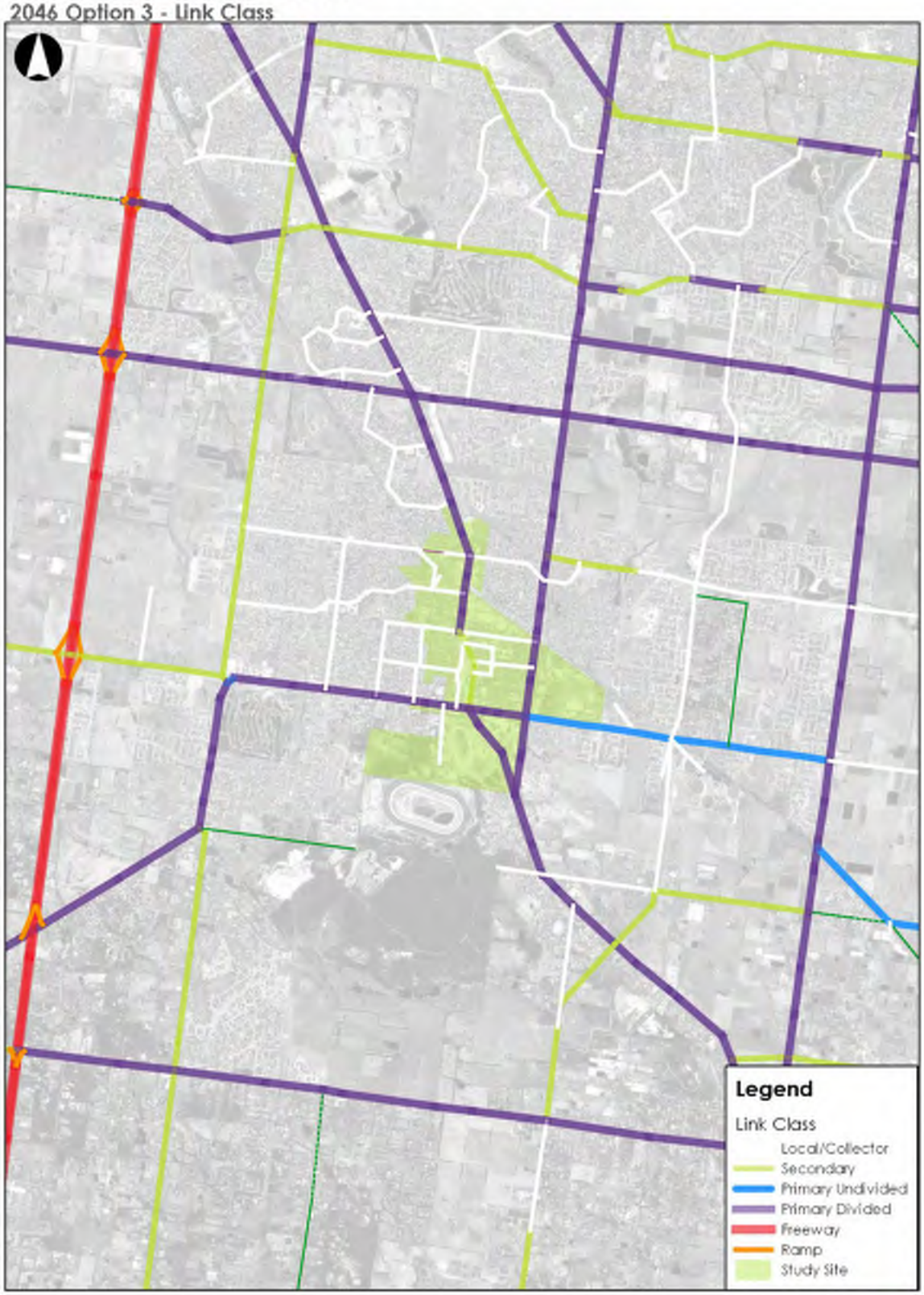

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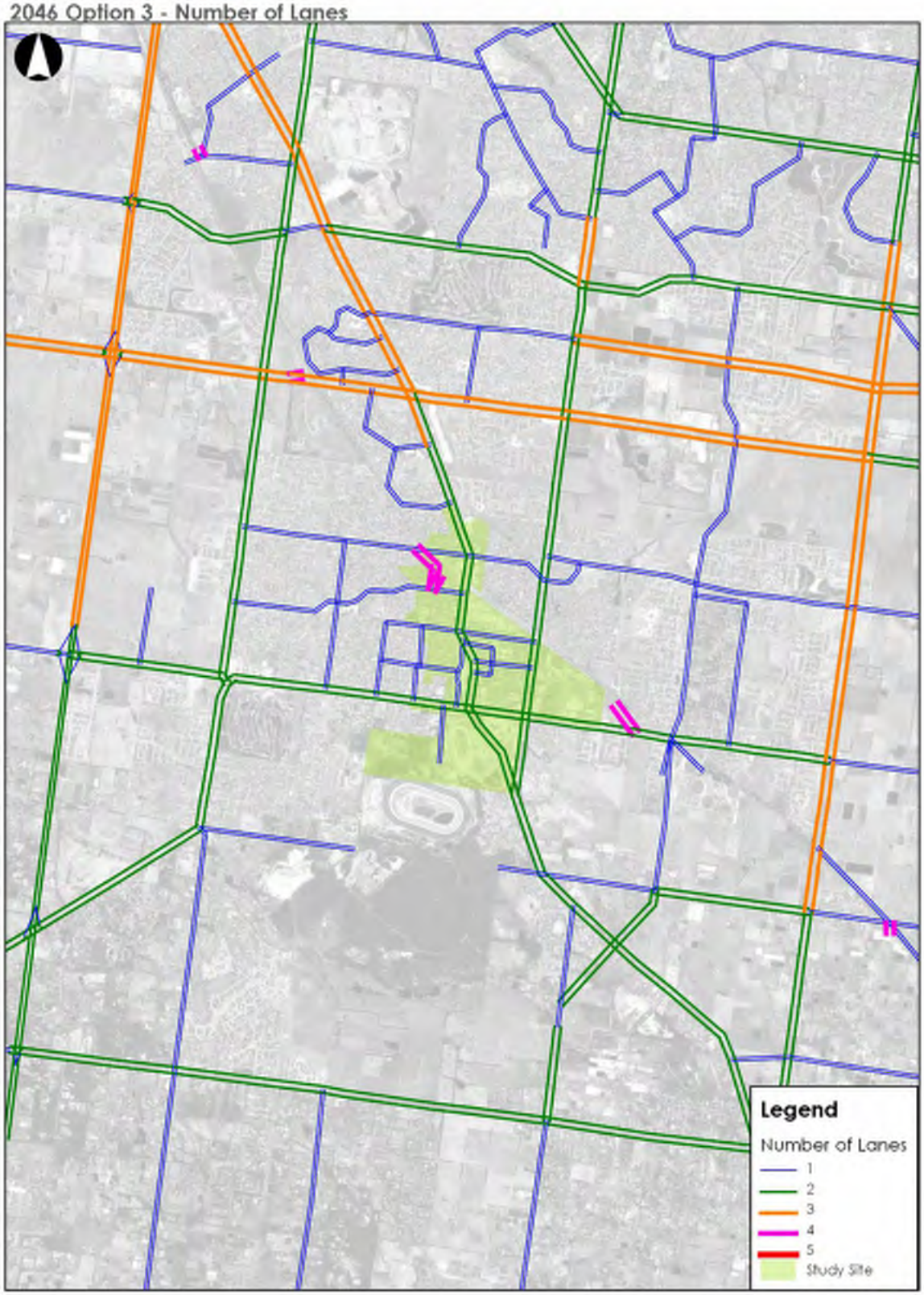
2046 Option 3 - Number of Lanes



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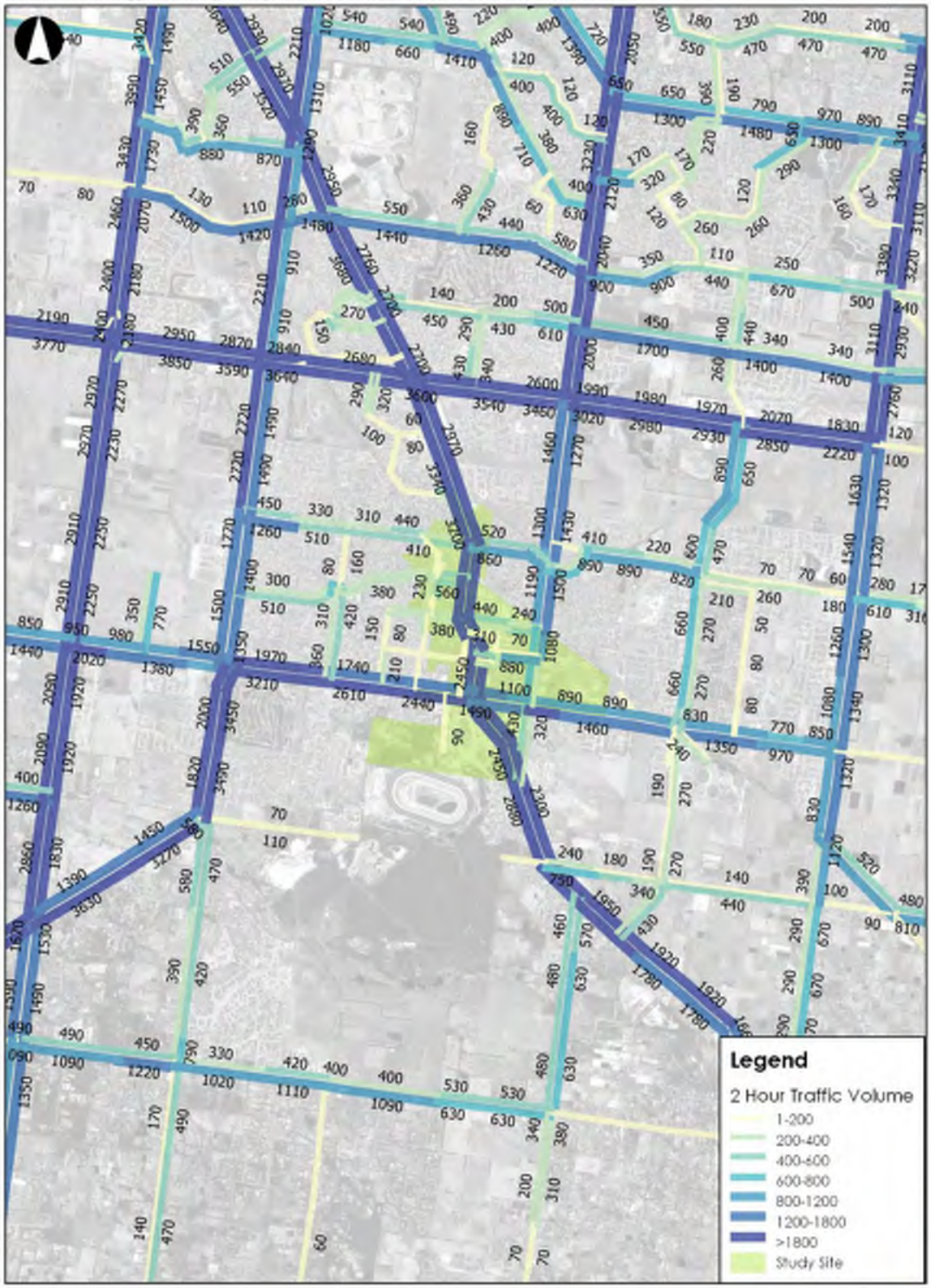
Model Outputs

Cranbourne Town Centre Access
2021 Existing Density - Option 1 - AM 2 Hour Traffic Volume



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Cranbourne Town Centre Access
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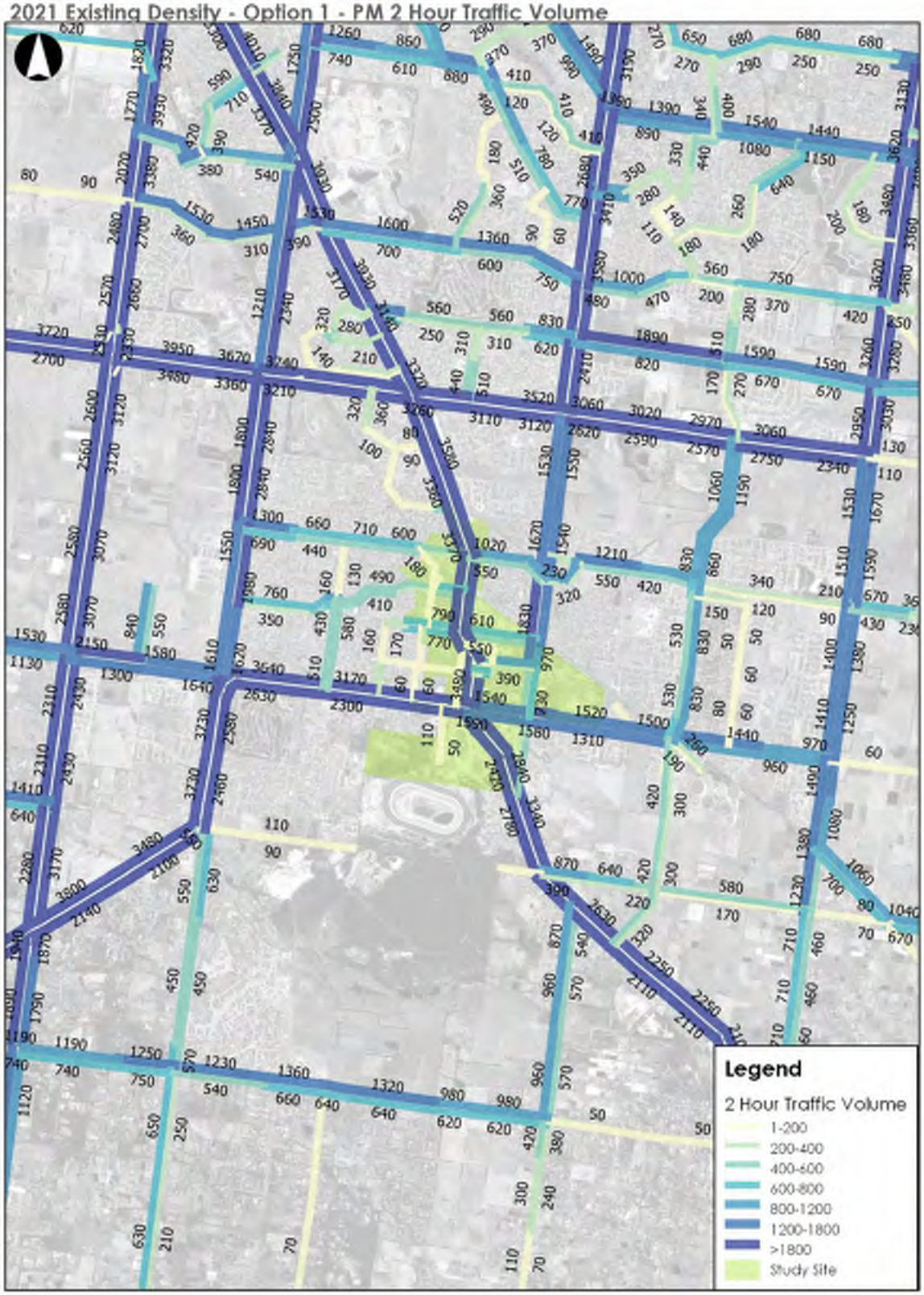

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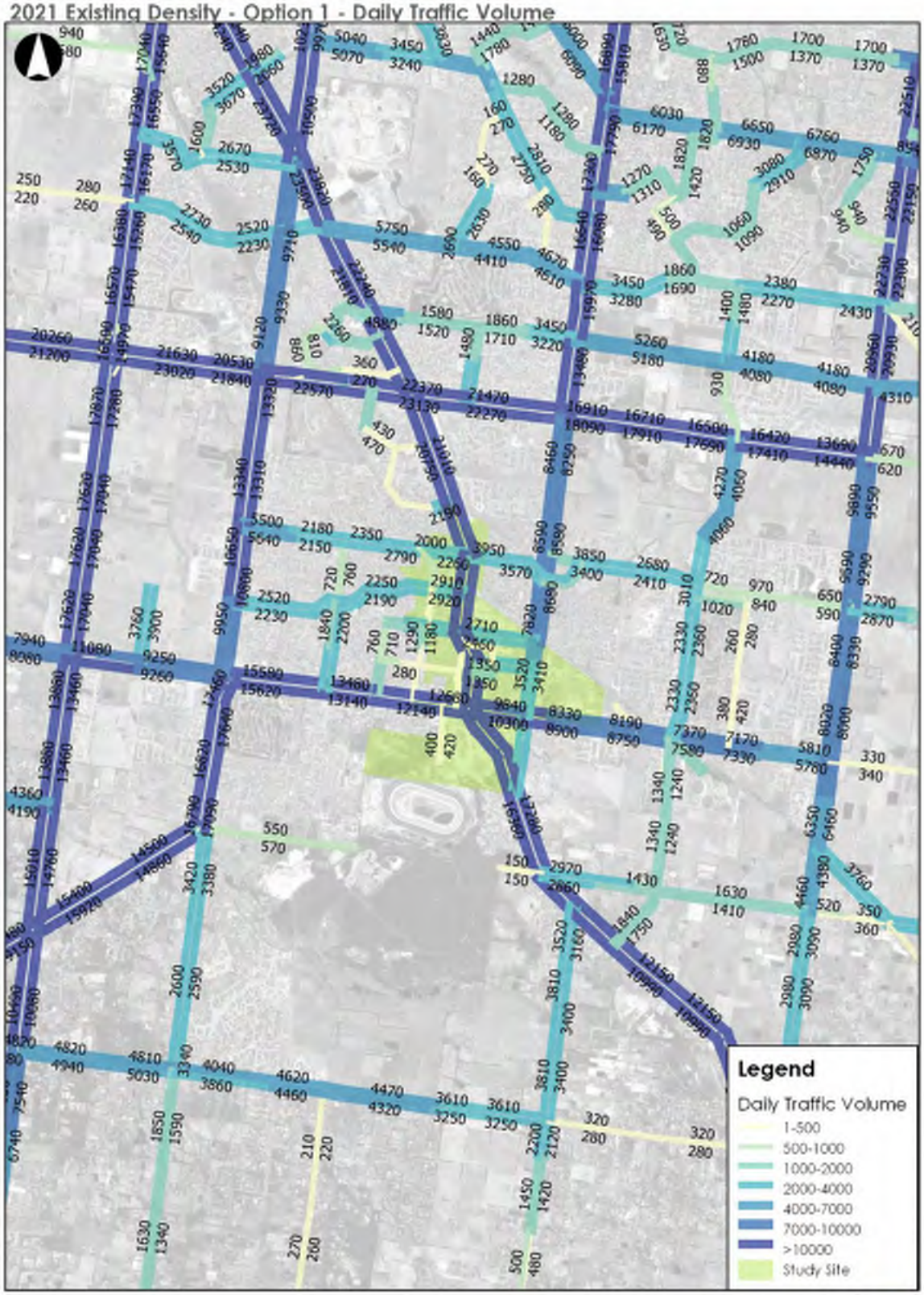
Cranbourne Town Centre Access
2021 Existing Density - Option 1 - Daily Traffic Volume



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Cranbourne Town Centre Access
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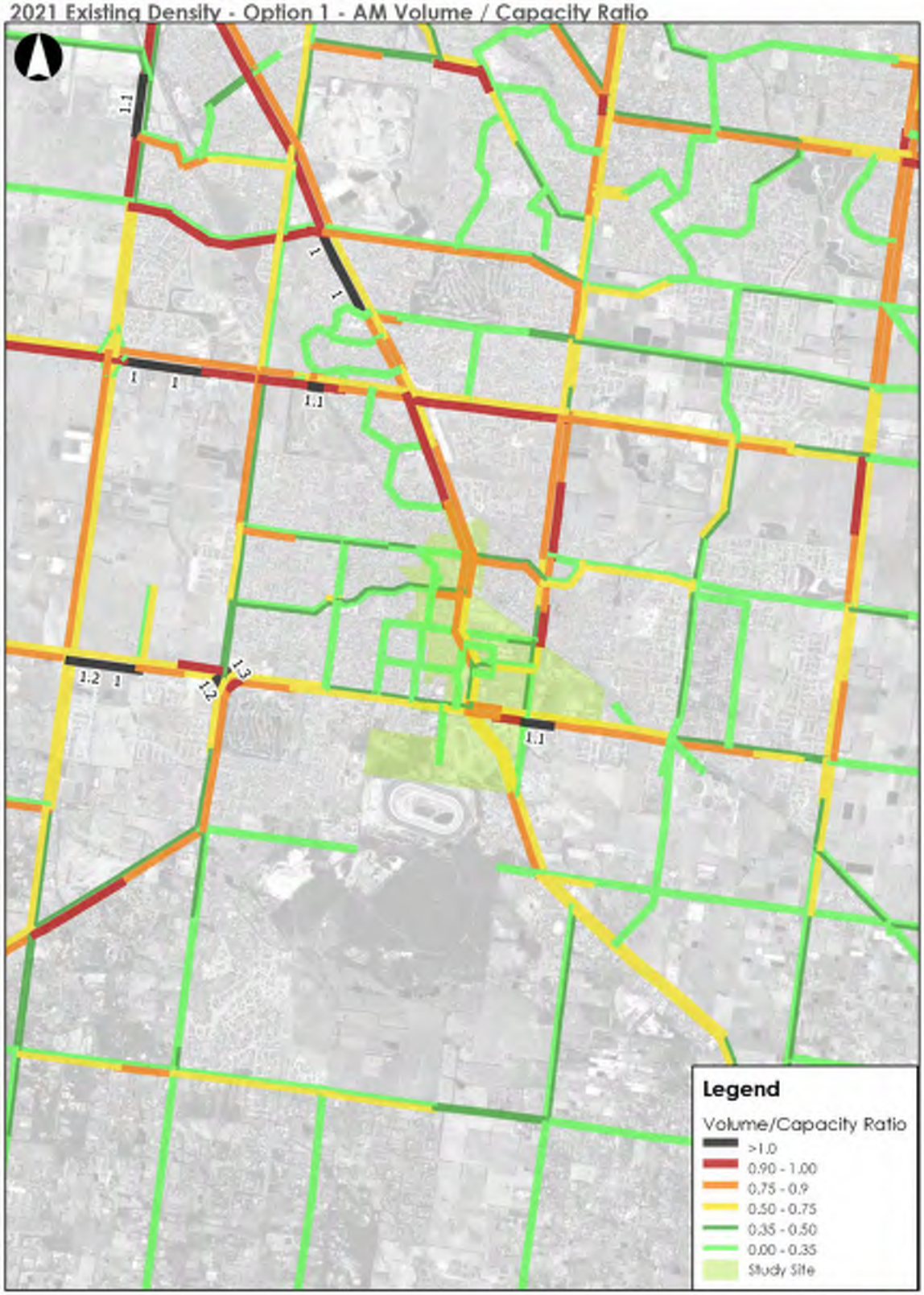

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Cranbourne Town Centre Access
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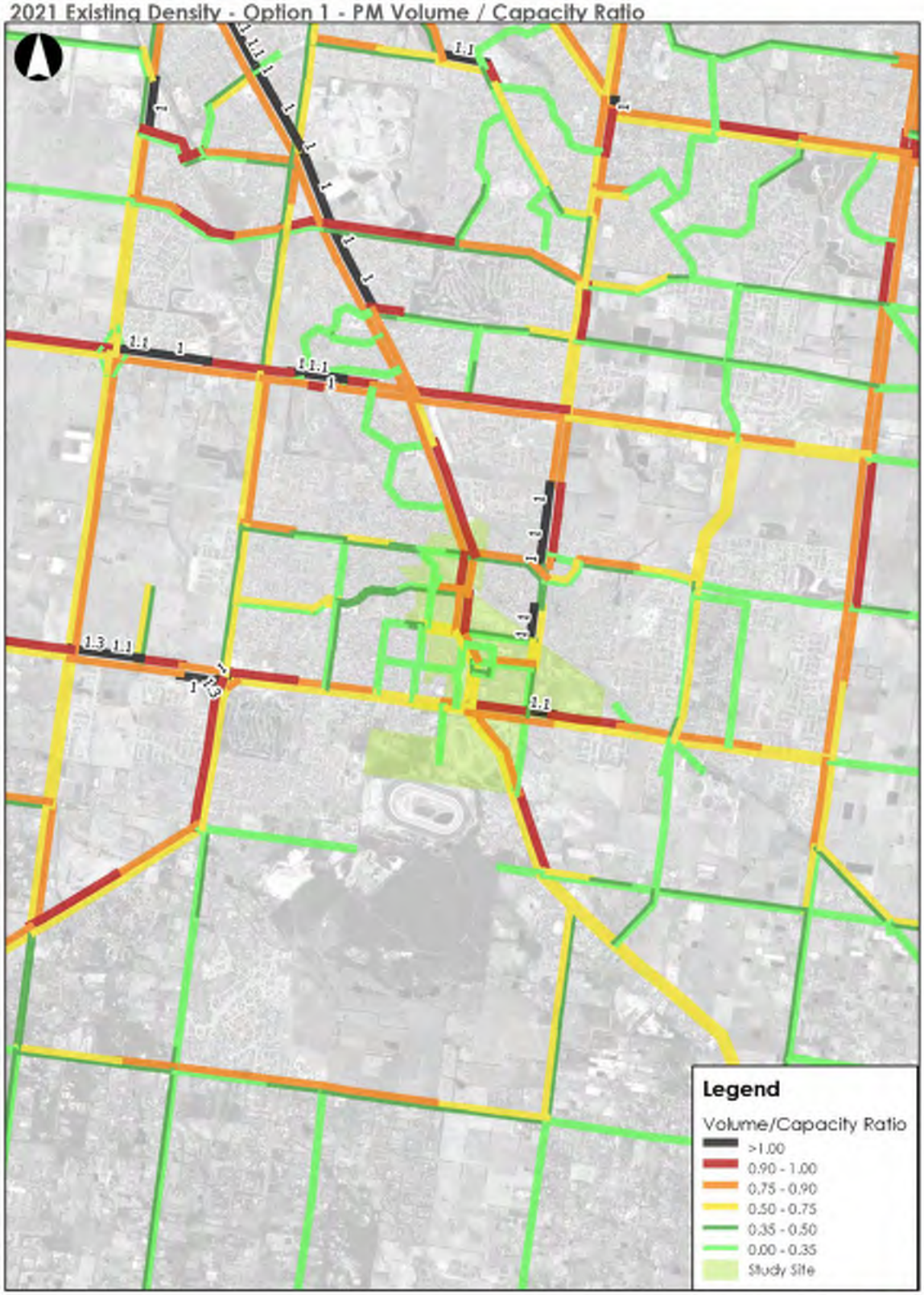

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Cranbourne Town Centre Access
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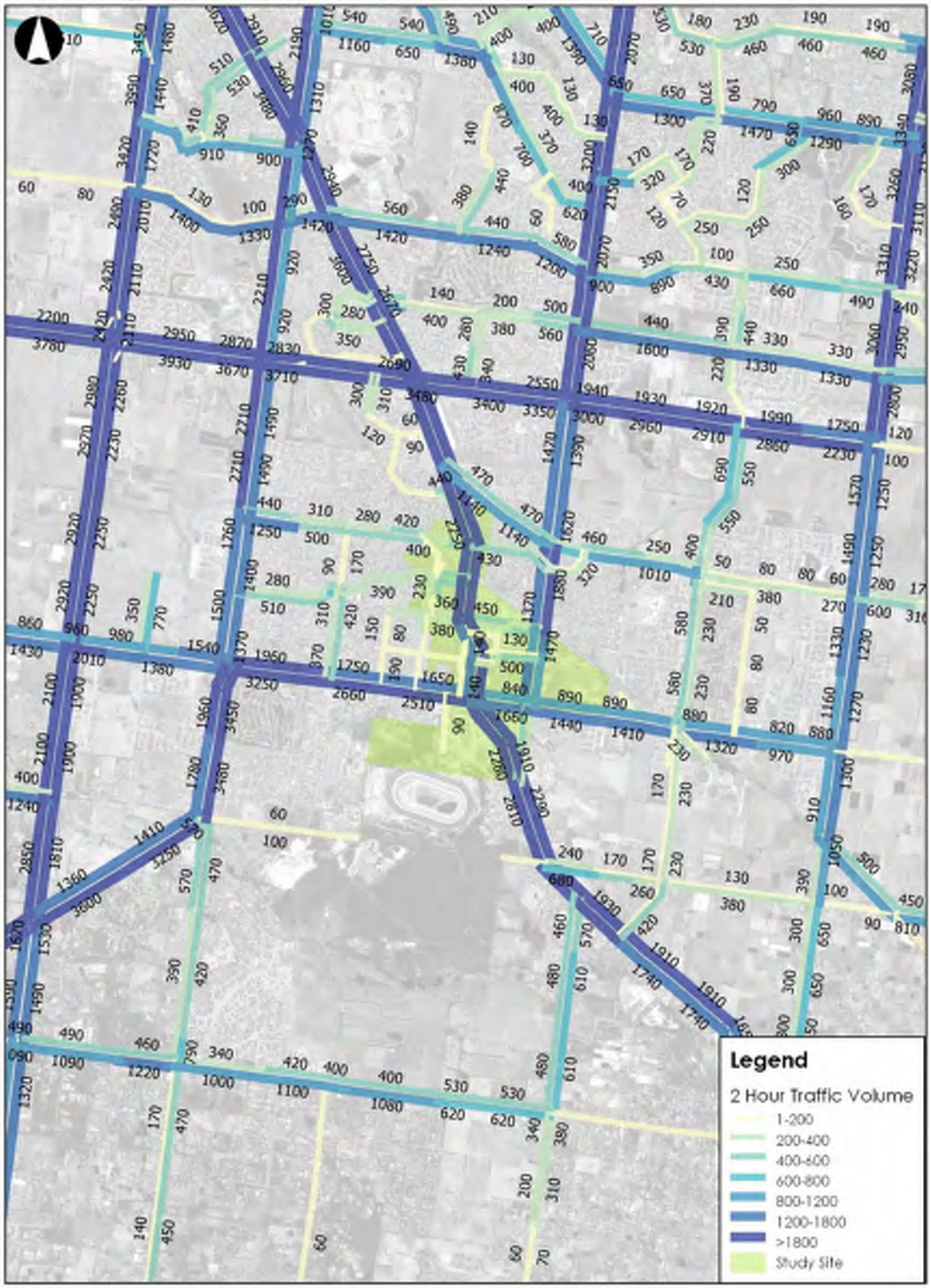

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Cranbourne Town Centre Access
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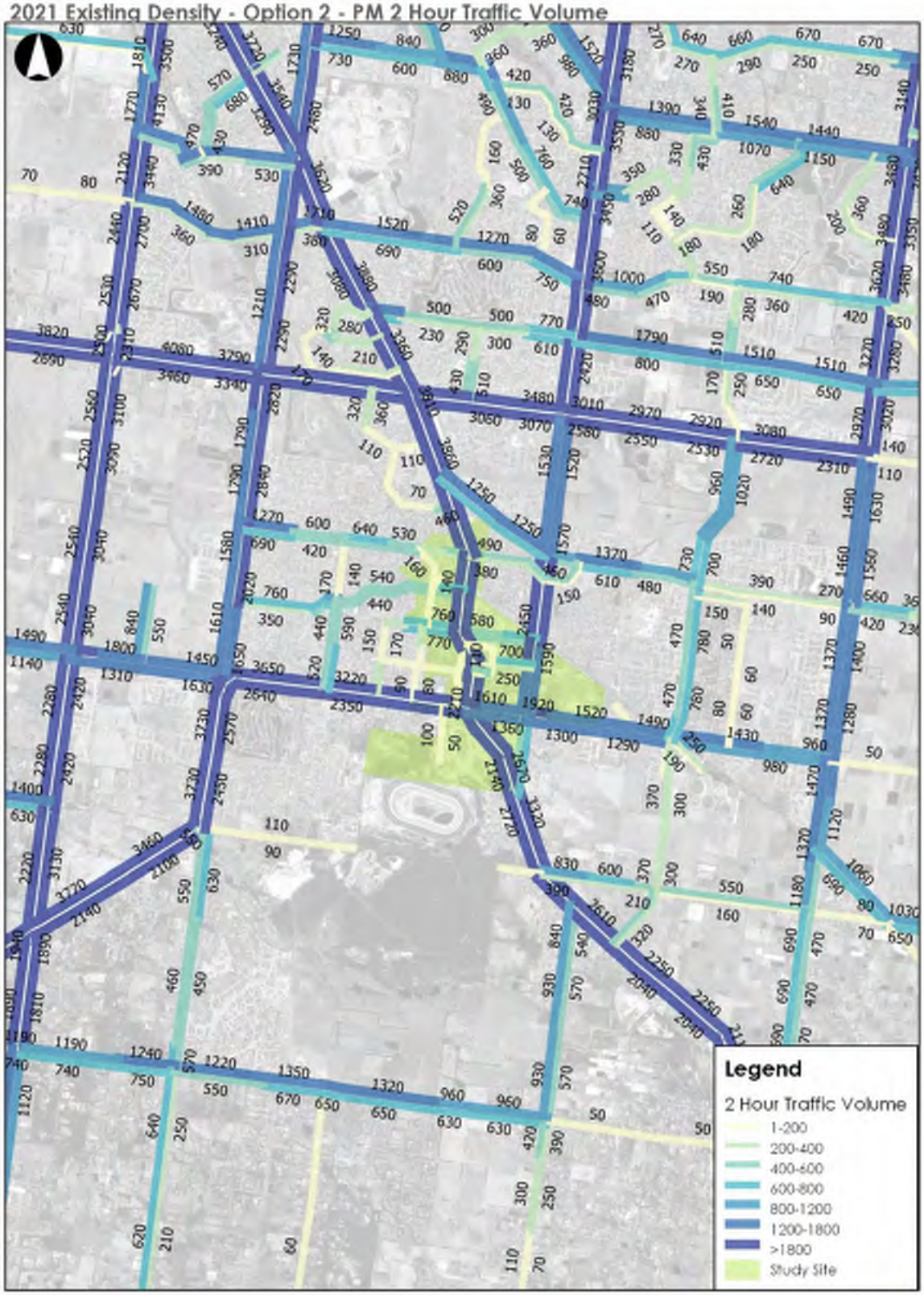

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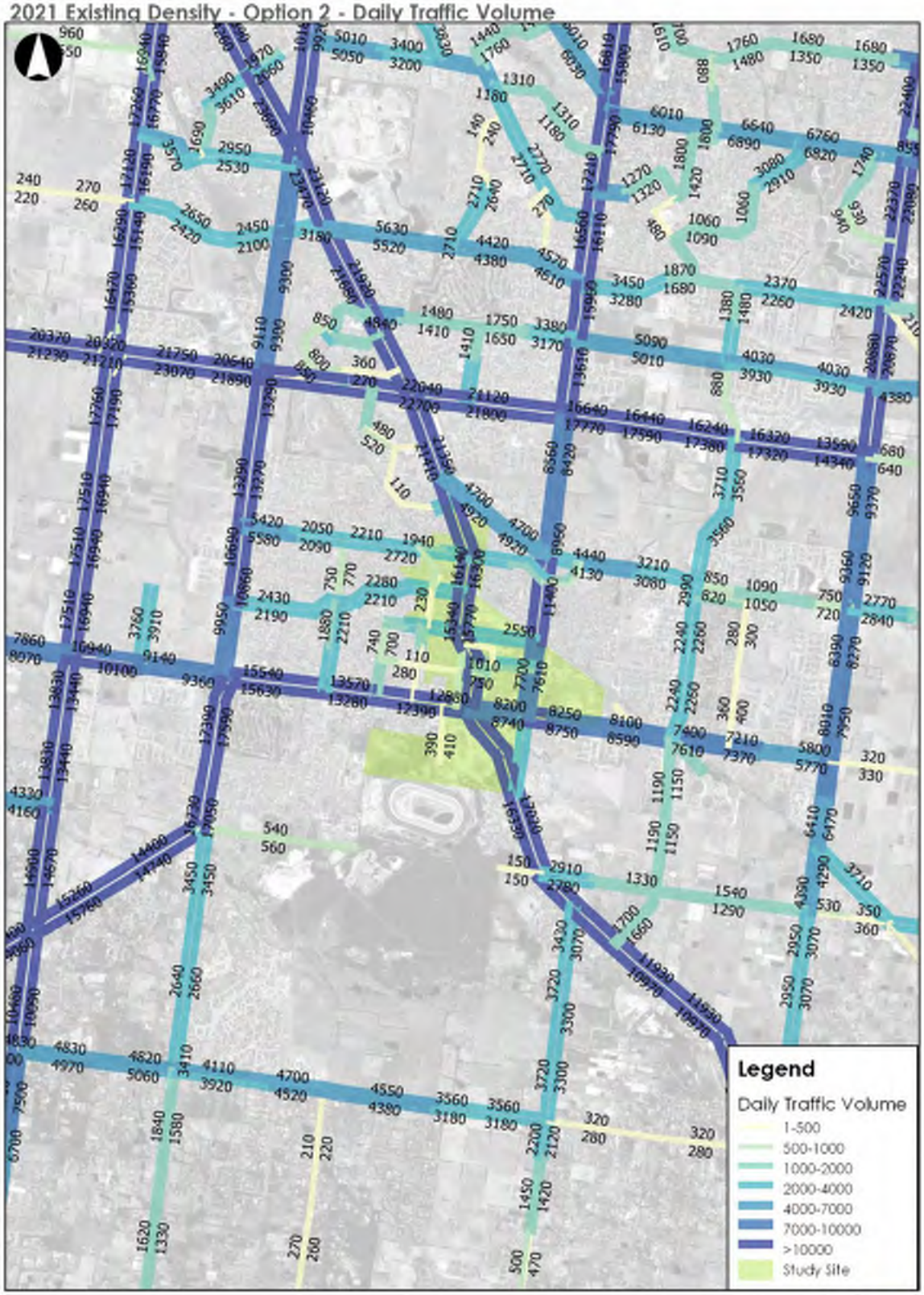
Cranbourne Town Centre Access
2021 Existing Density - Option 2 - Daily Traffic Volume



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Cranbourne Town Centre Access
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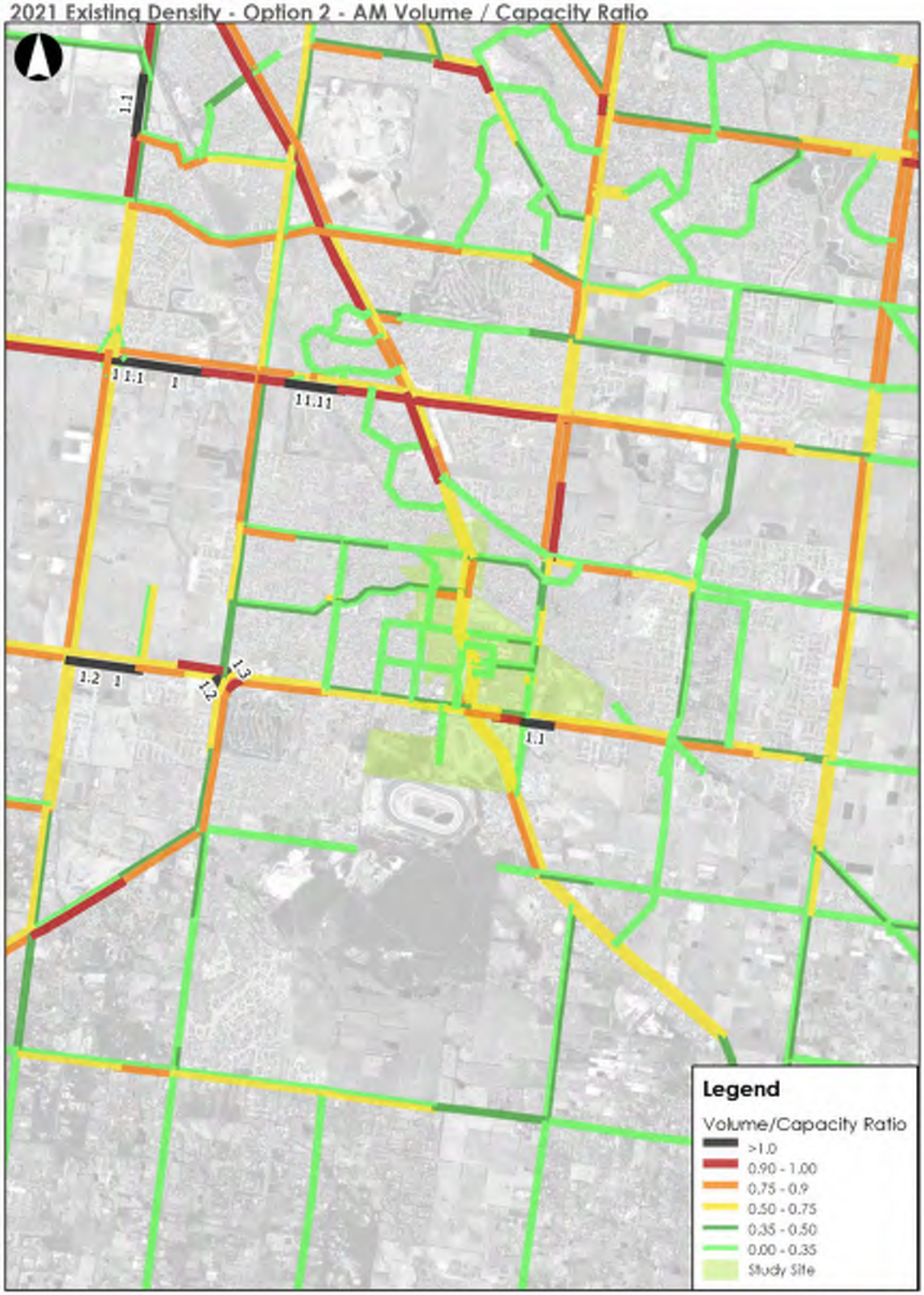

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Cranbourne Town Centre Access
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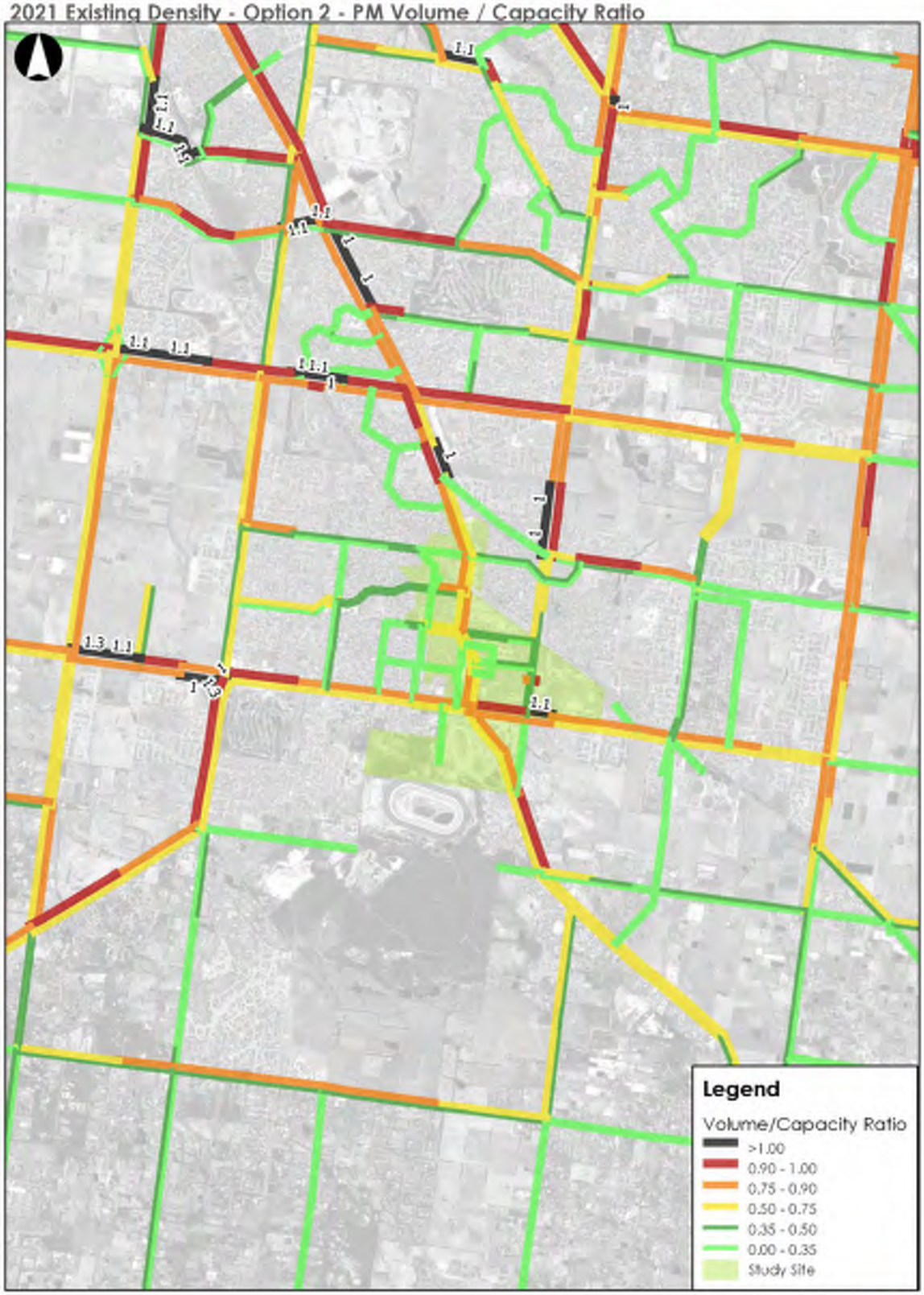

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Cranbourne Town Centre Access
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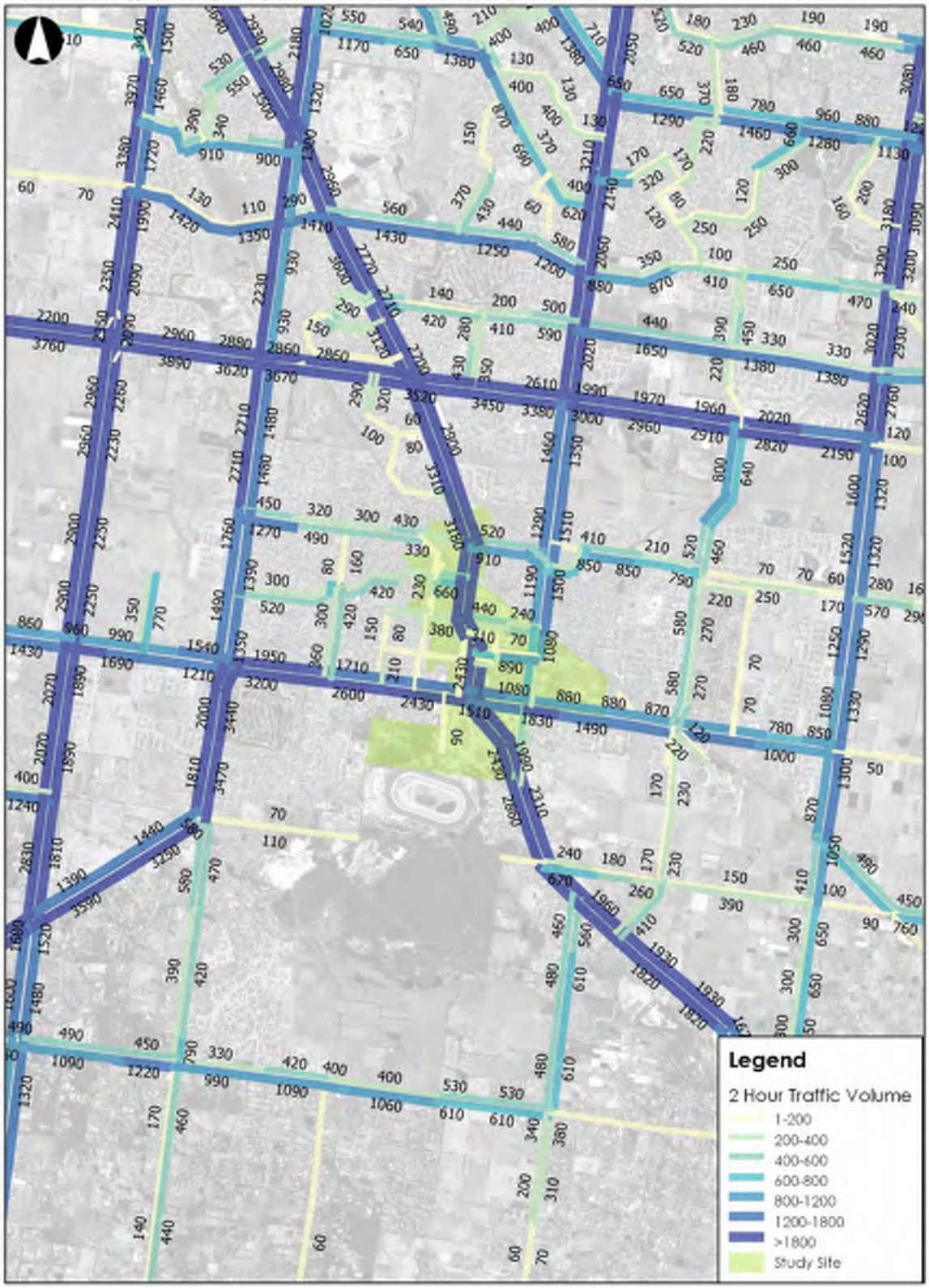

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Cranbourne Town Centre Access
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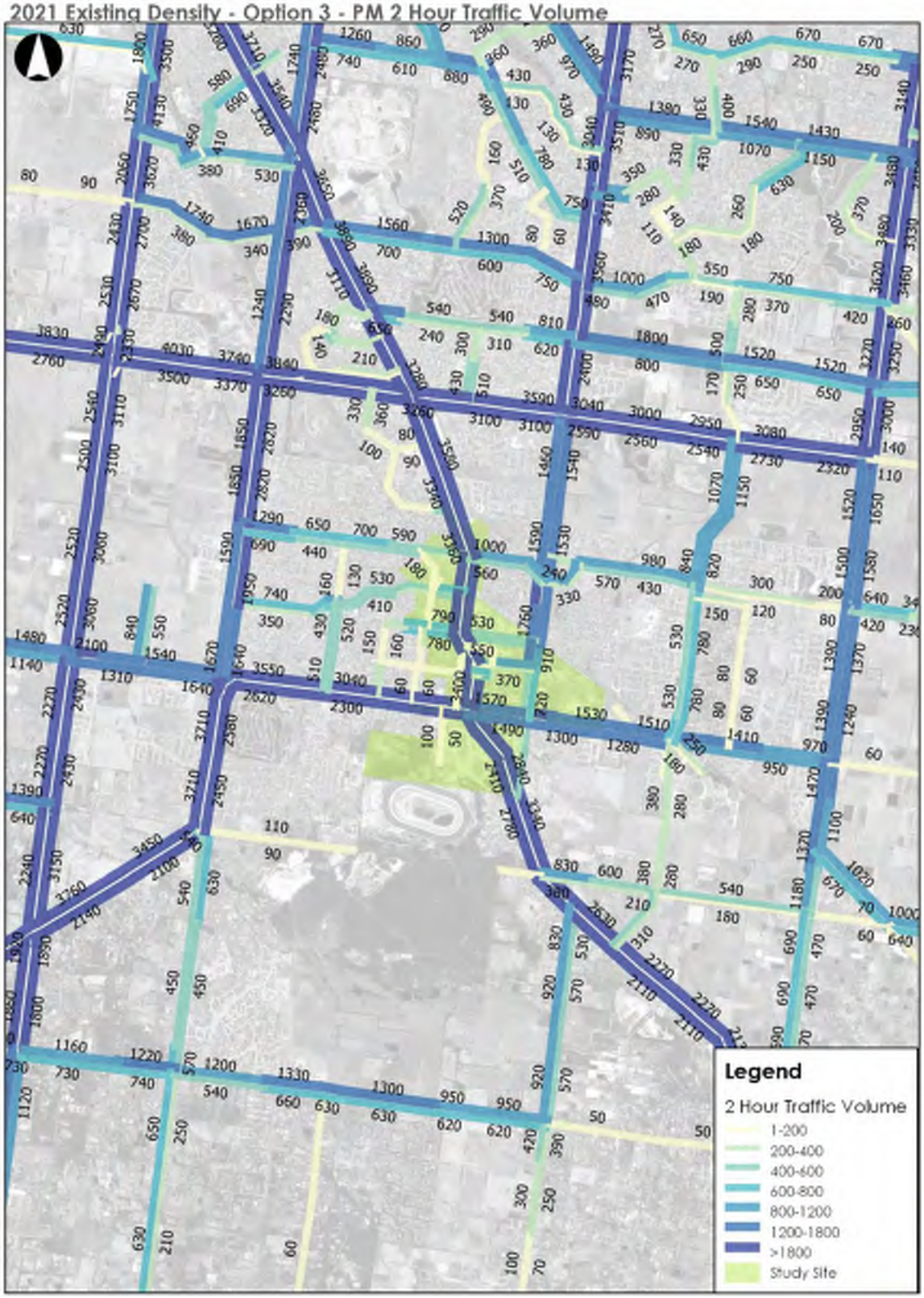

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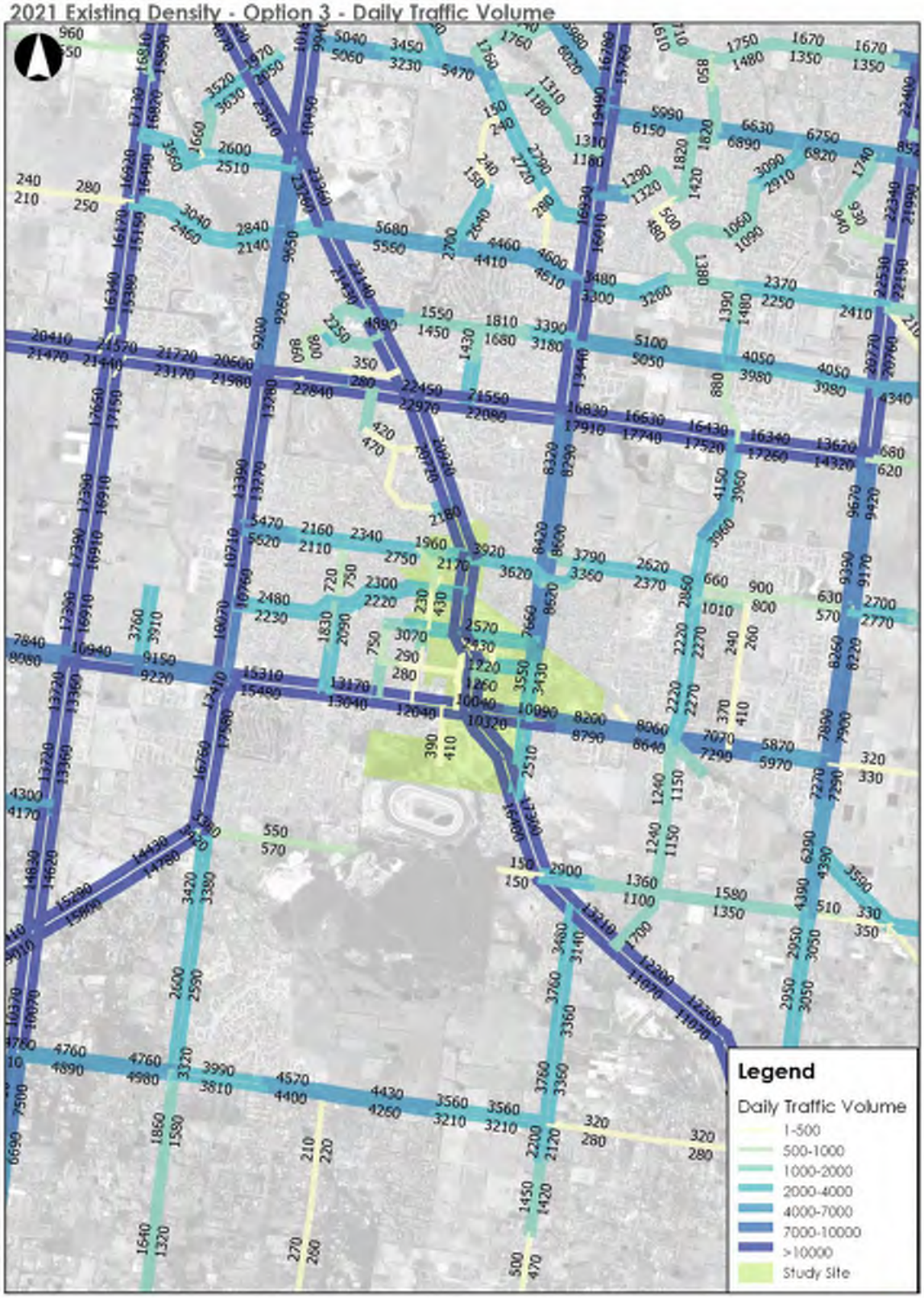
2021 Existing Density - Option 3 - Daily Traffic Volume



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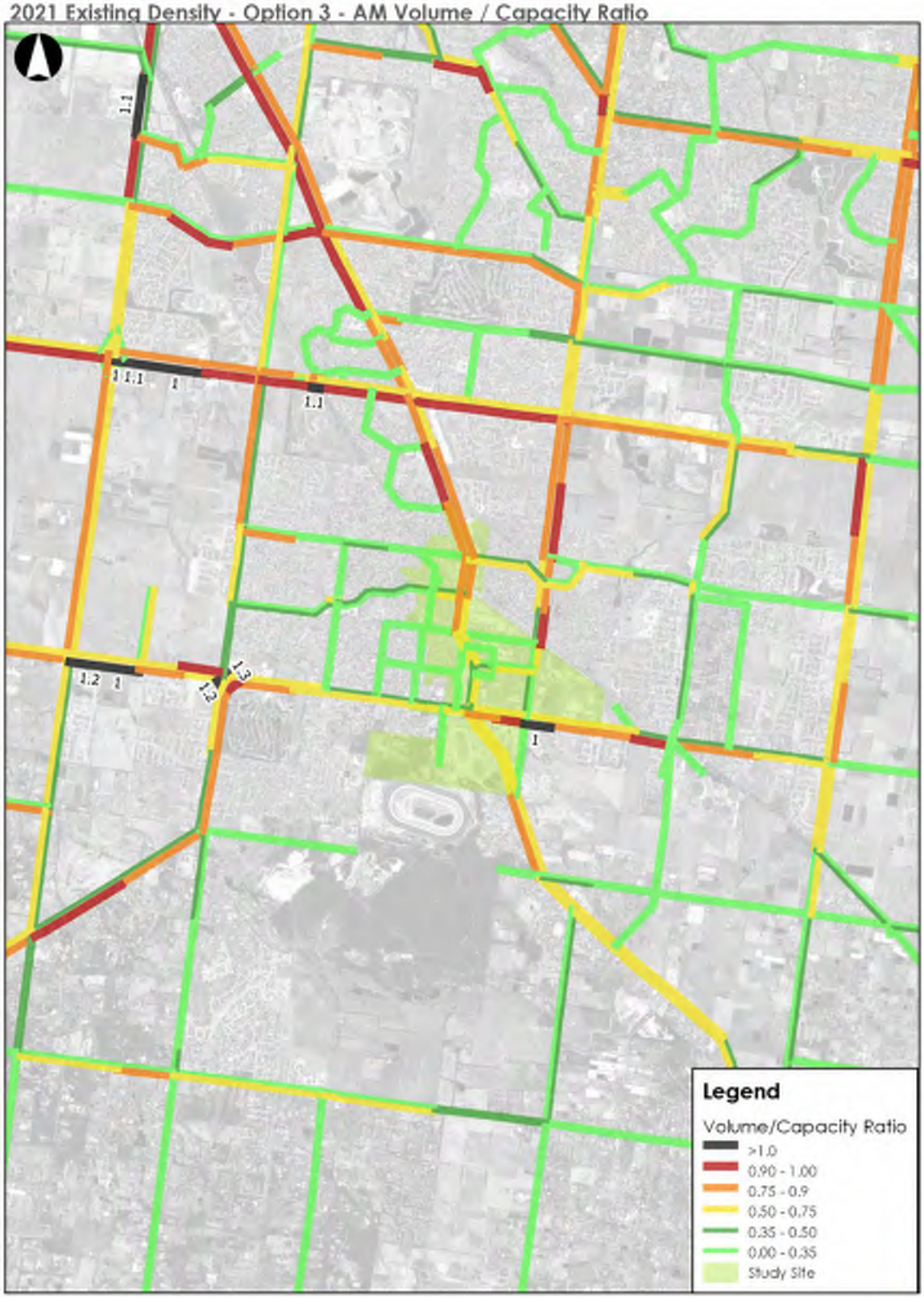
2021 Existing Density - Option 3 - AM Volume / Capacity Ratio



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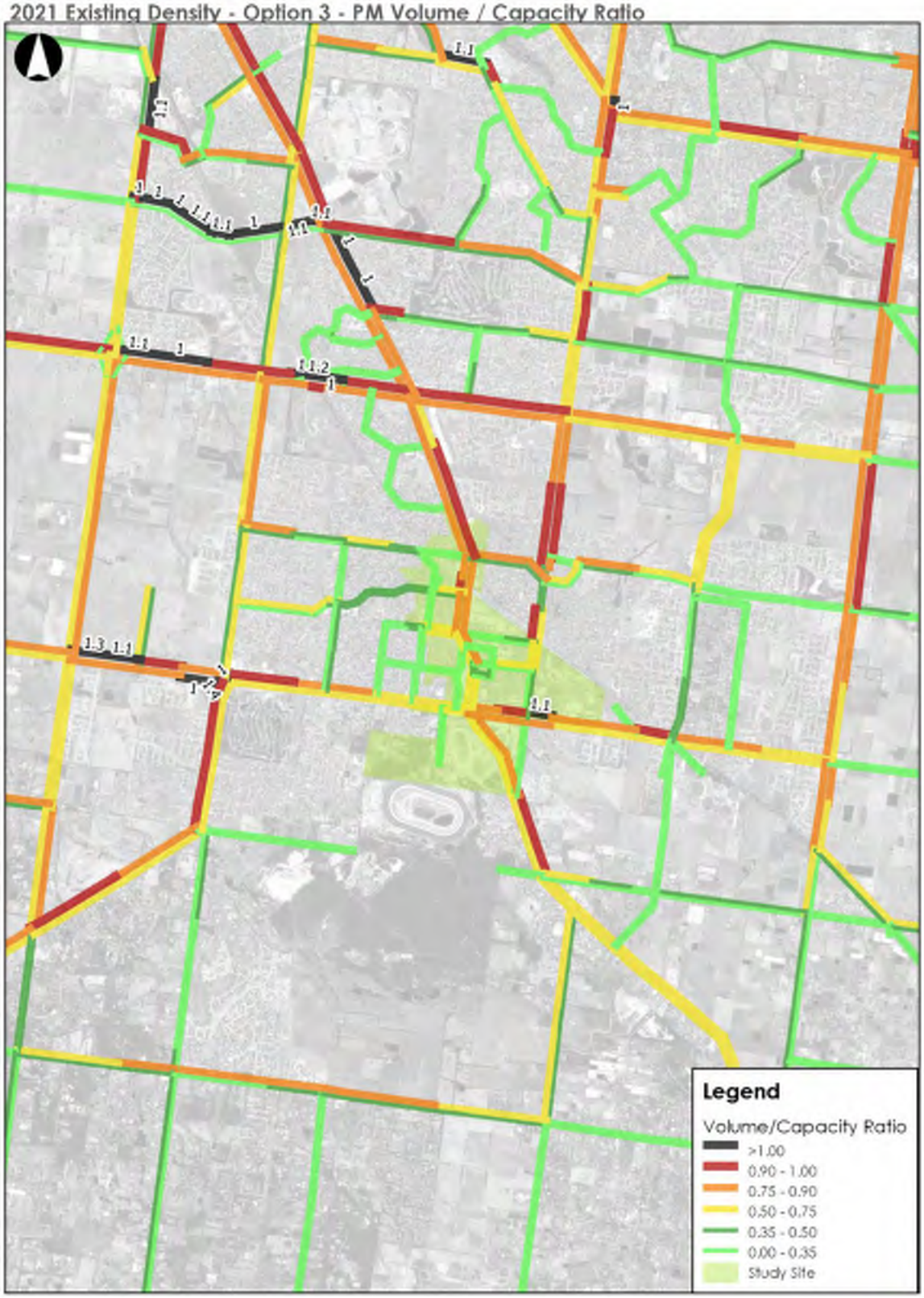

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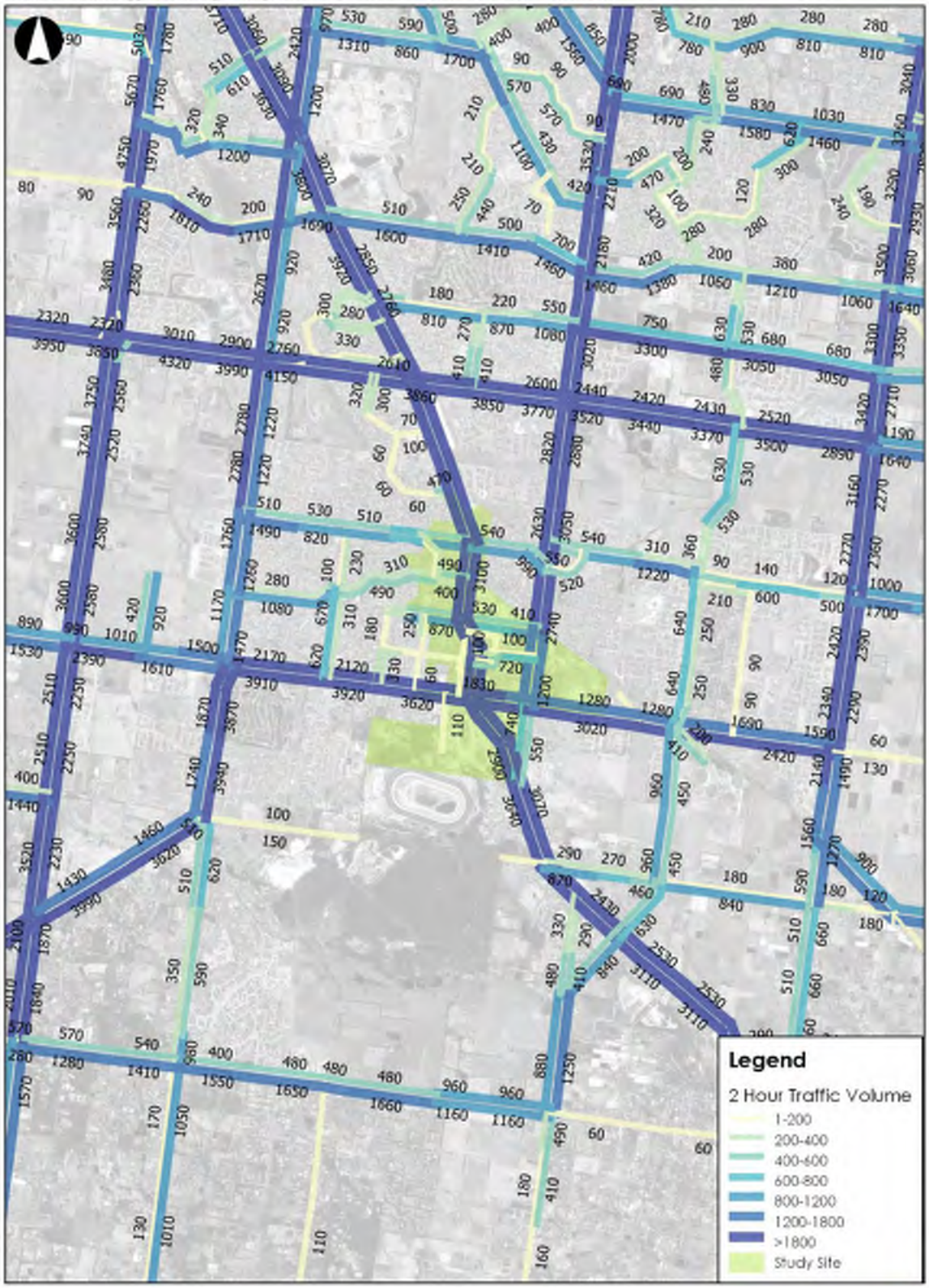
Cranbourne Town Centre Access
2031 Existing Density - Option 1 - AM 2 Hour Traffic Volume



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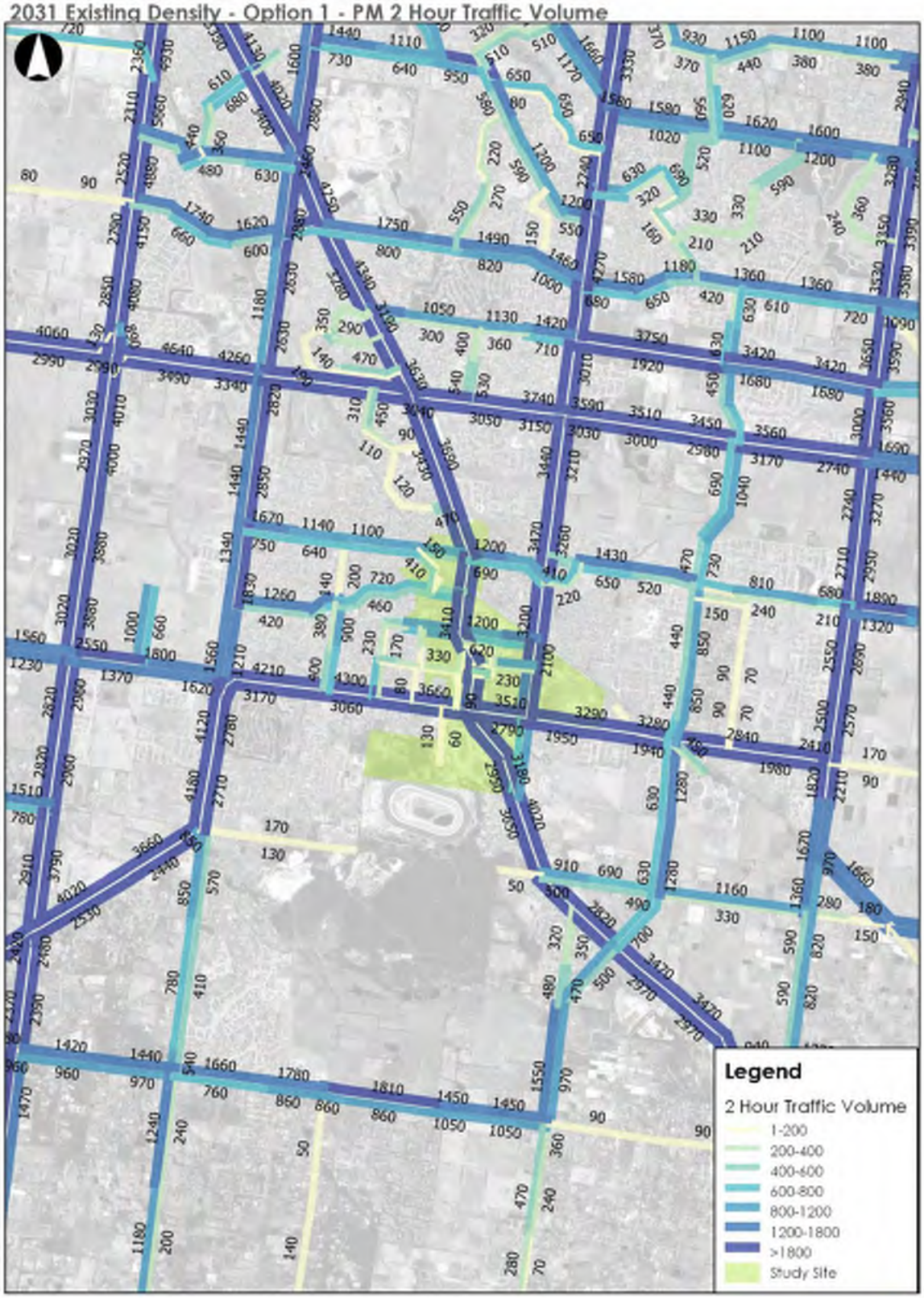

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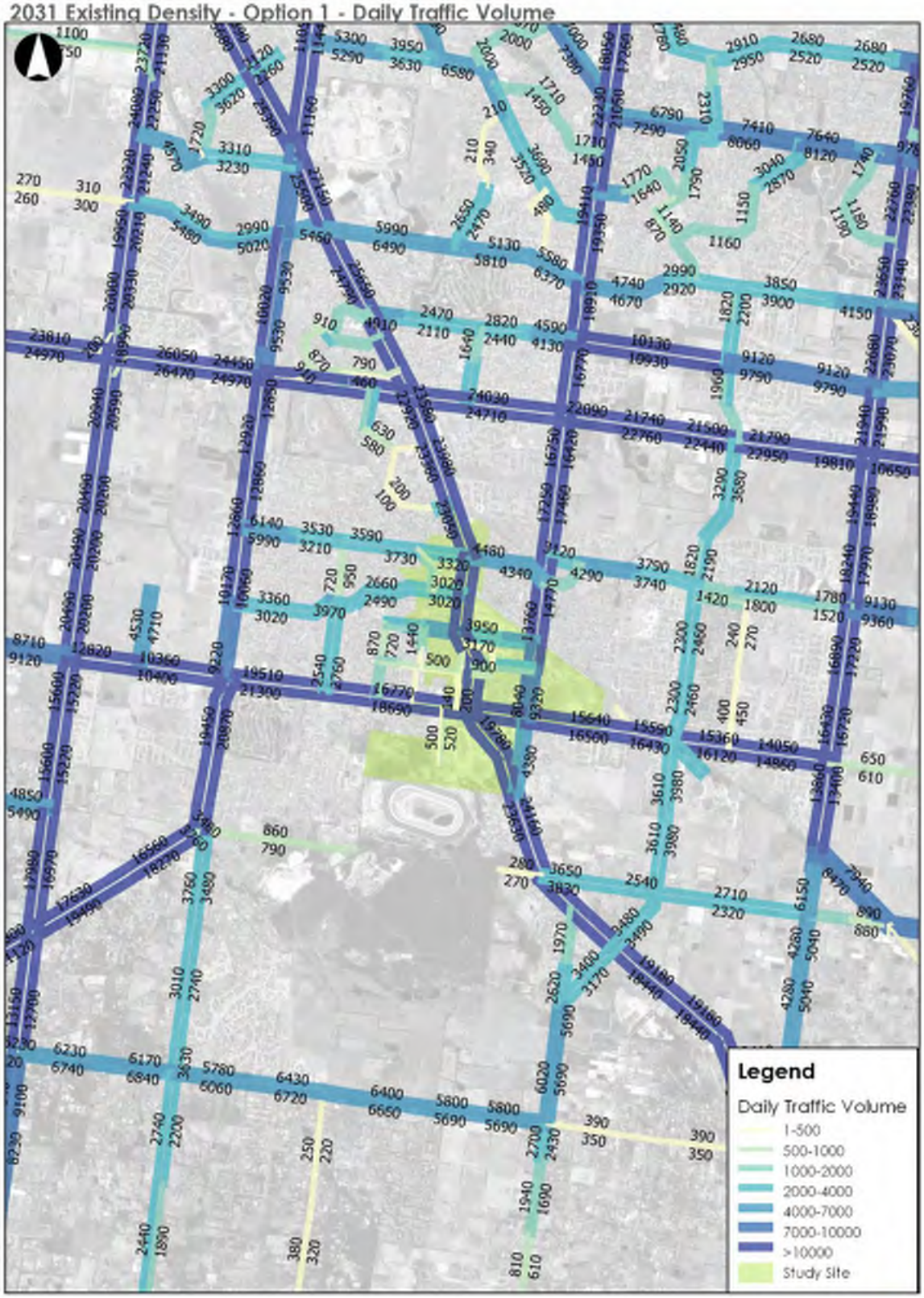

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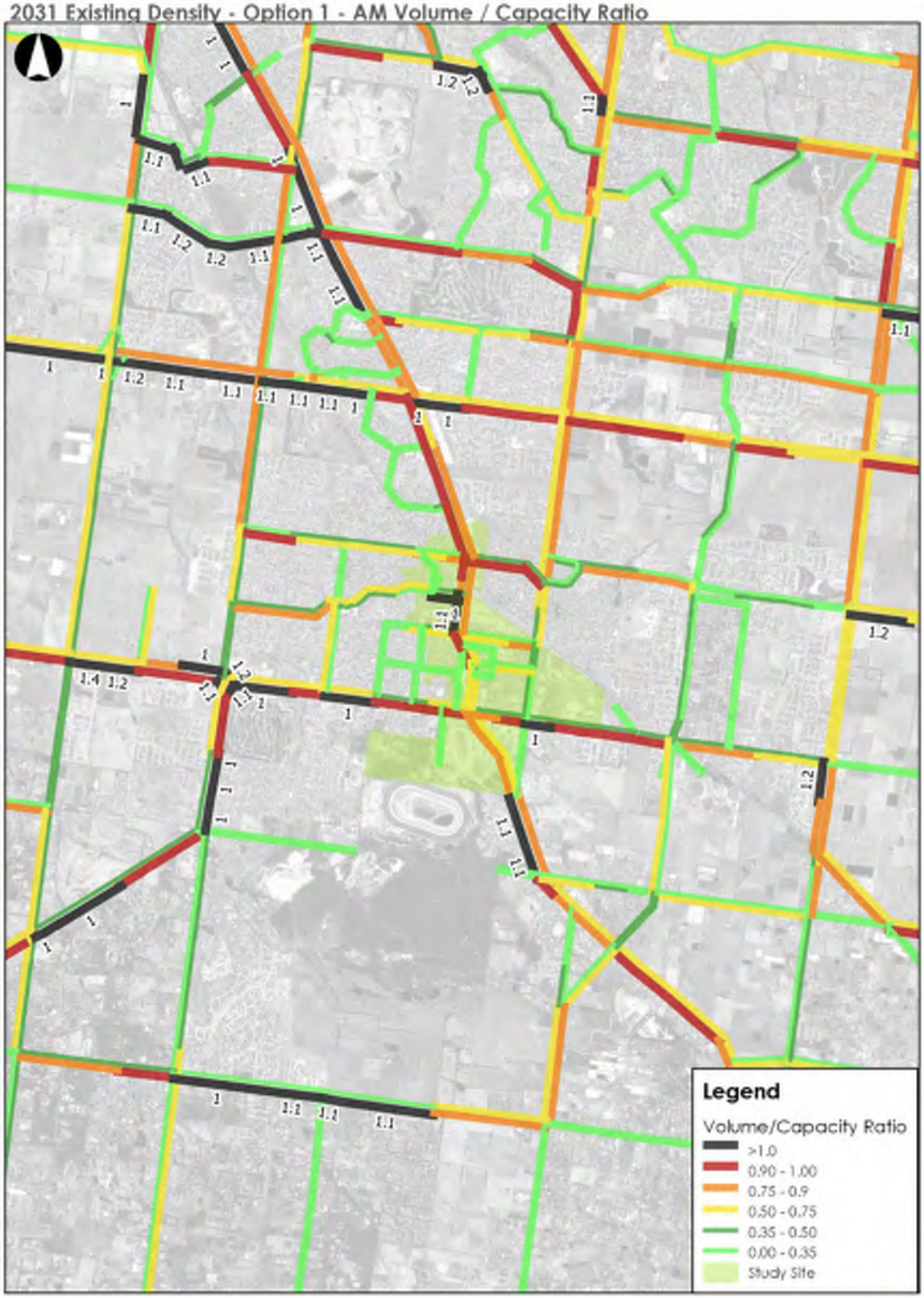

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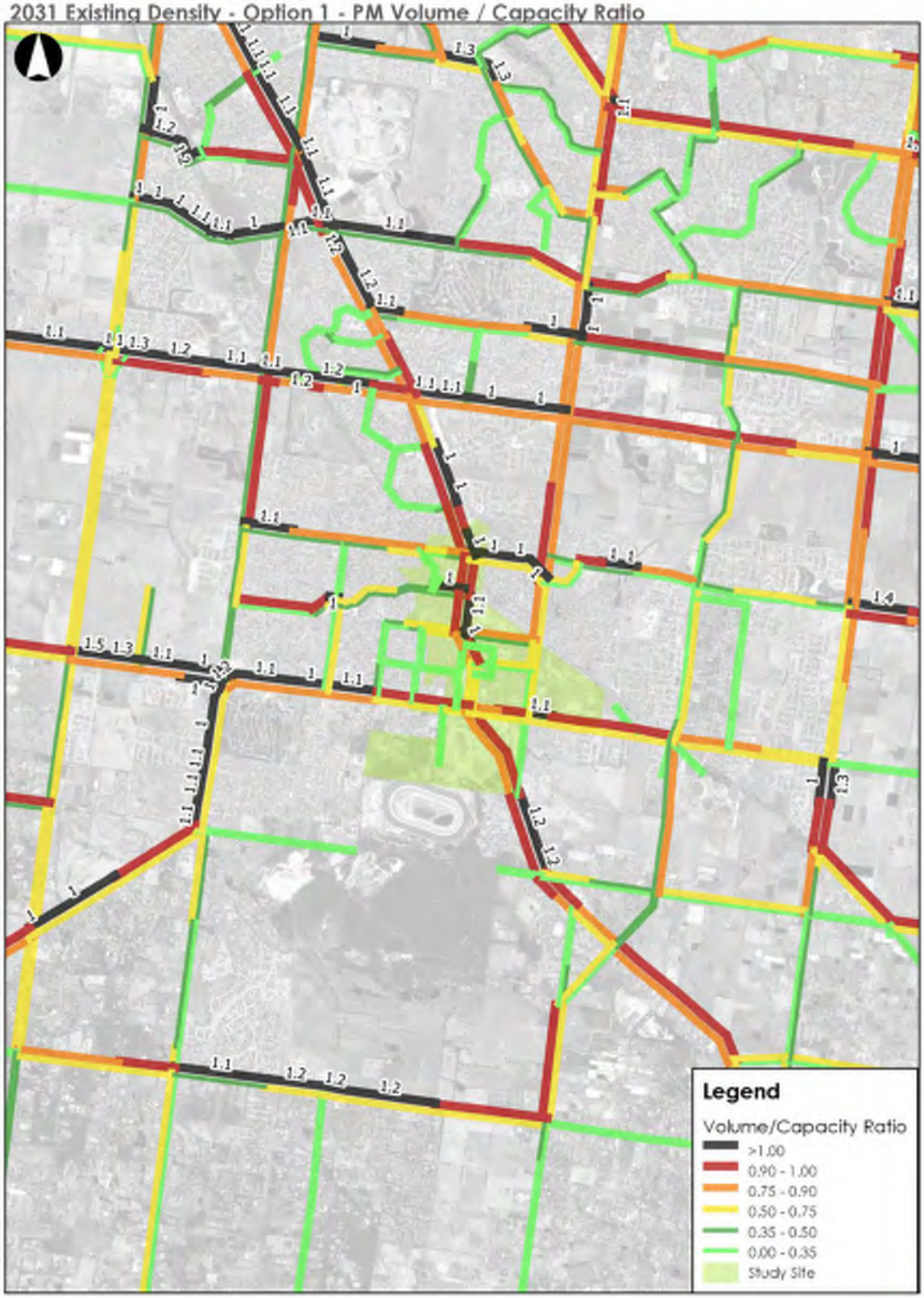

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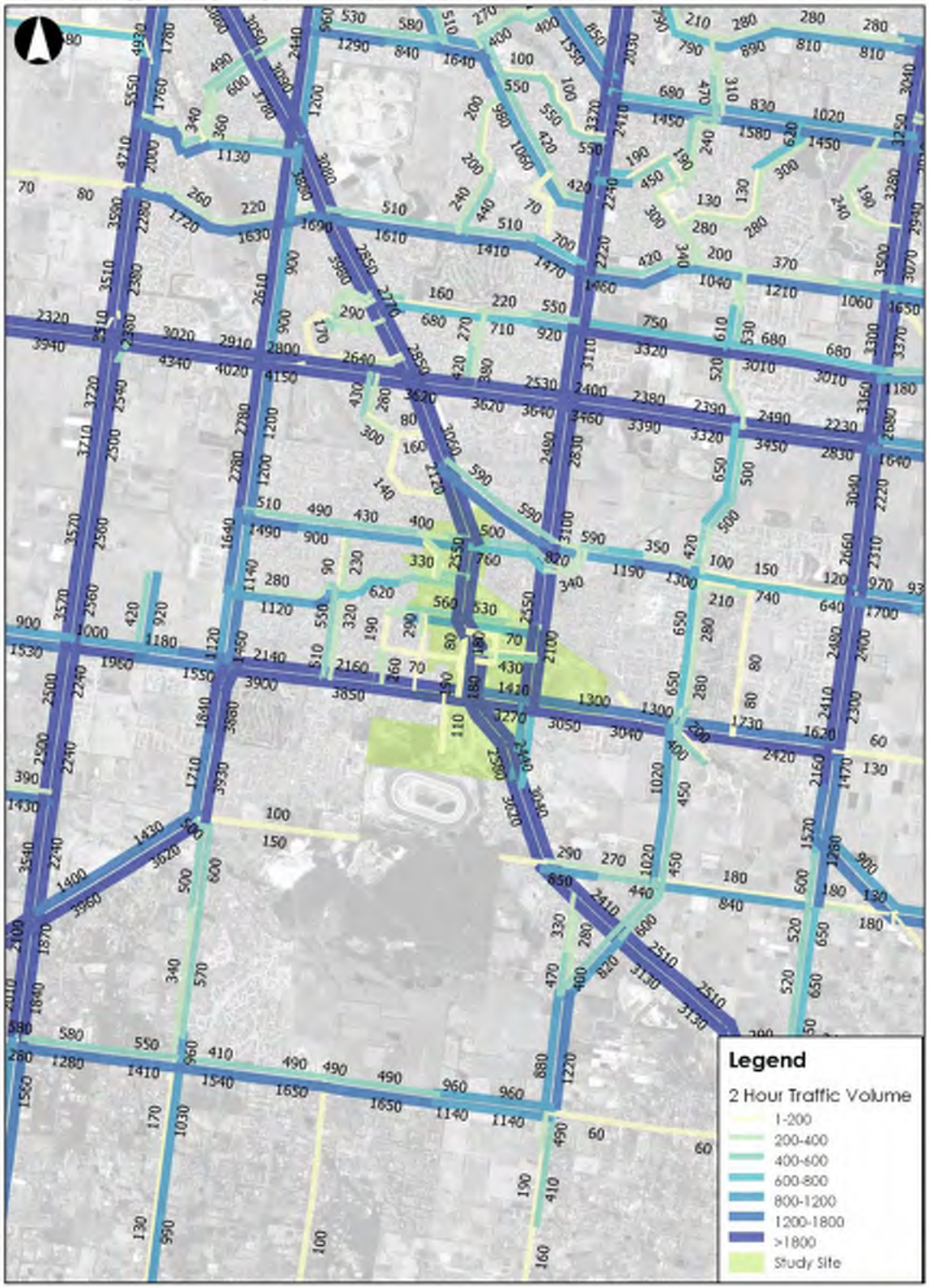

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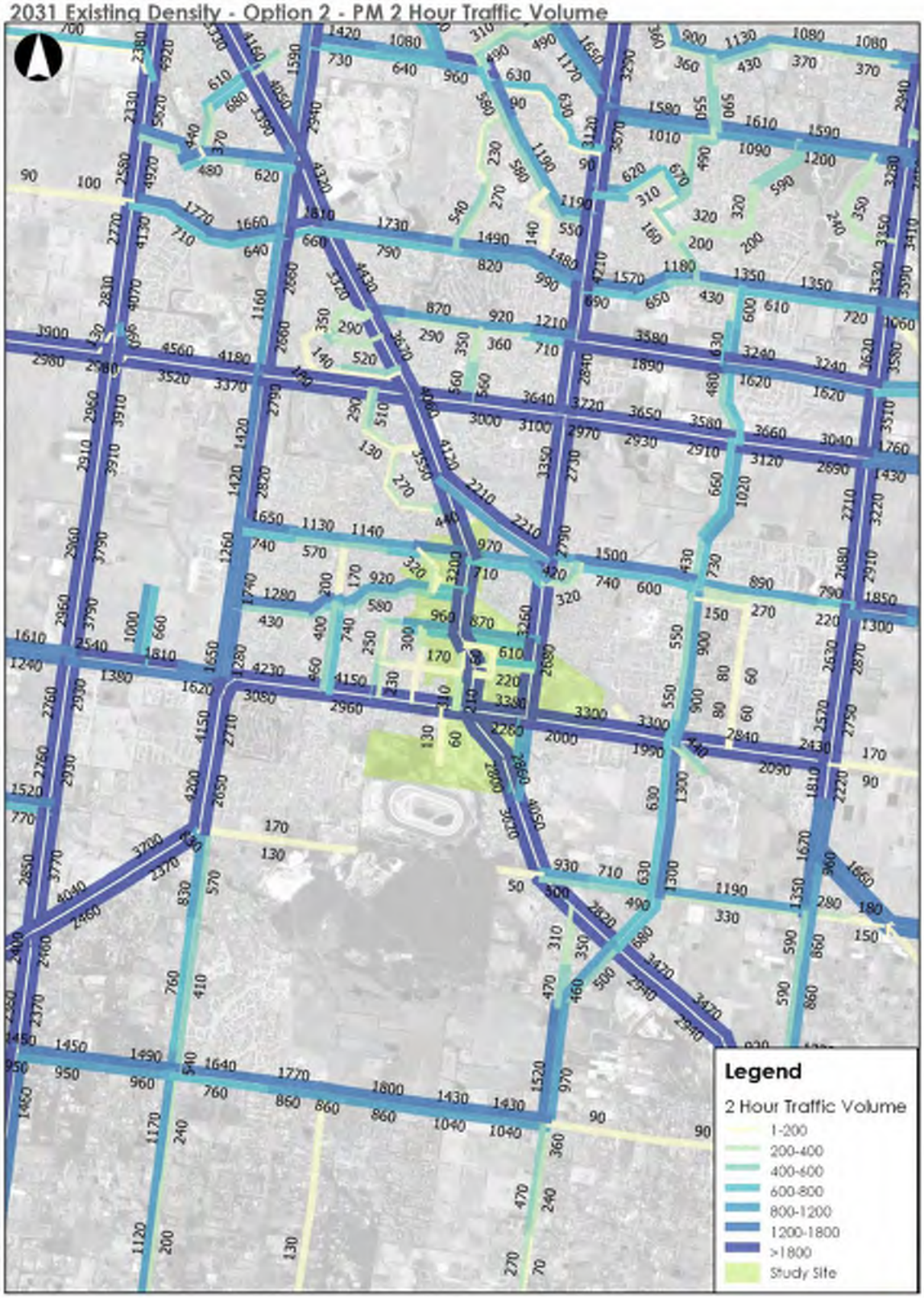
2031 Existing Density - Option 2 - PM 2 Hour Traffic Volume



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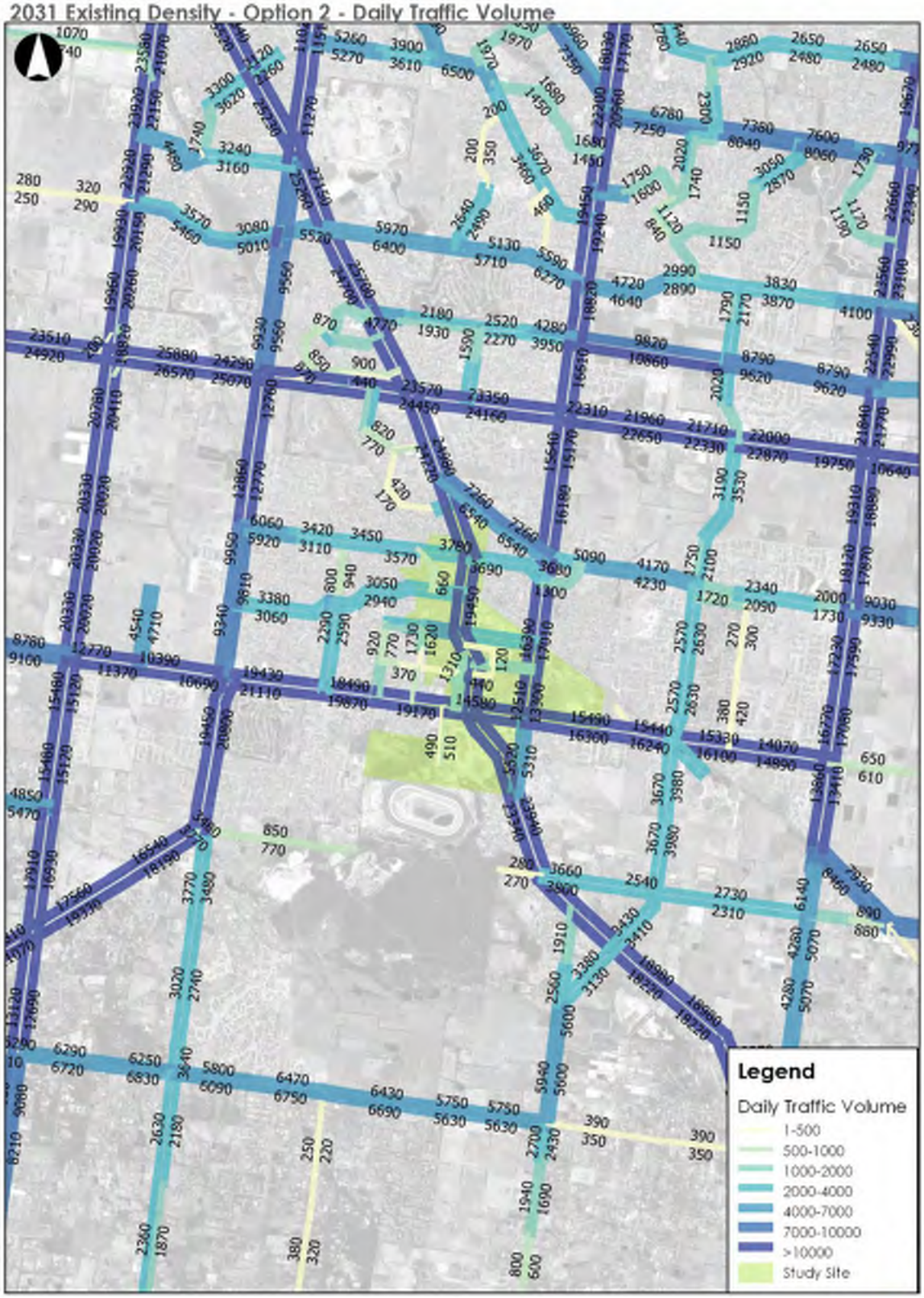

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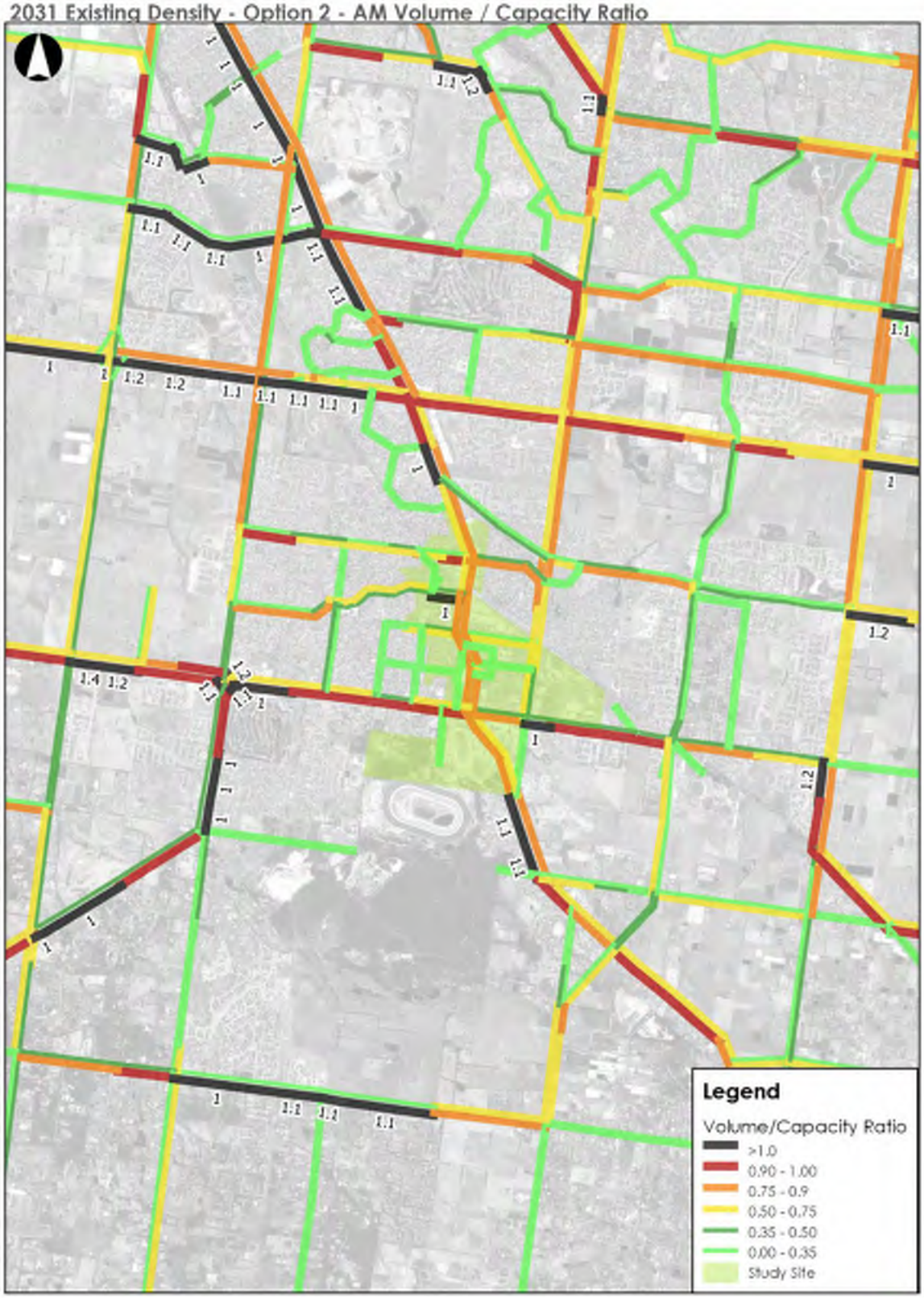

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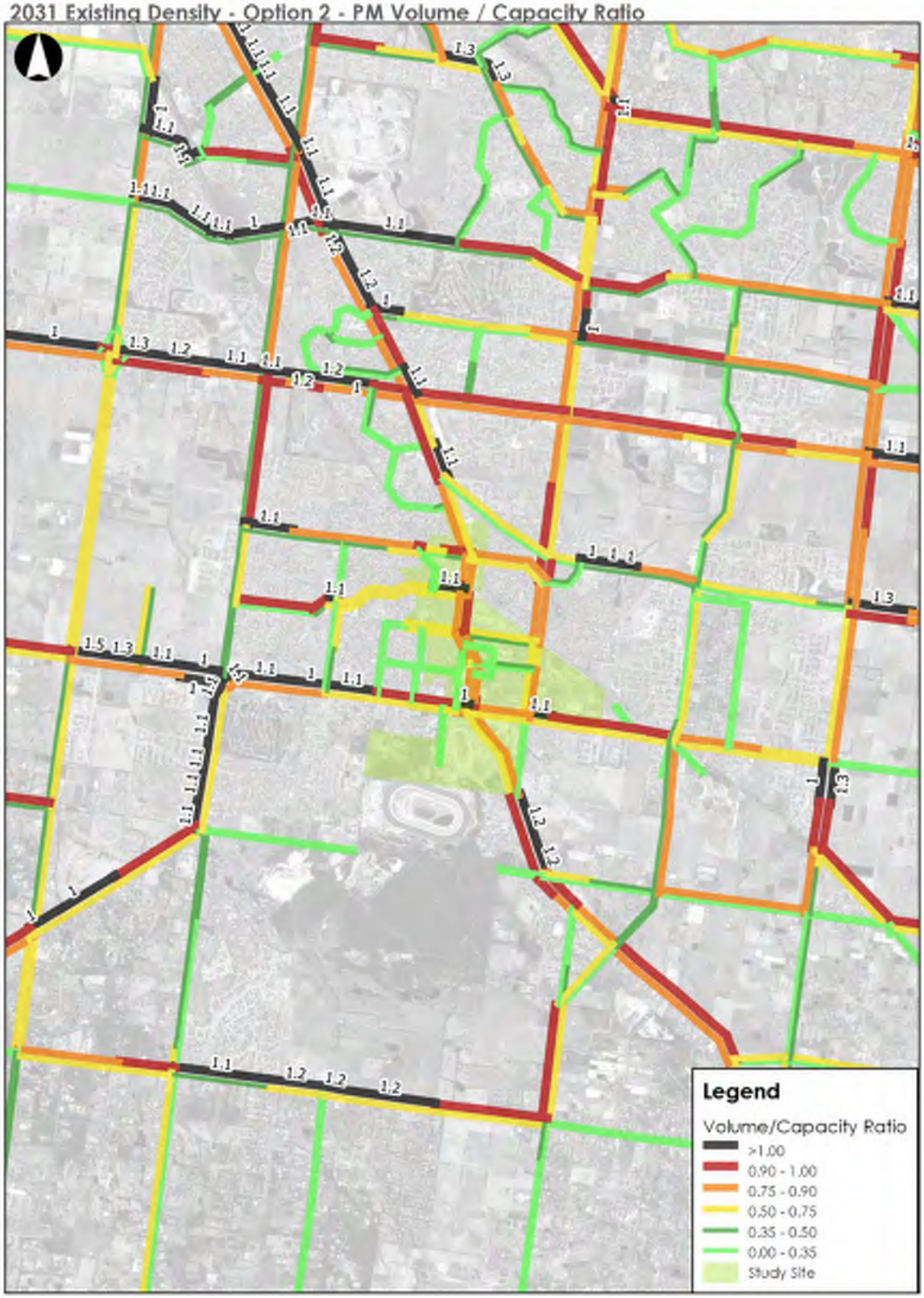

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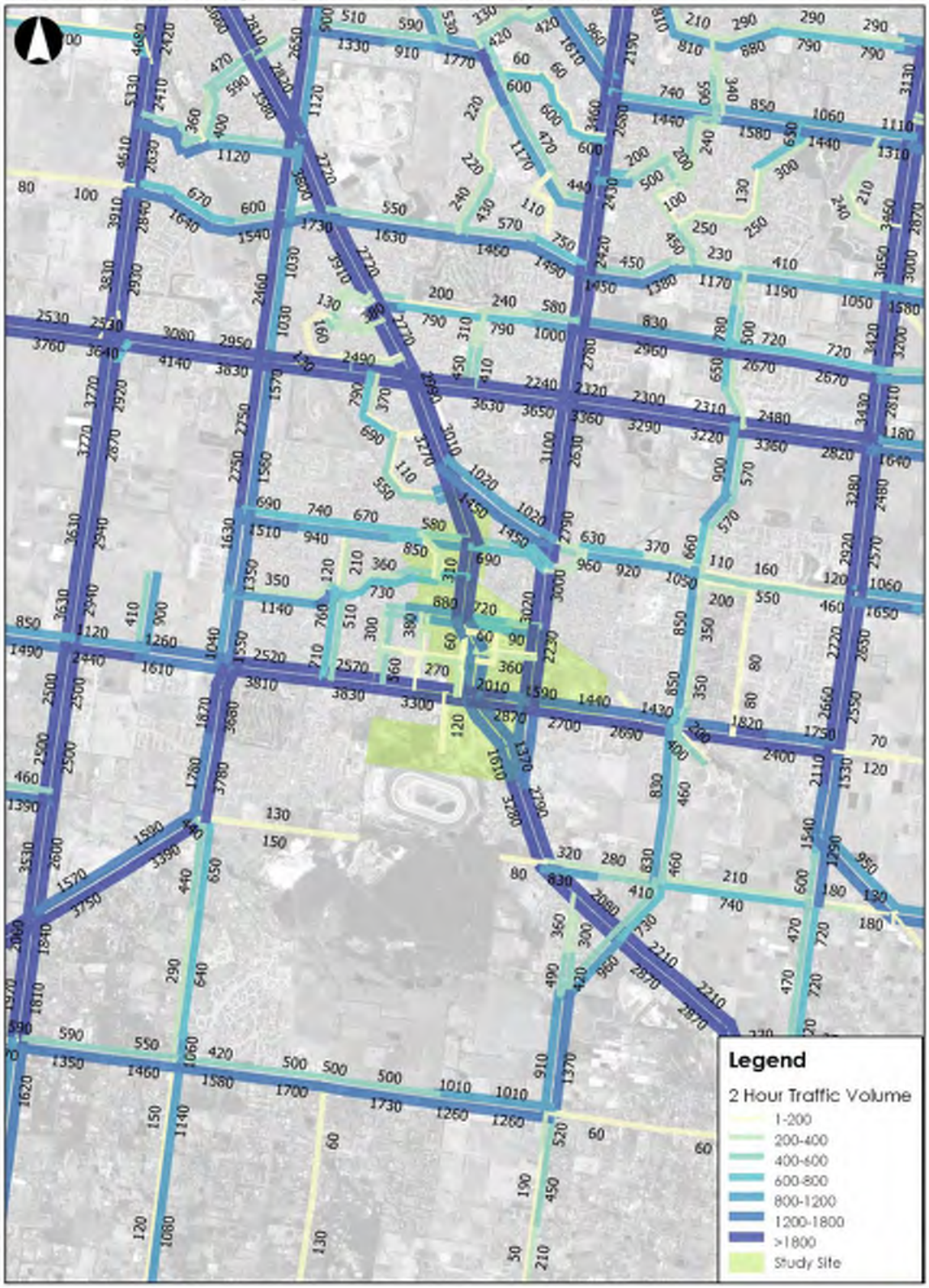

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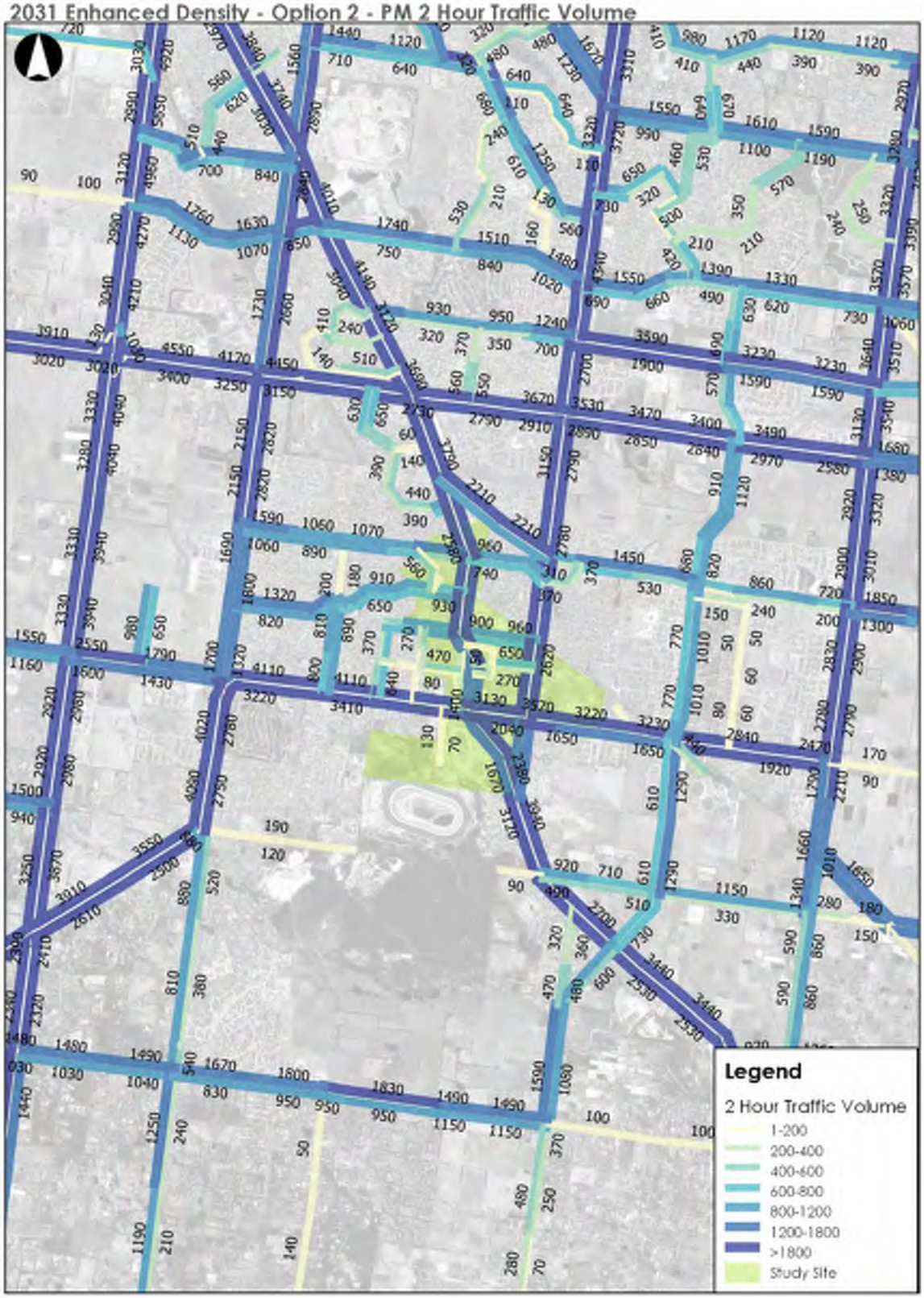

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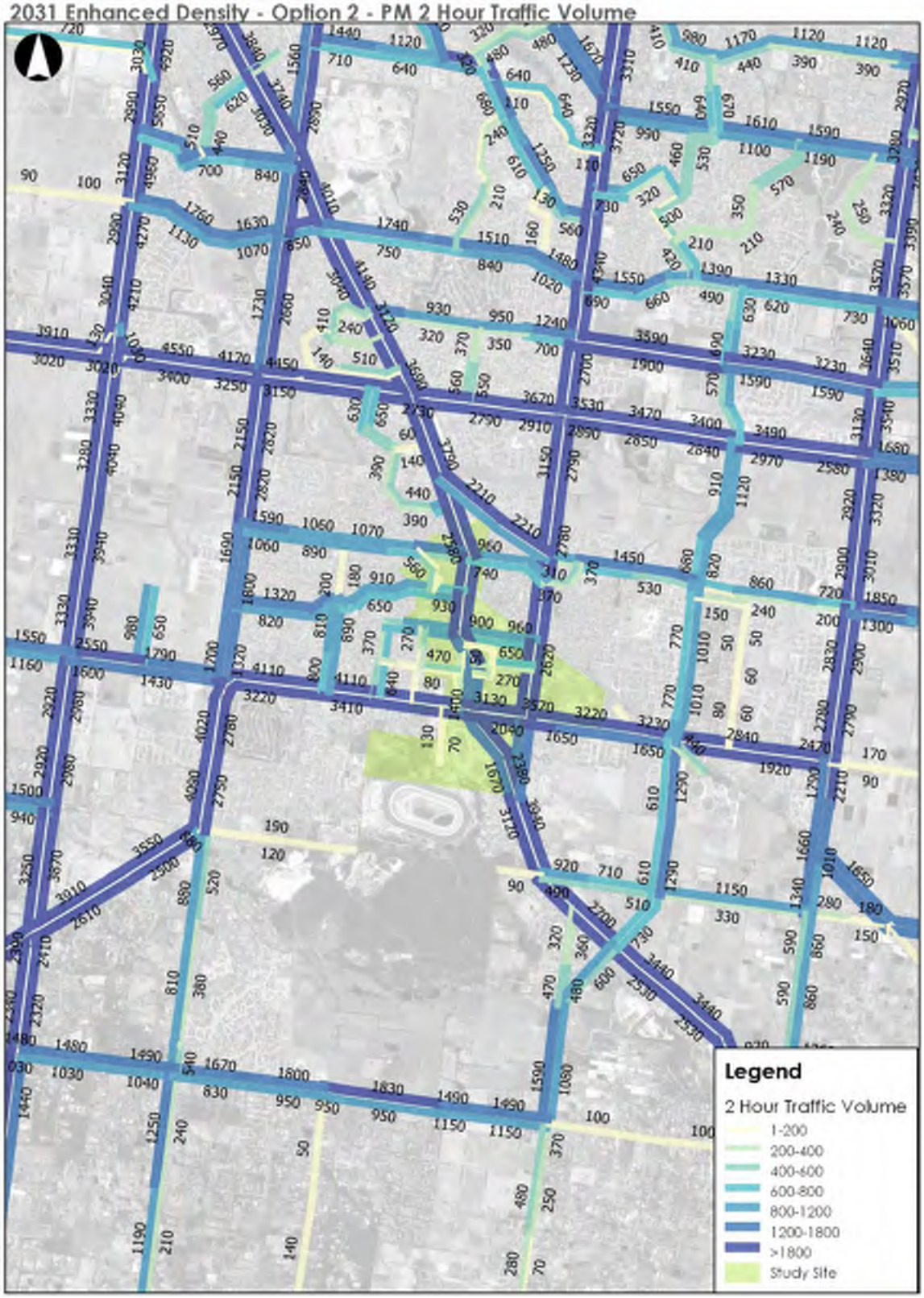

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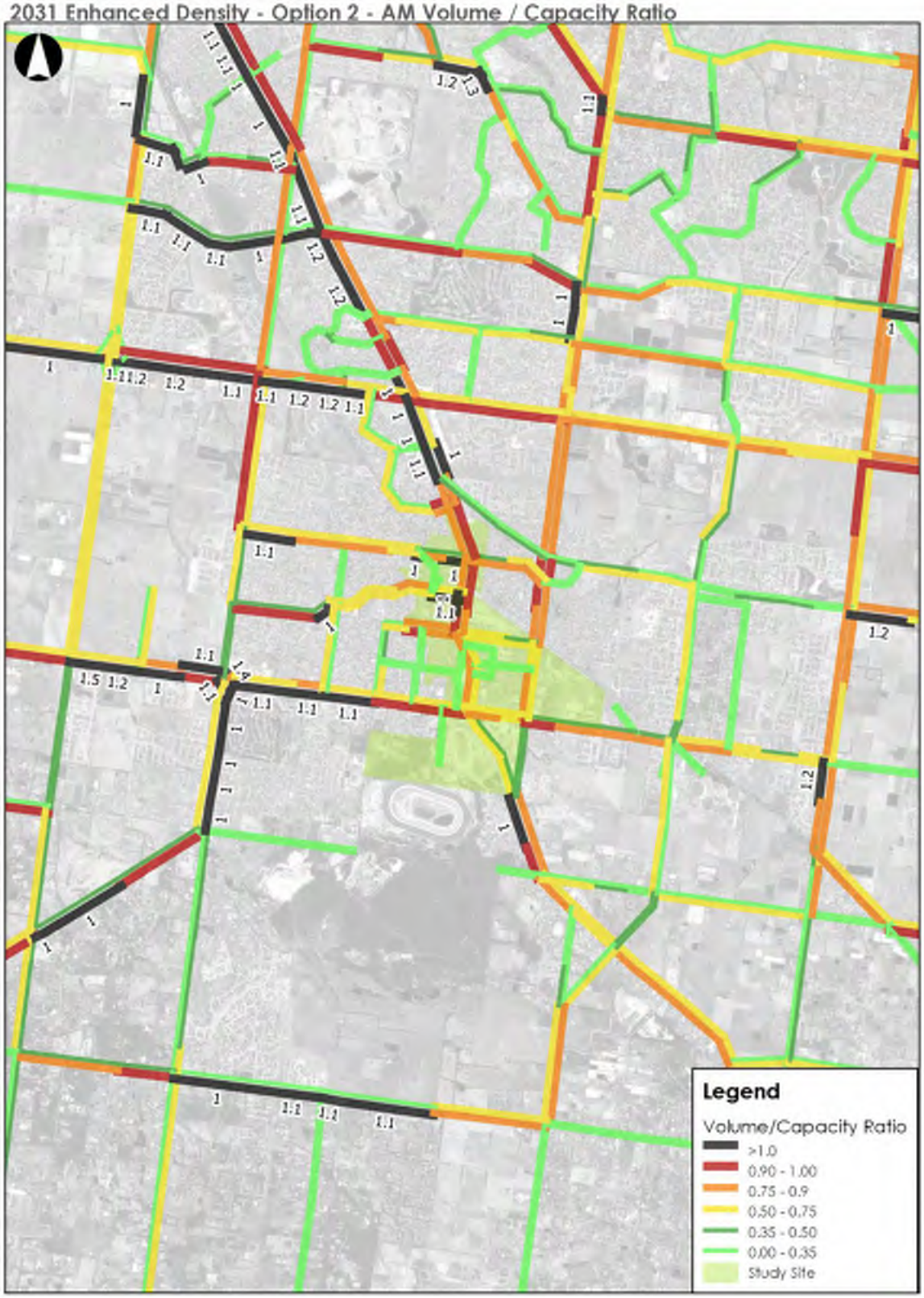

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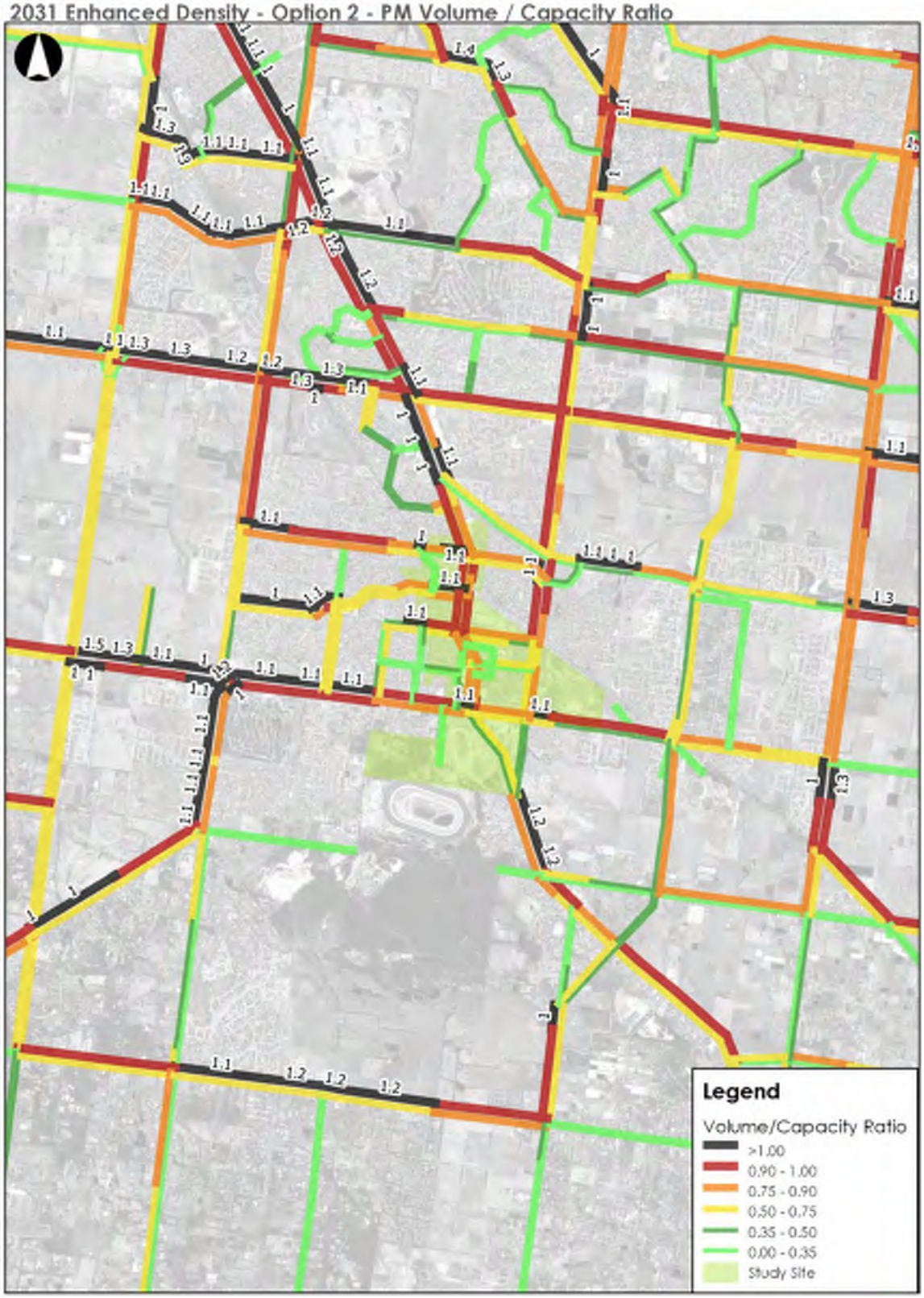

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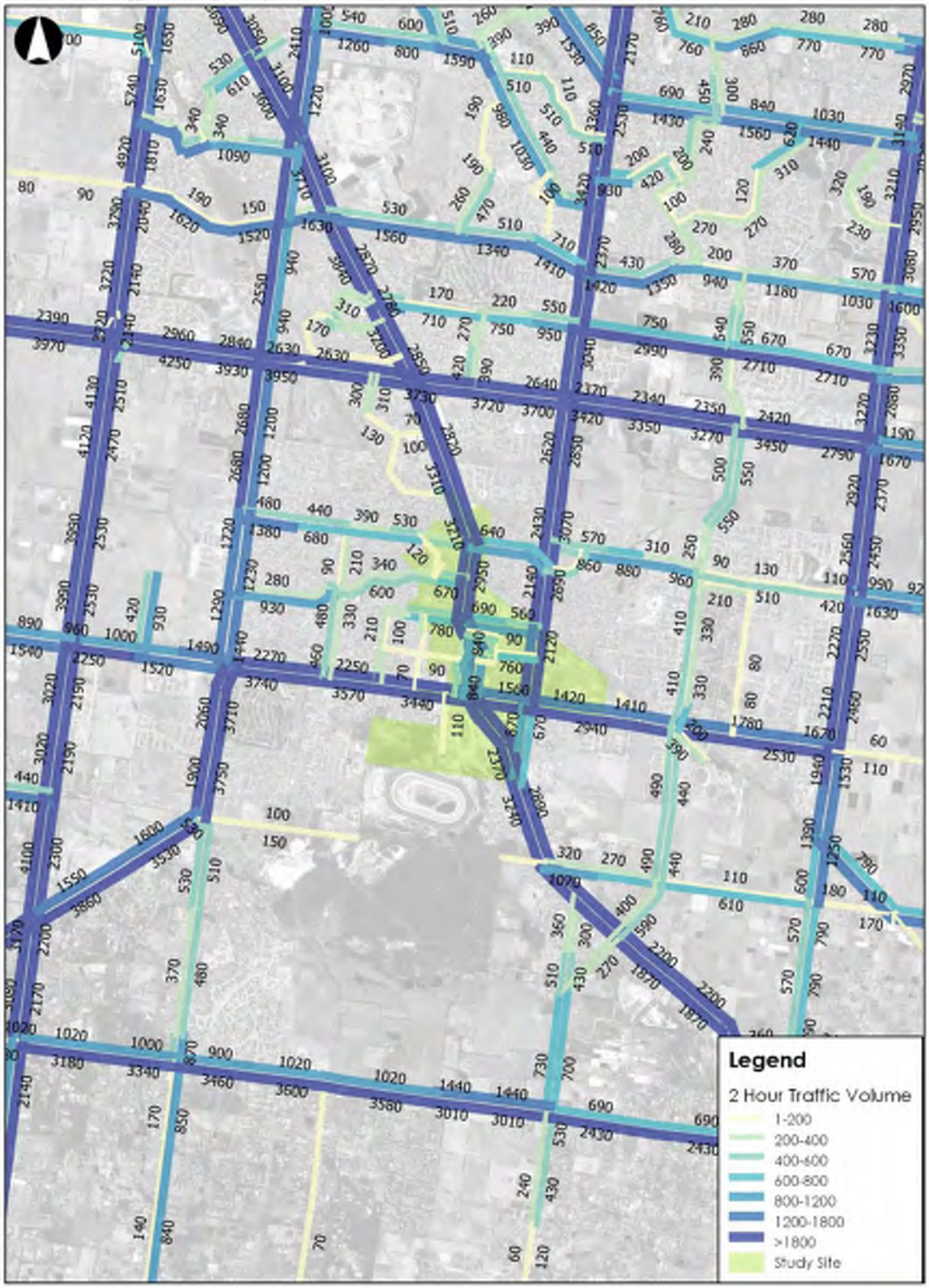

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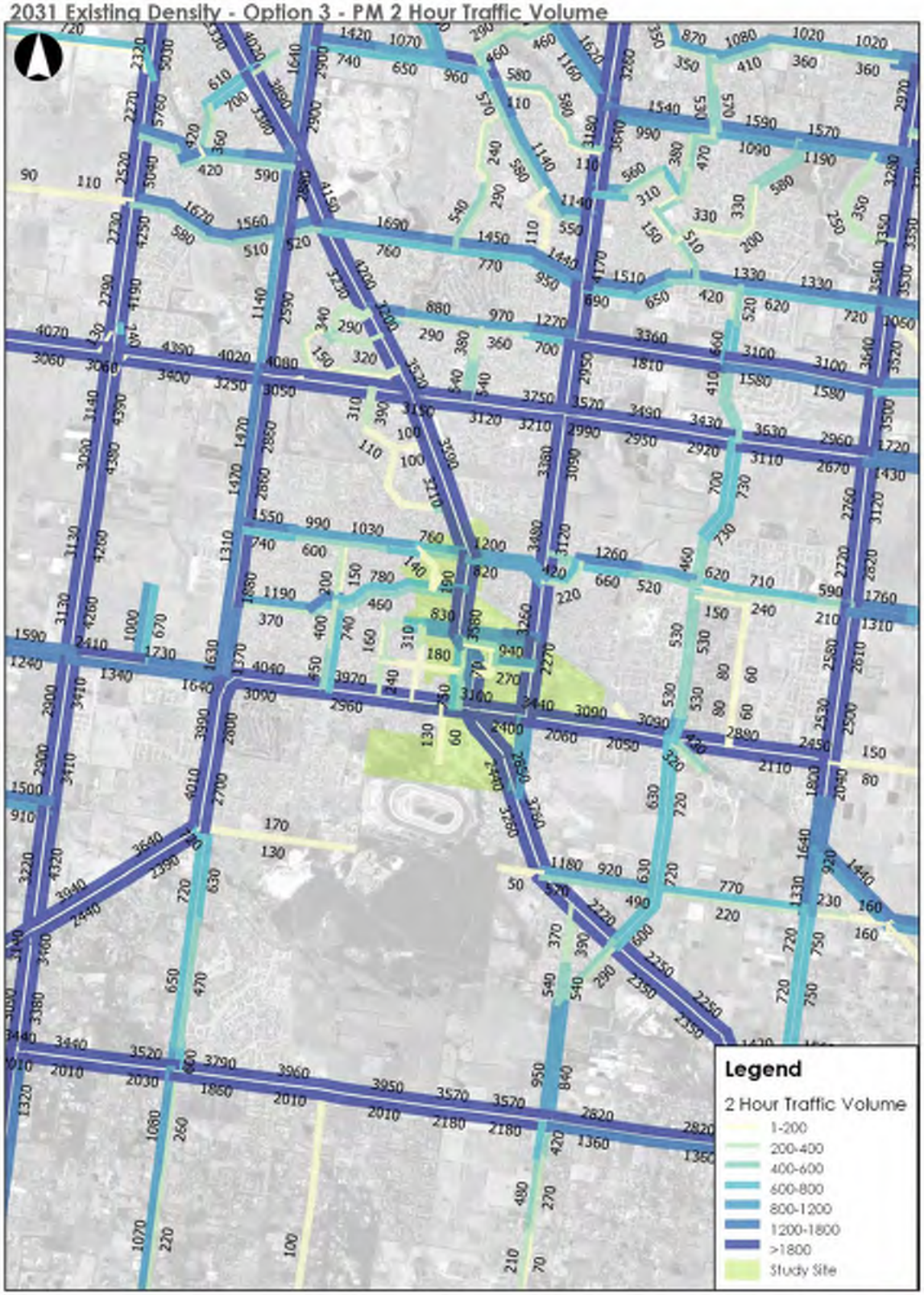

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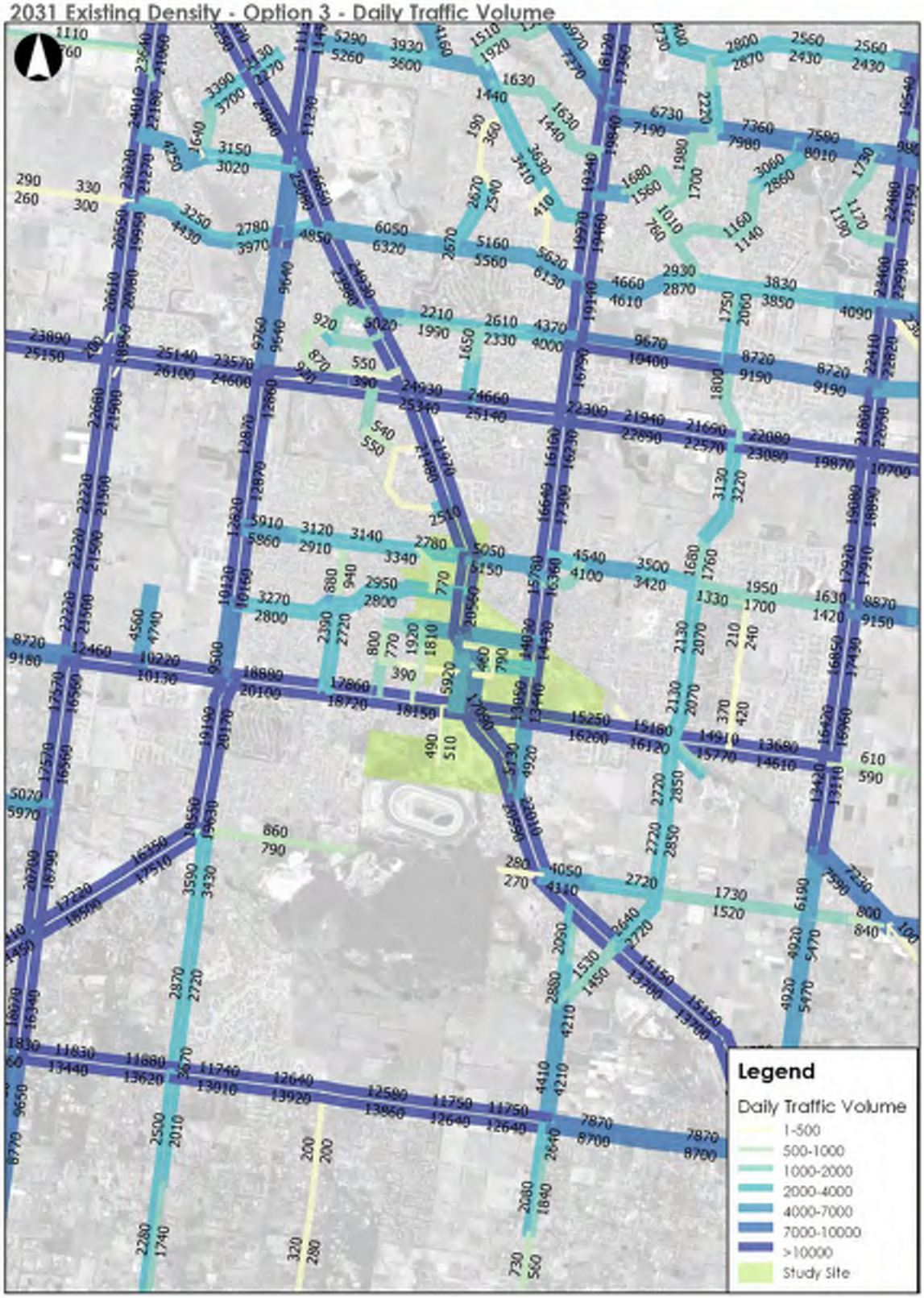

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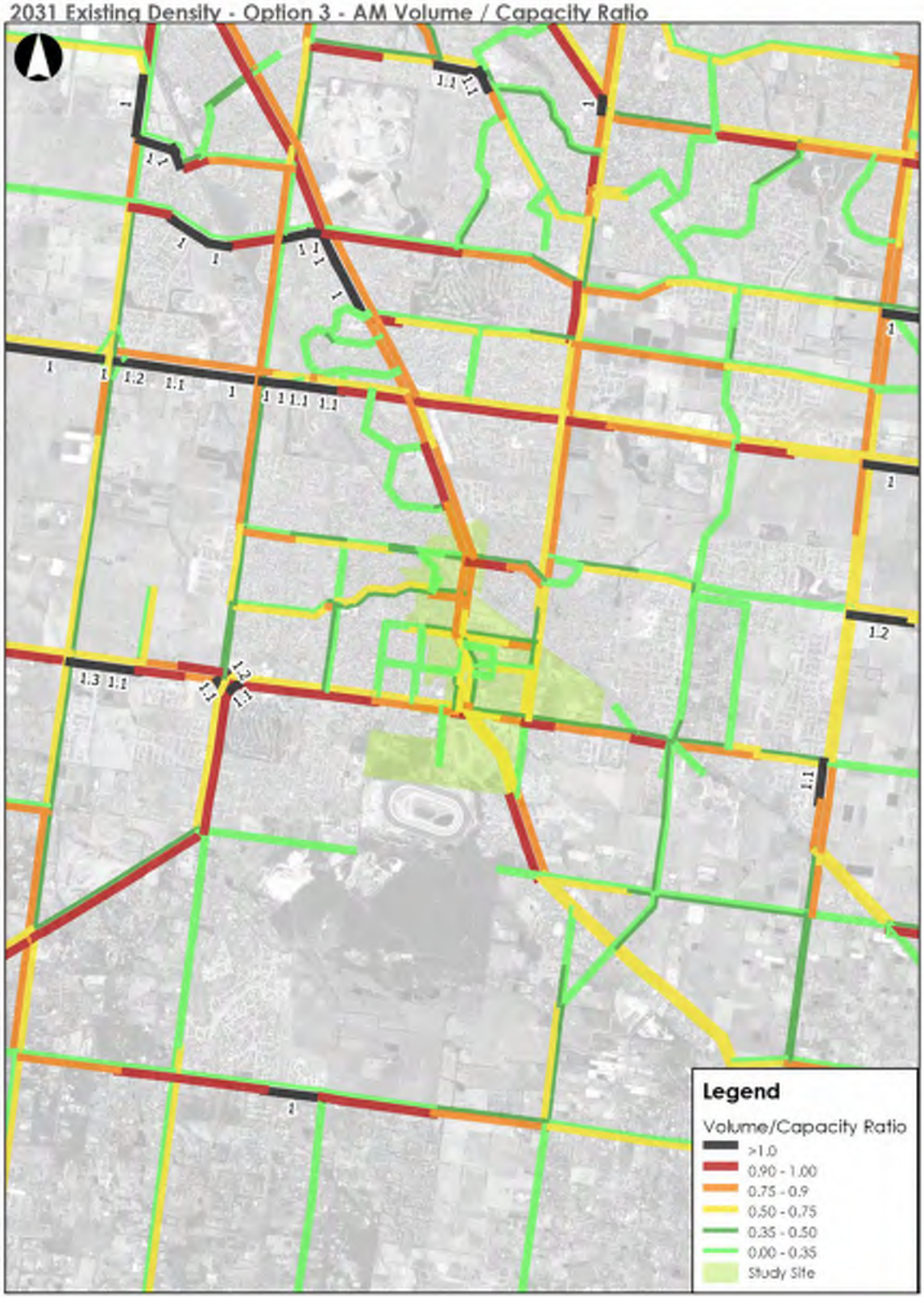

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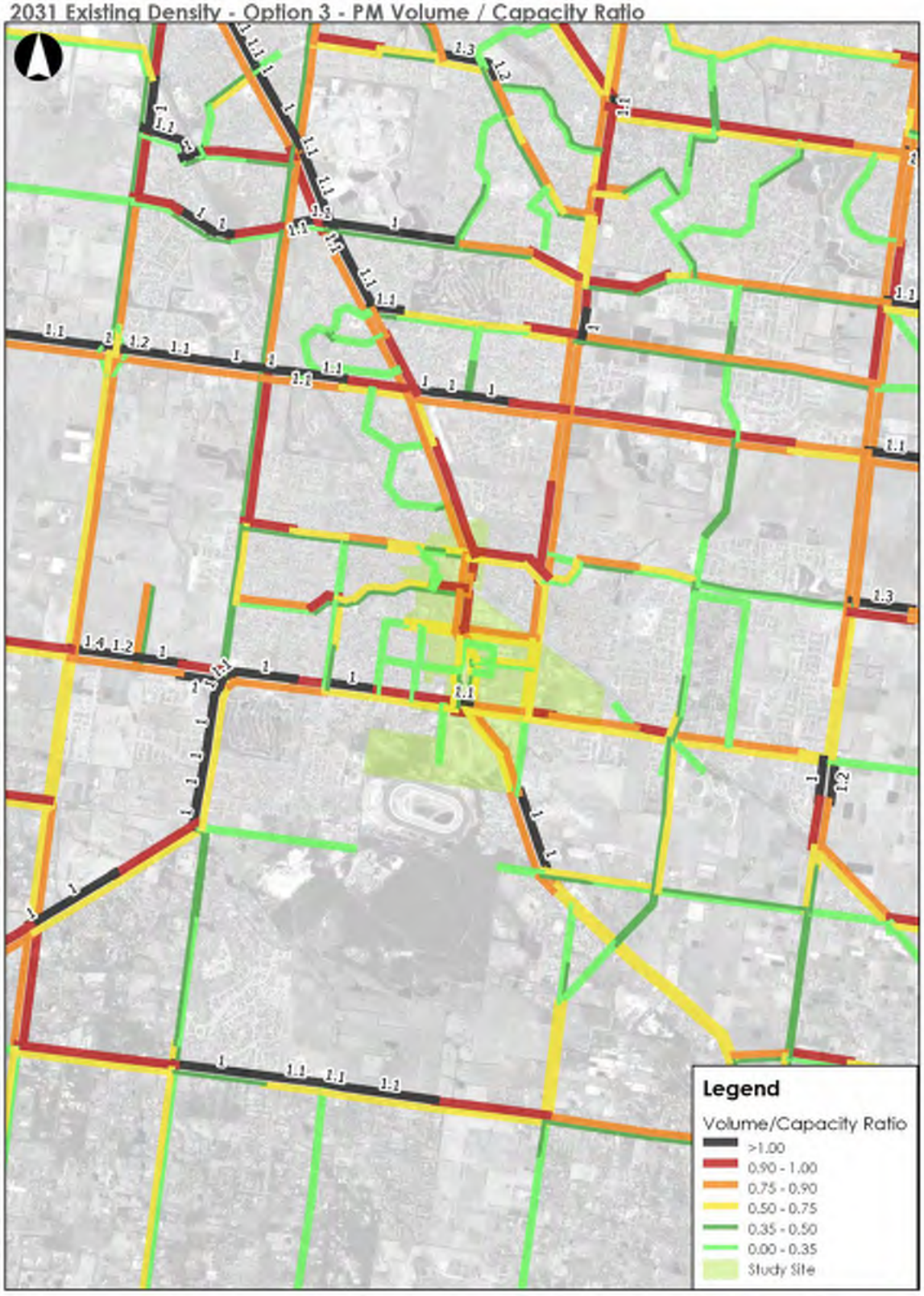

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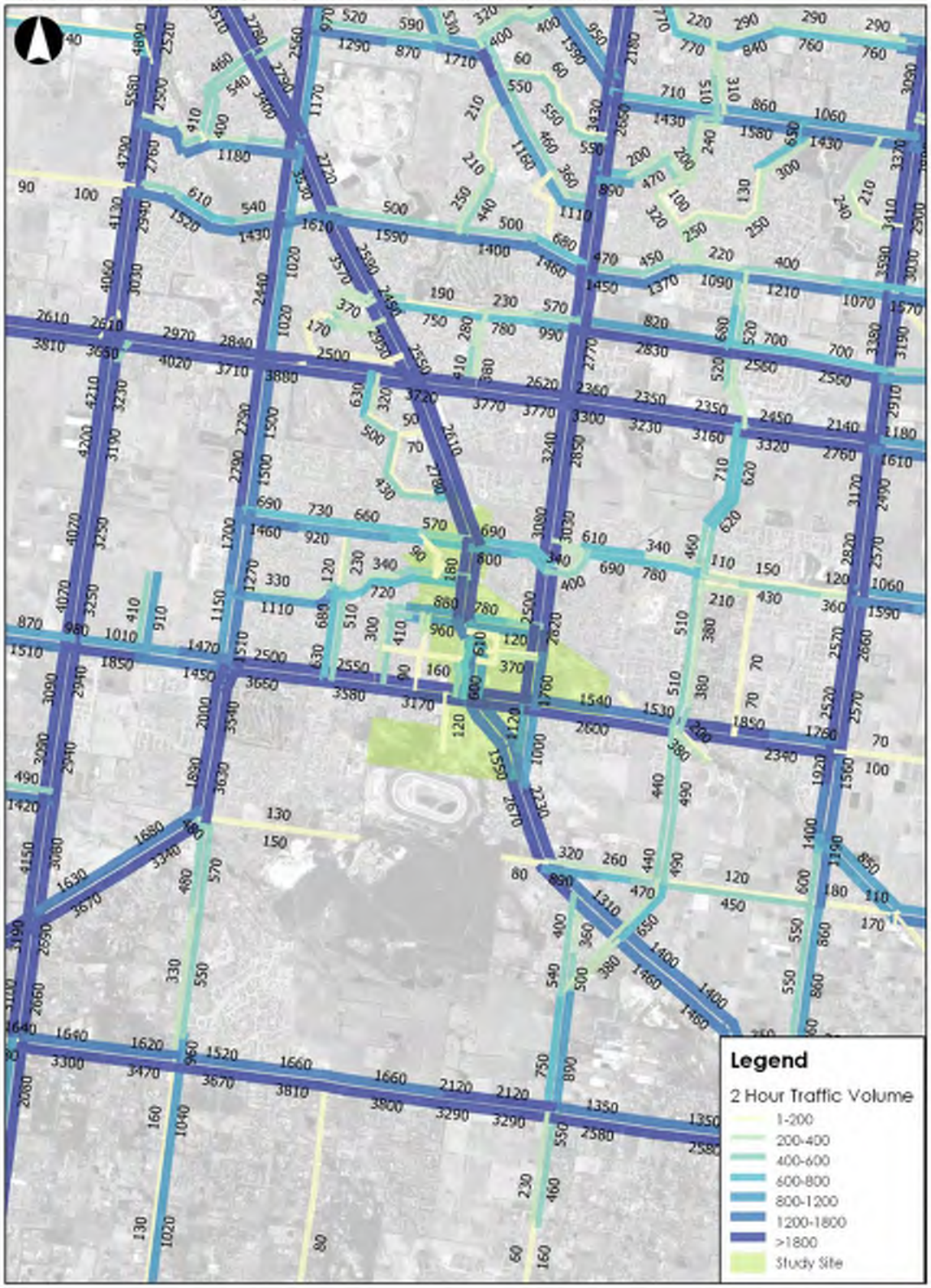
2031 Enhanced Density - Option 3 - AM 2 Hour Traffic Volume



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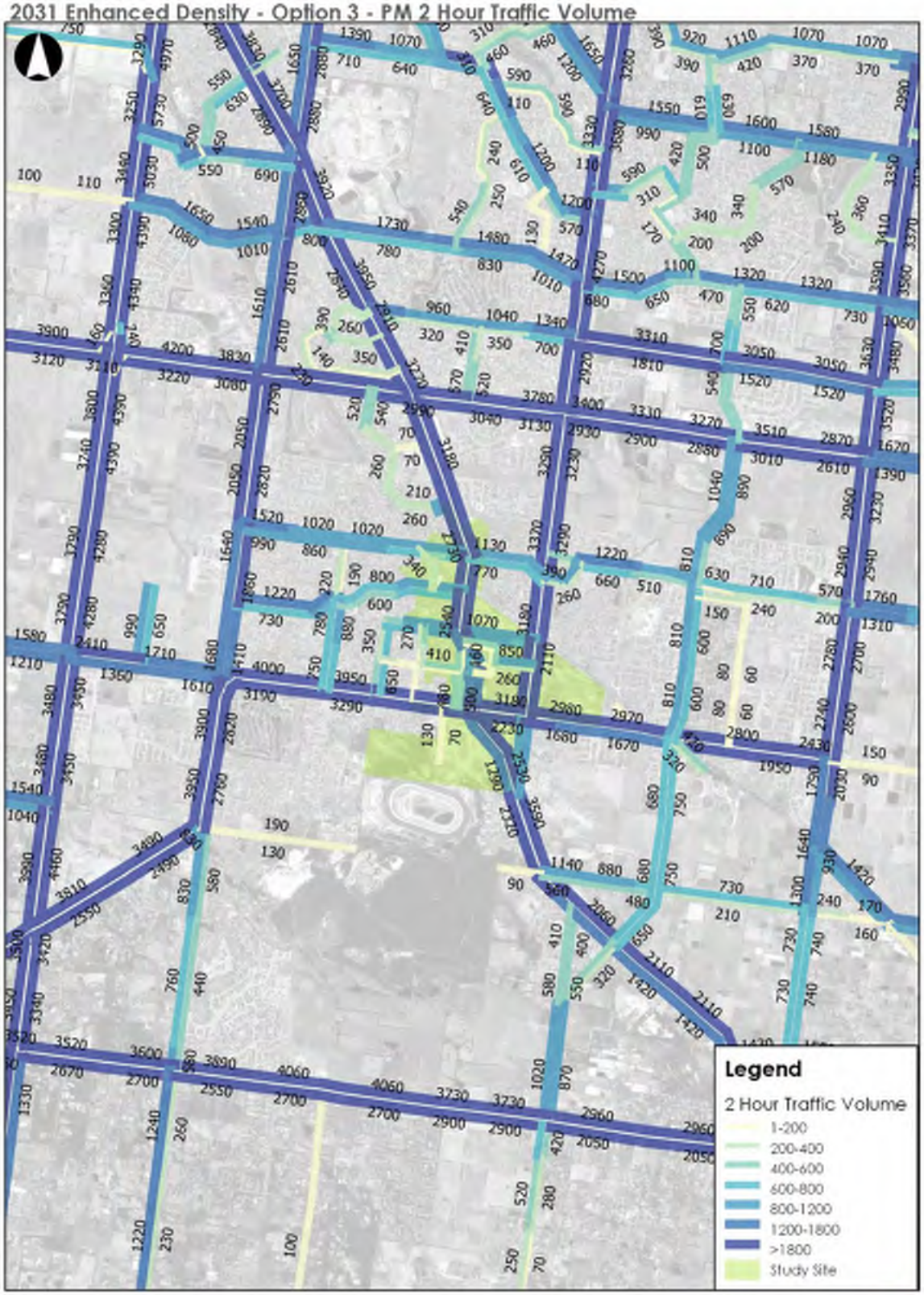

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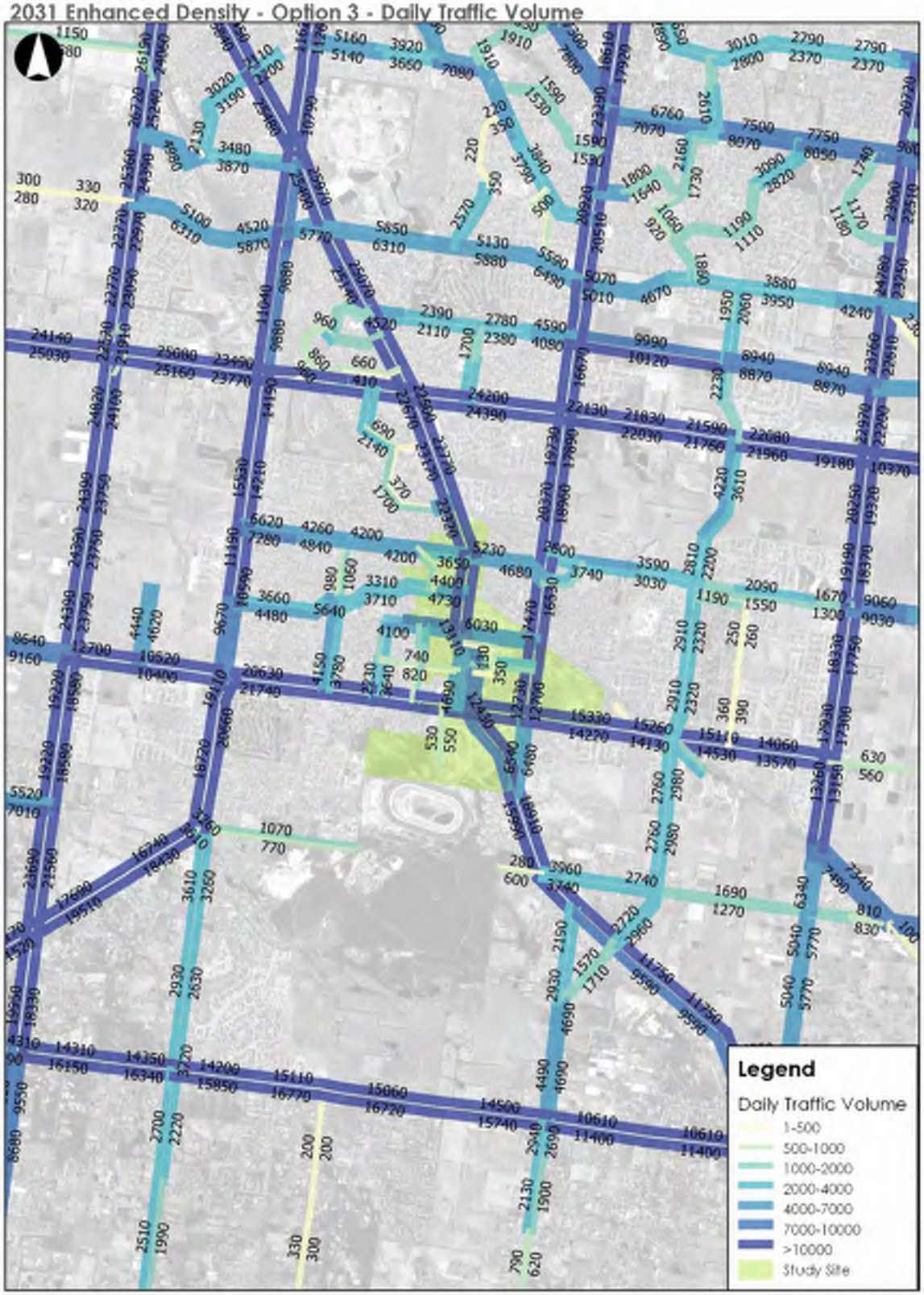

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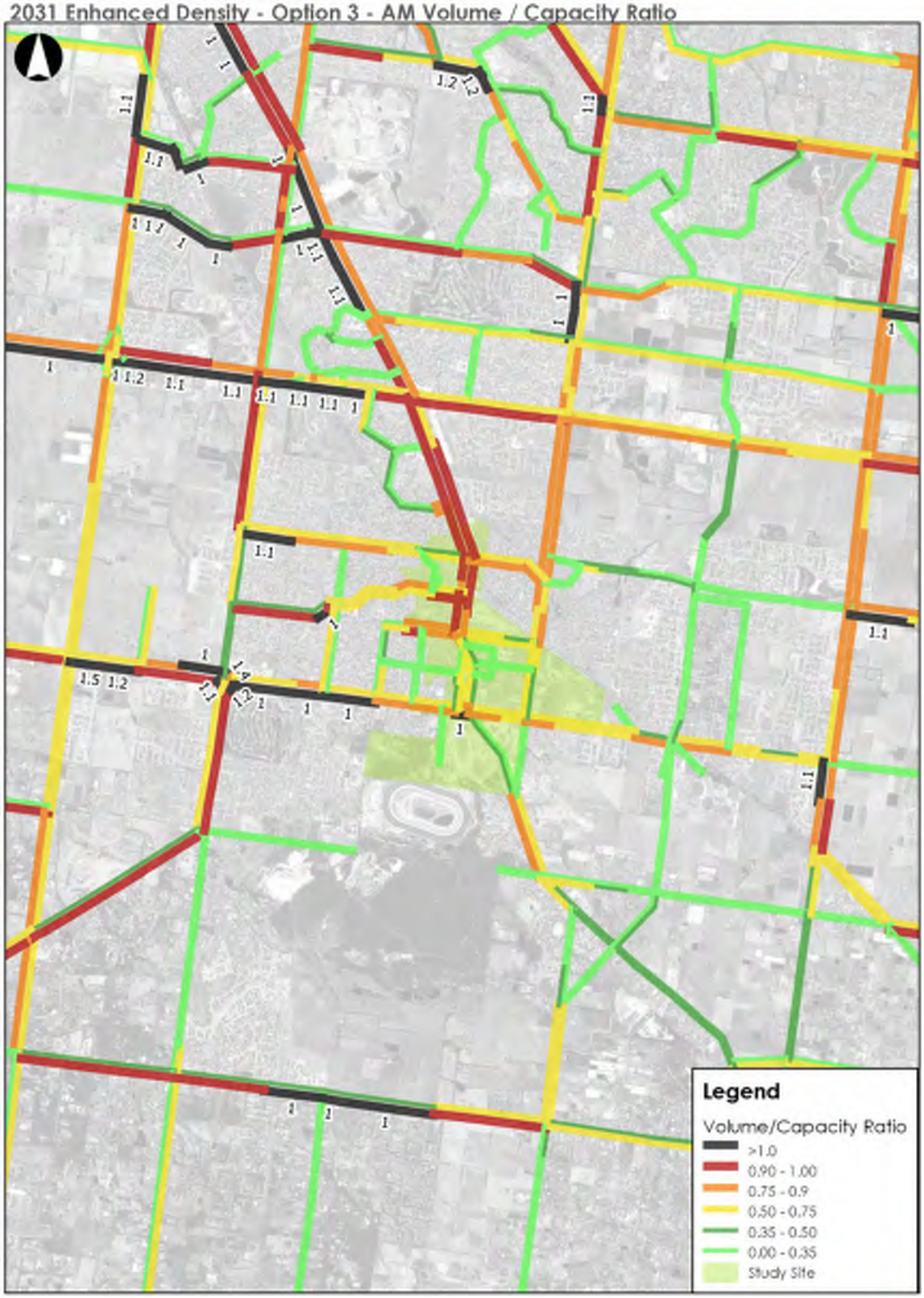
2031 Enhanced Density - Option 3 - AM Volume / Capacity Ratio



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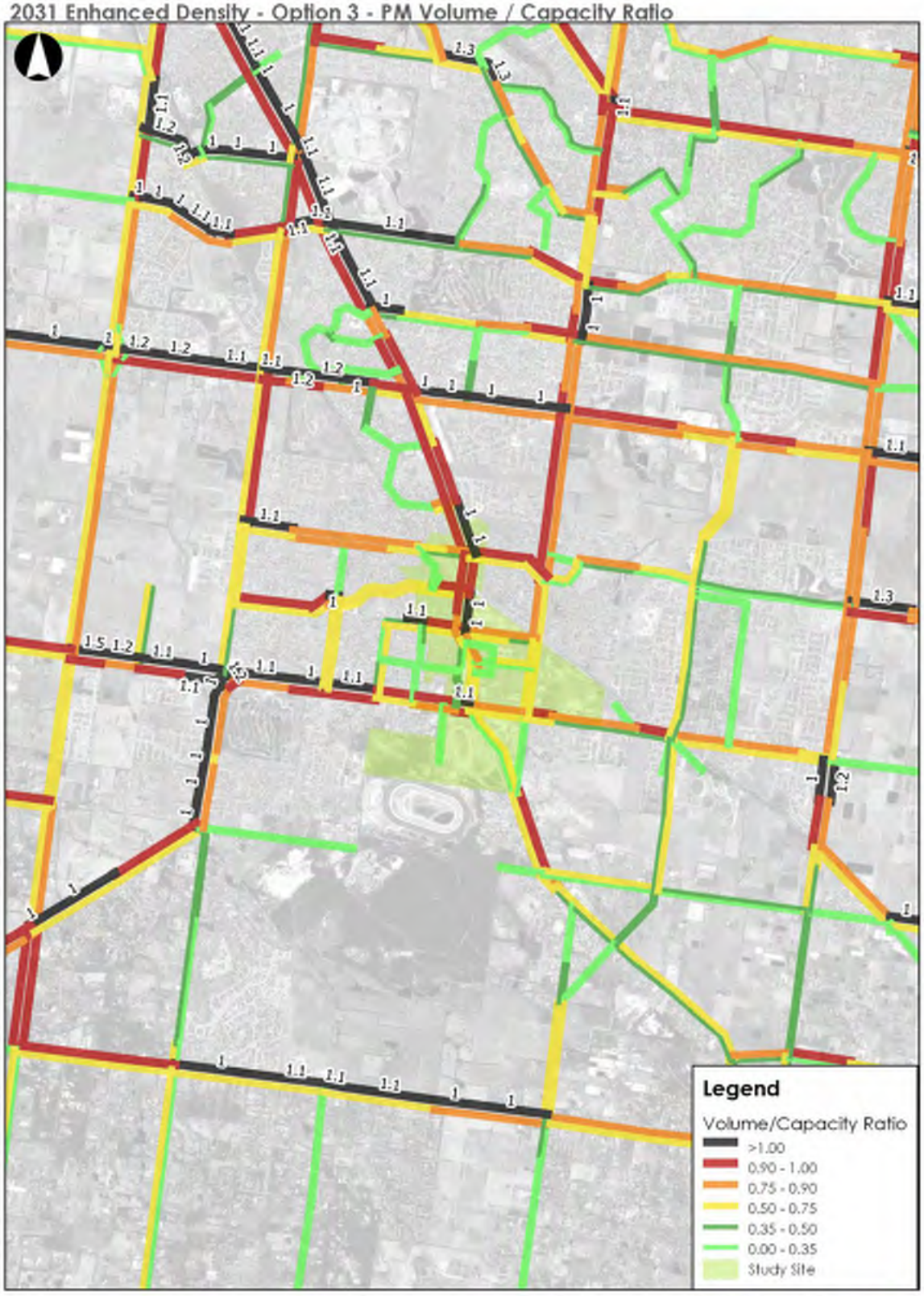

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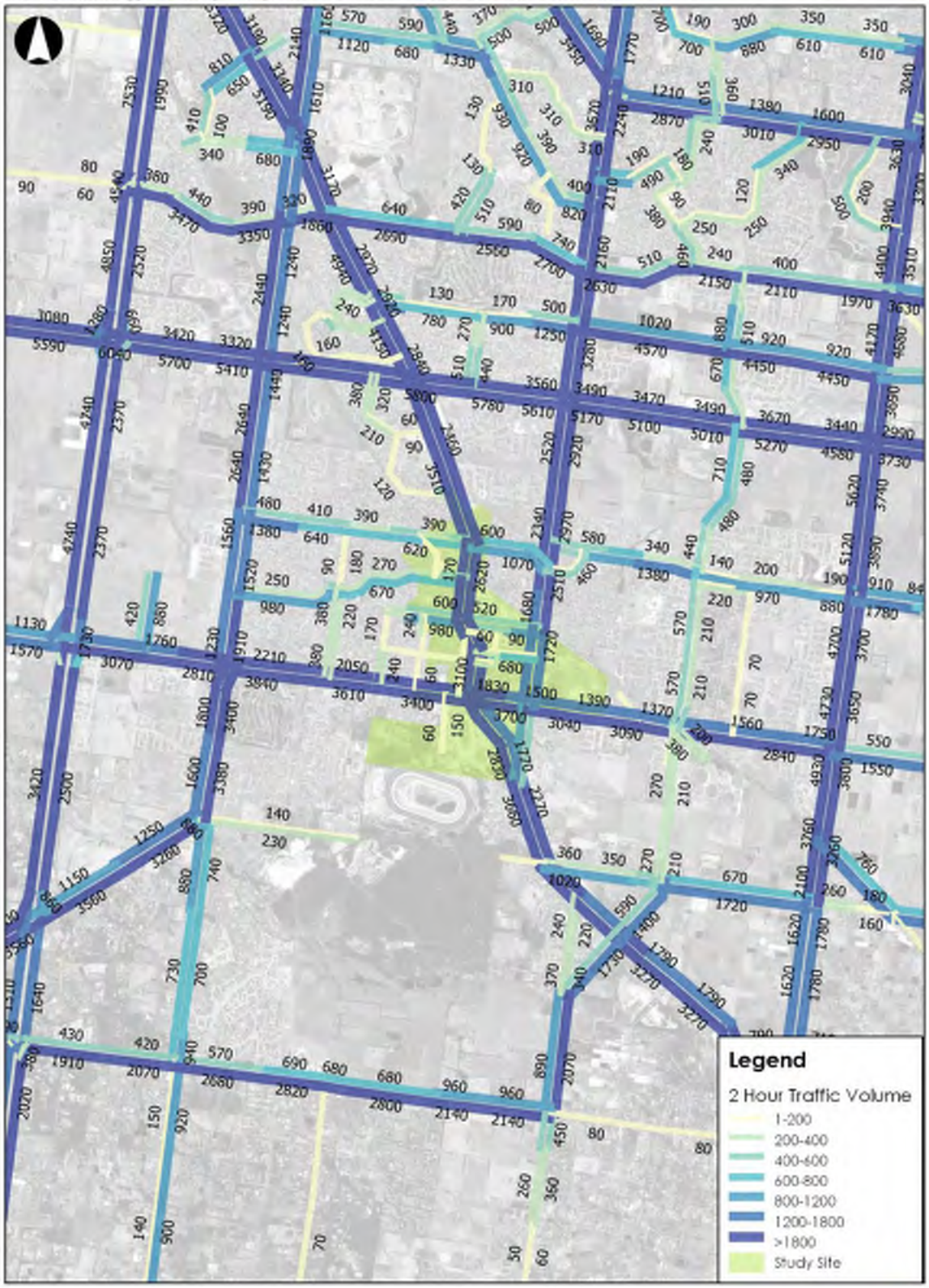
2046 Existing Density - Option 1 - AM 2 Hour Traffic Volume



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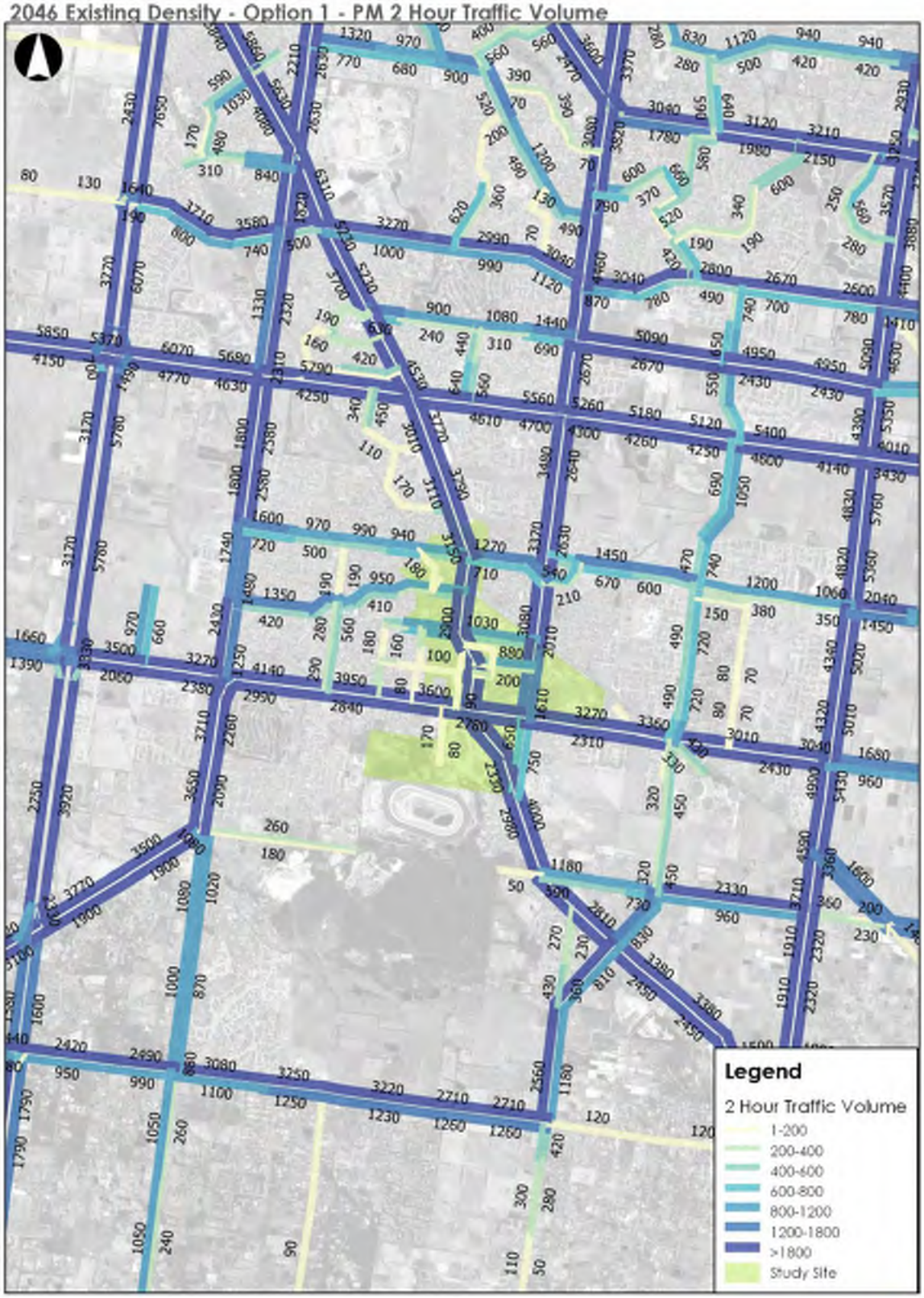

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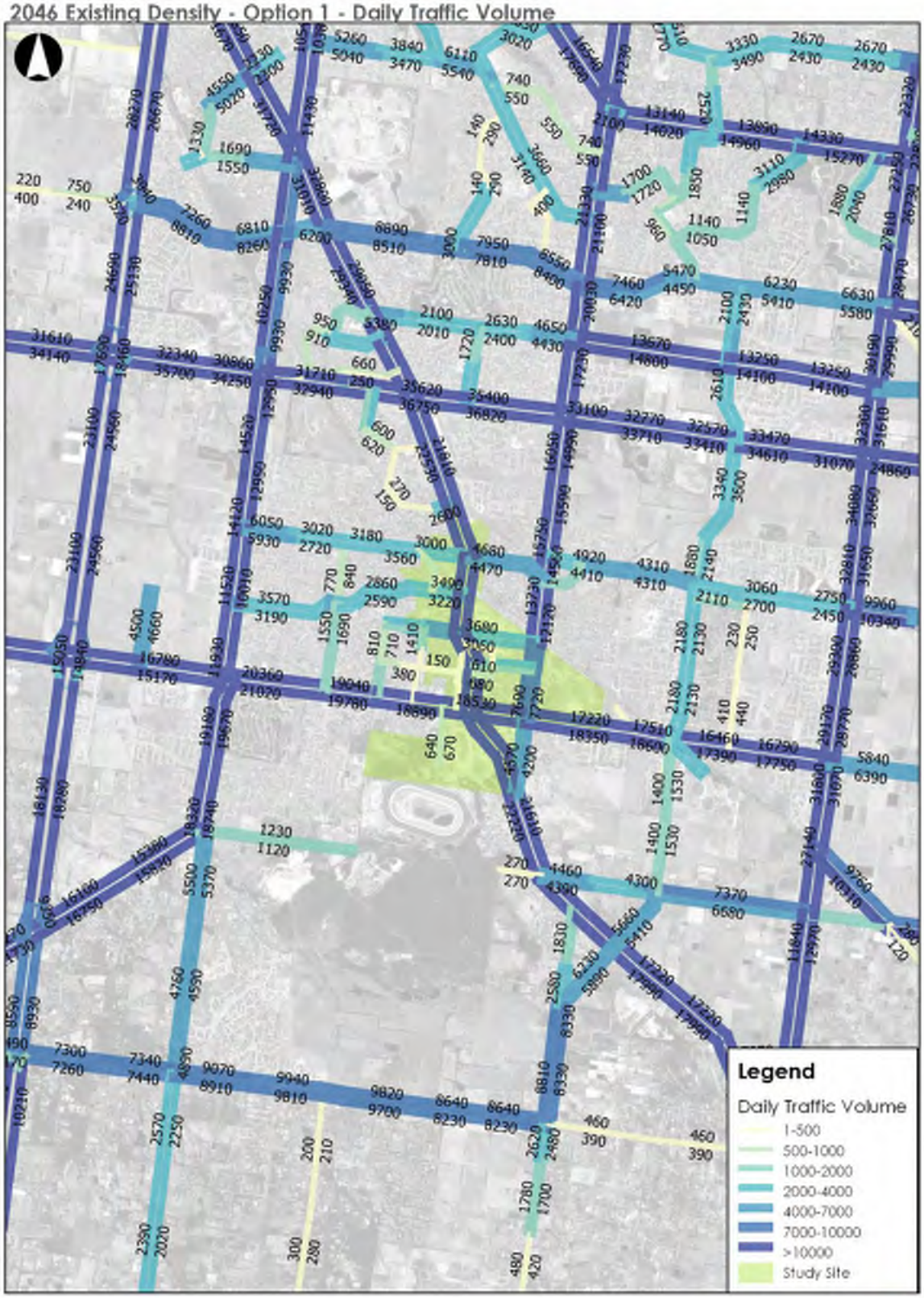

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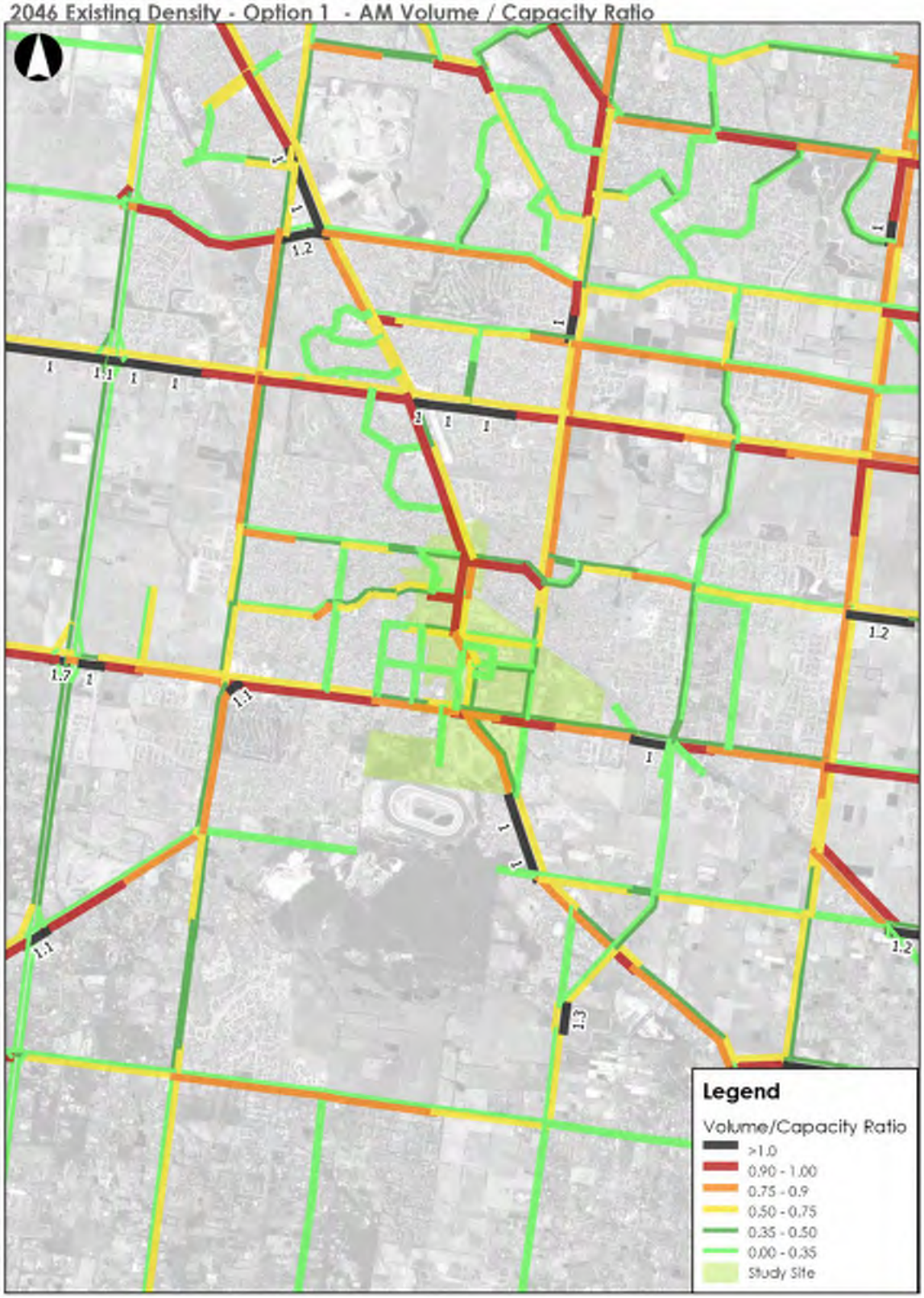

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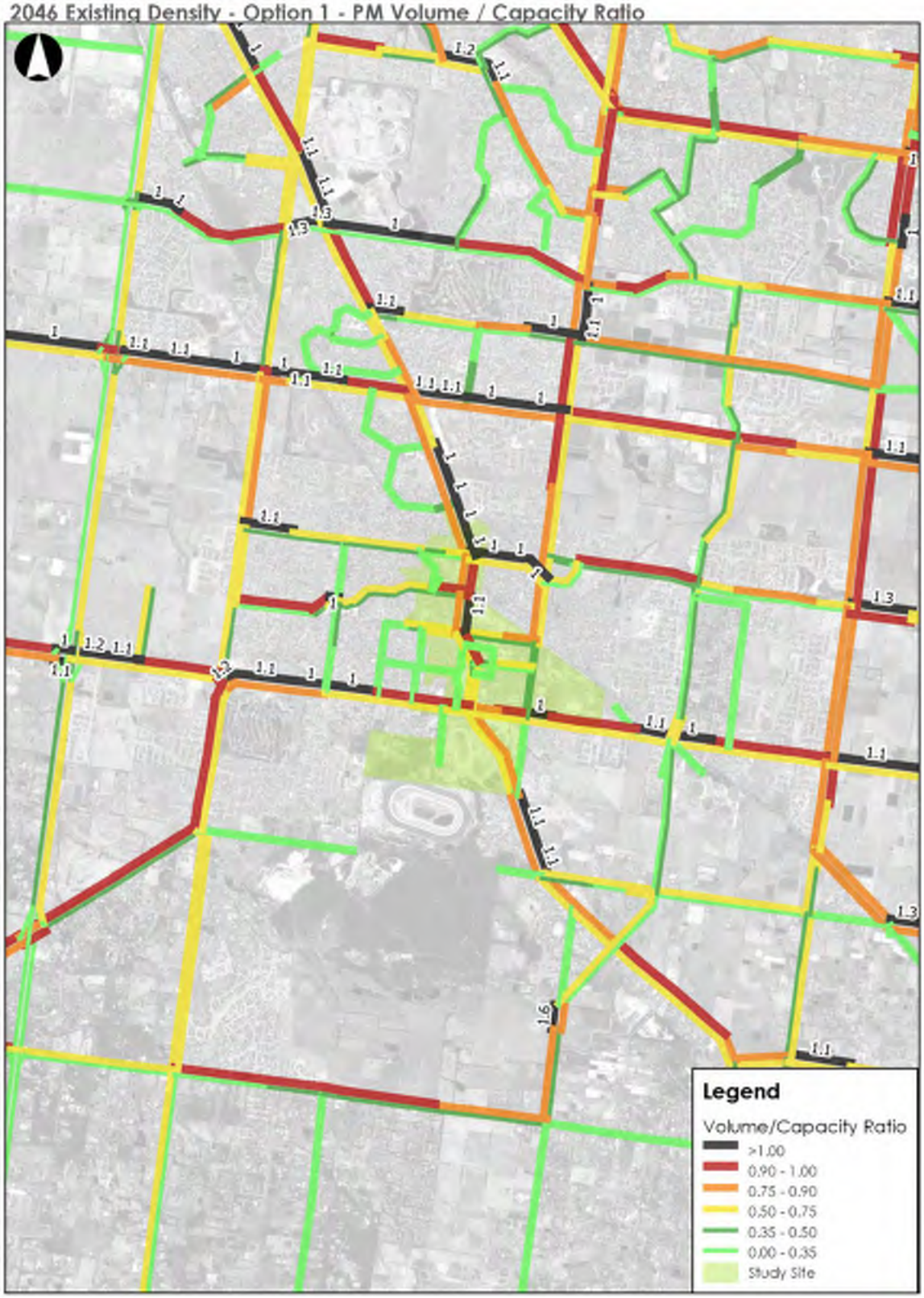

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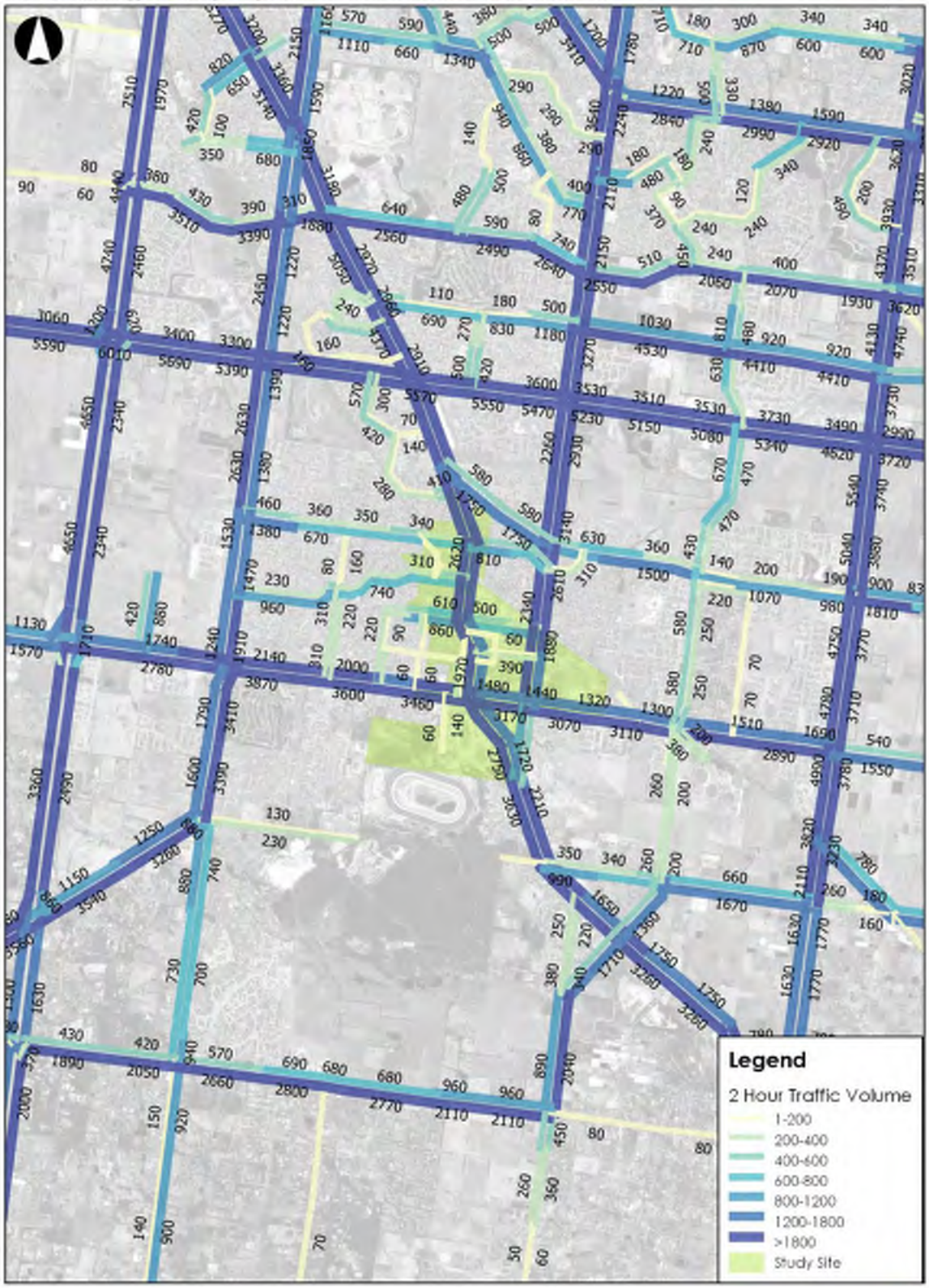

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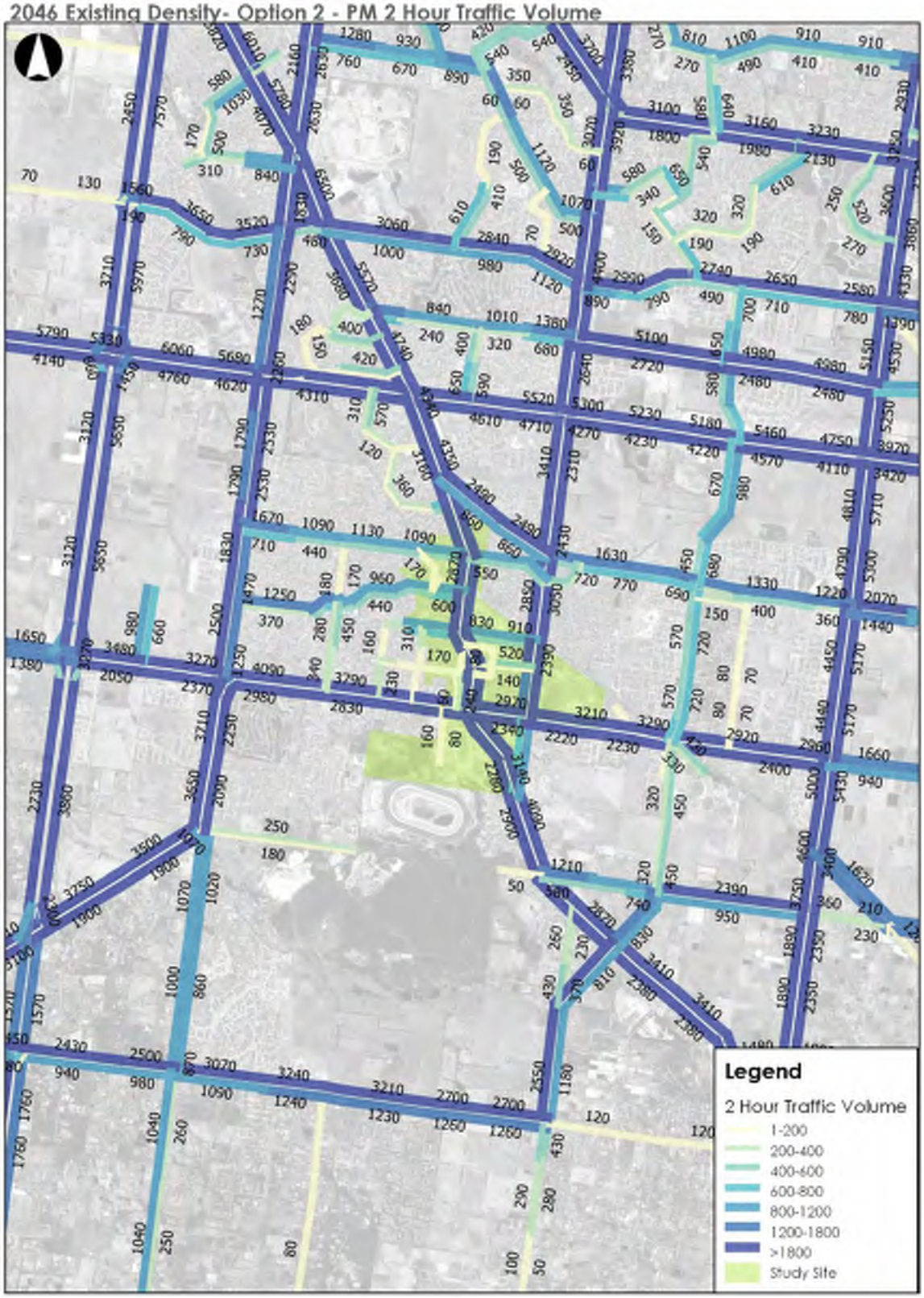

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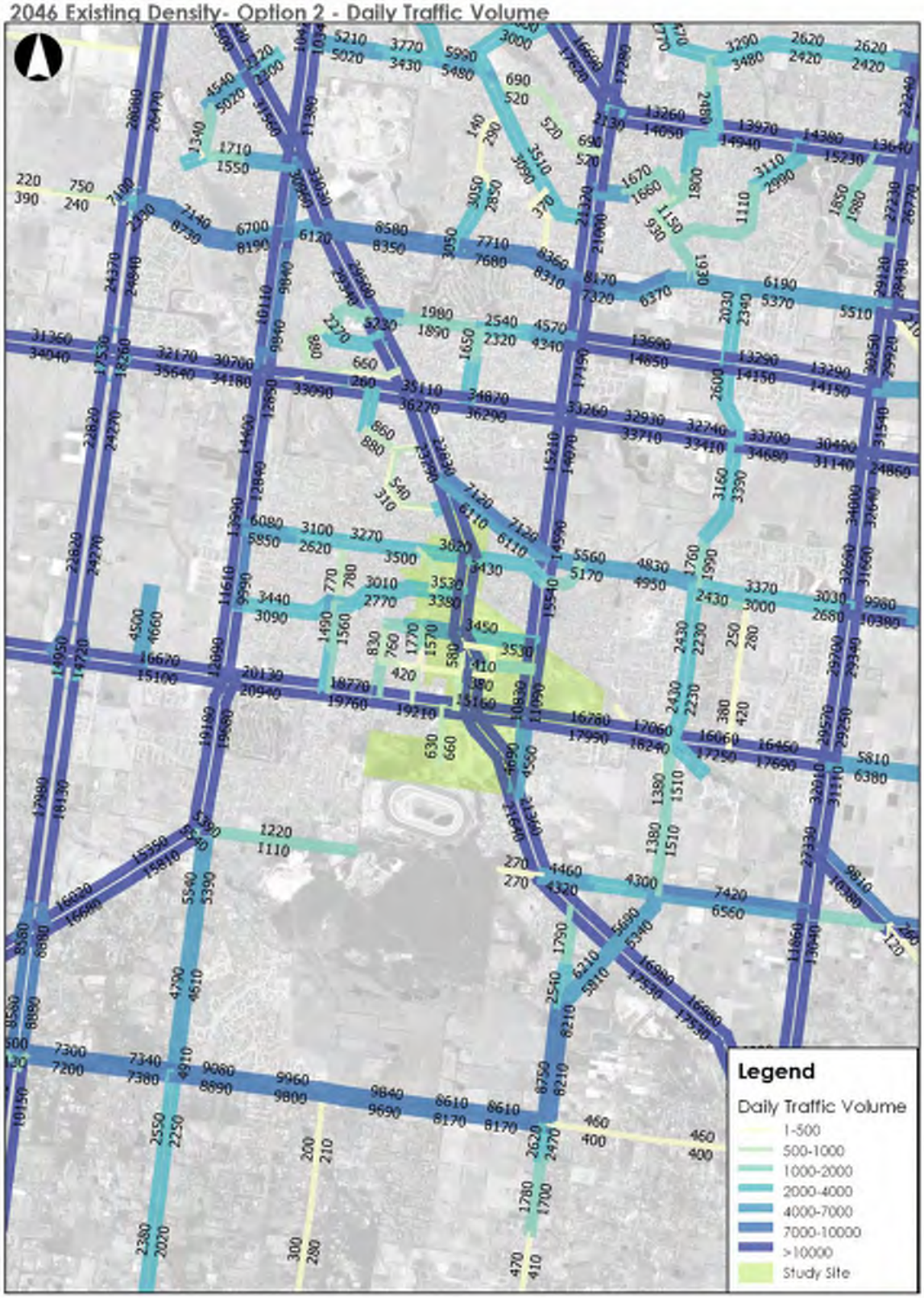

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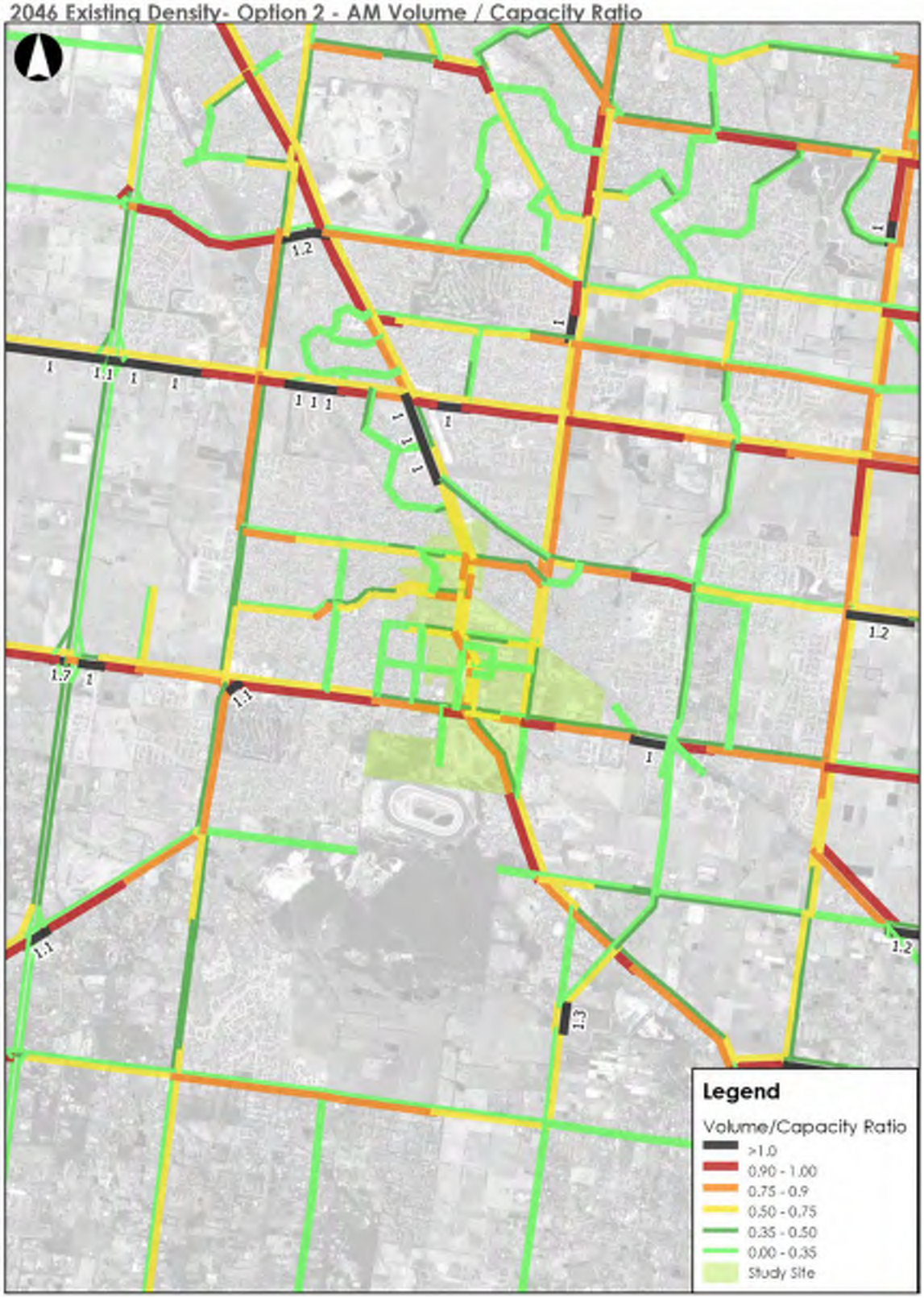

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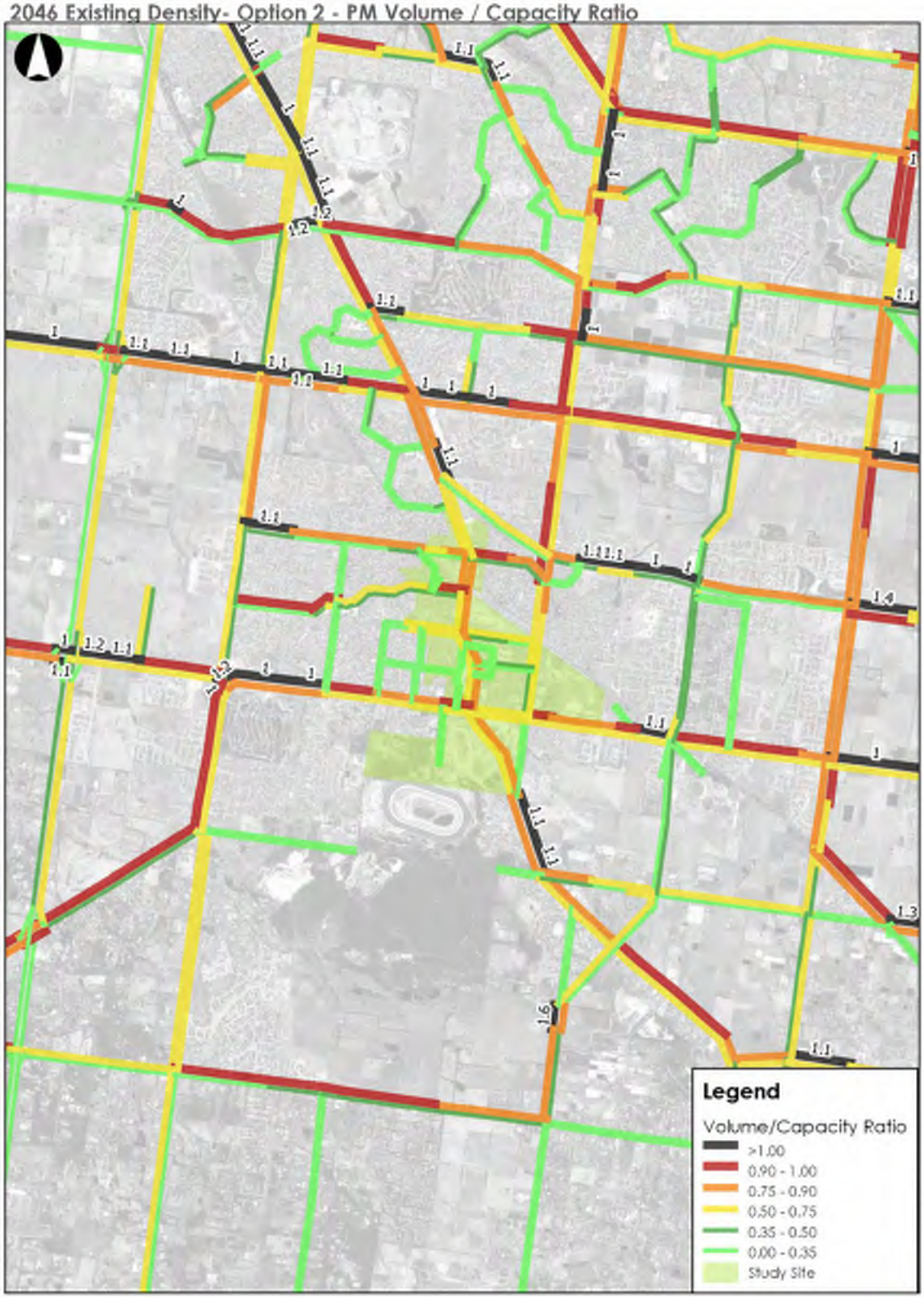

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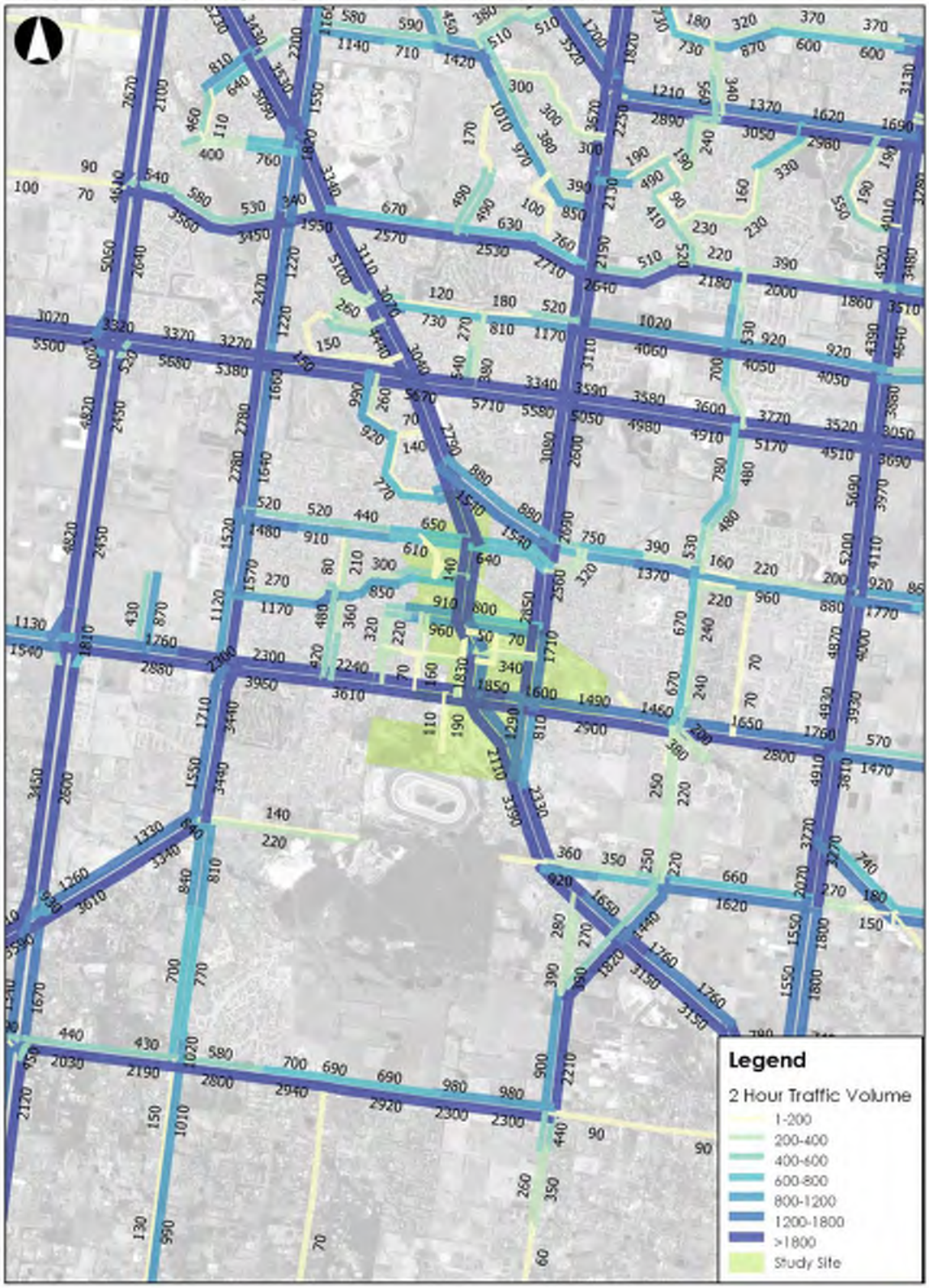

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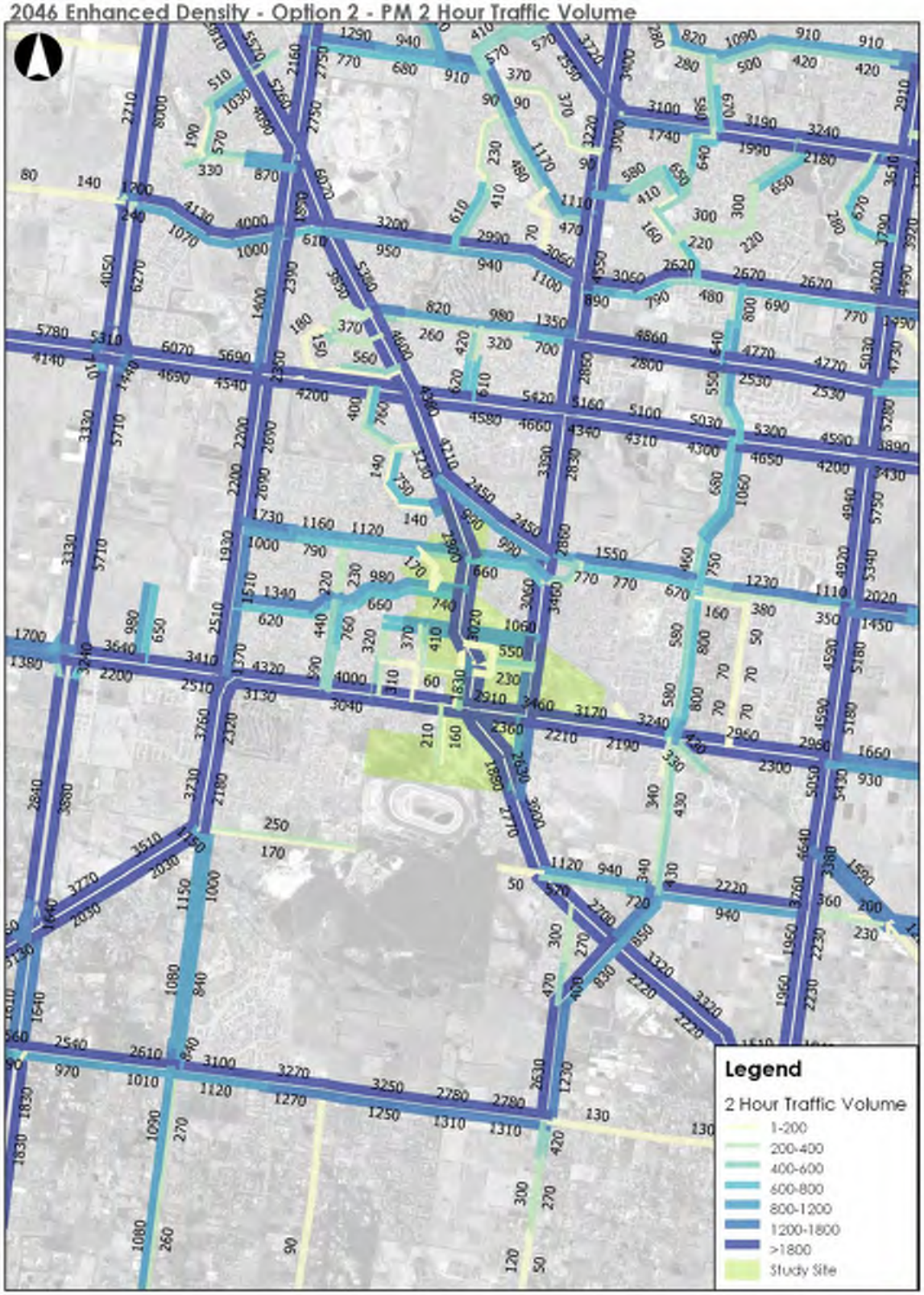

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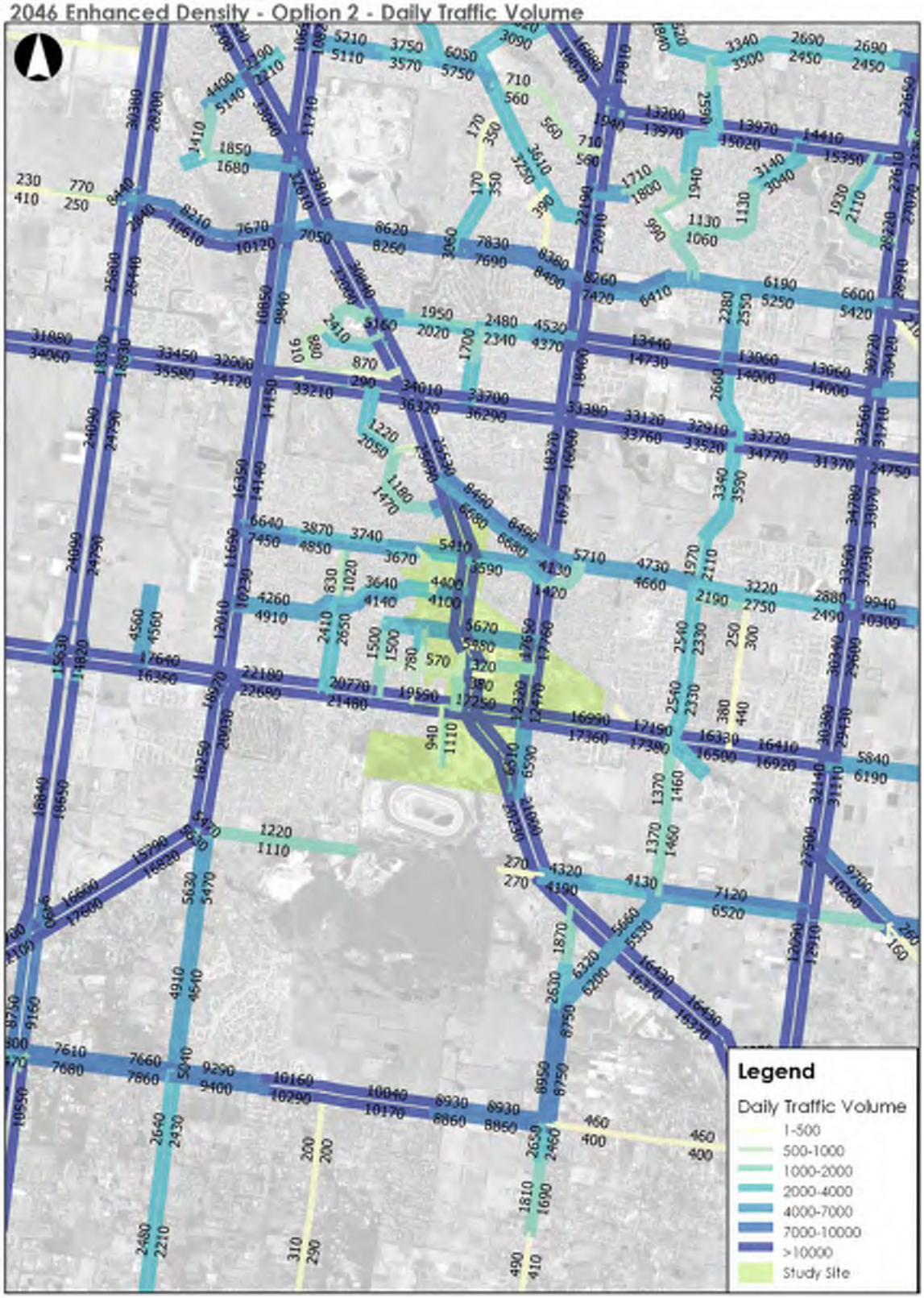

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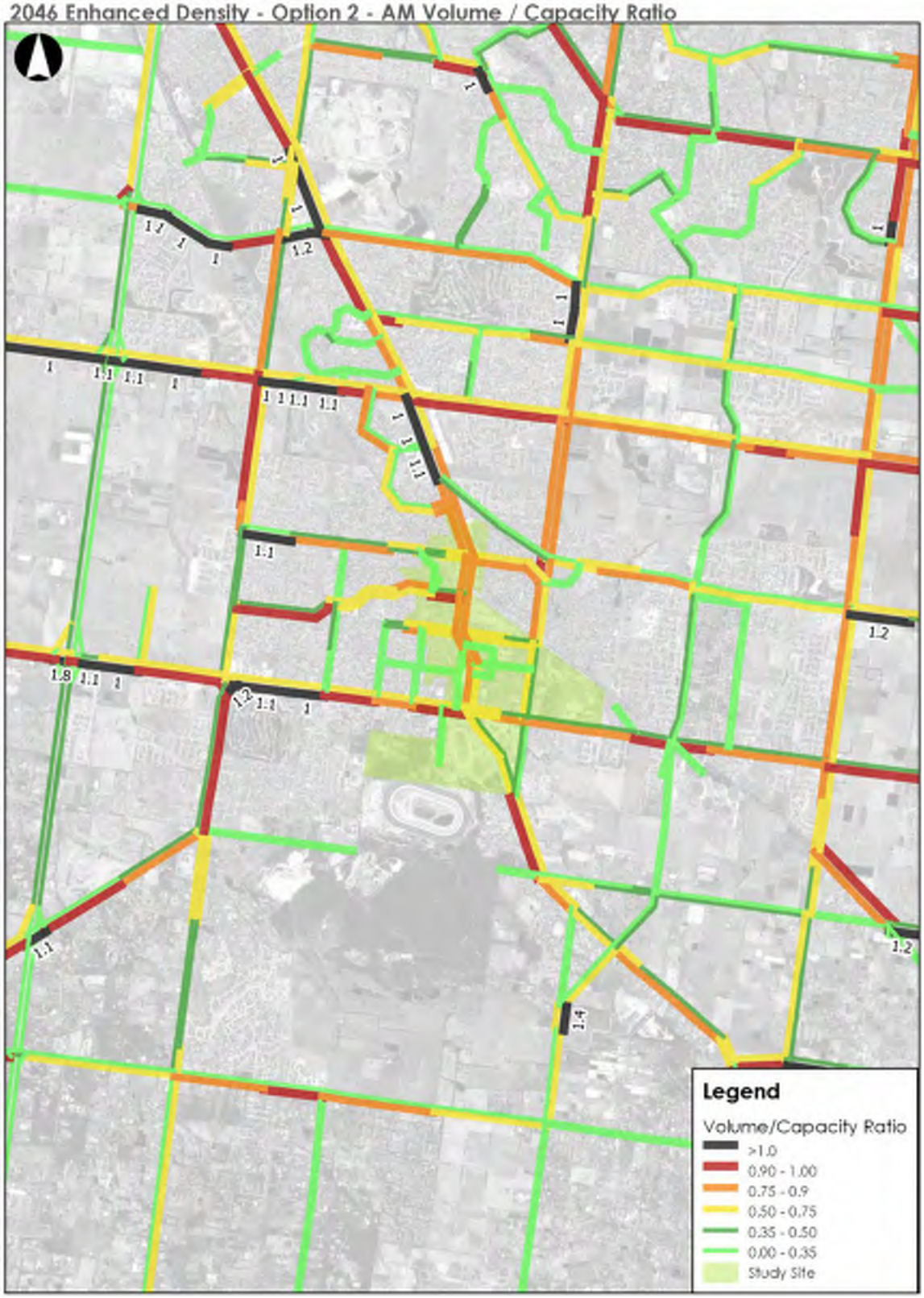

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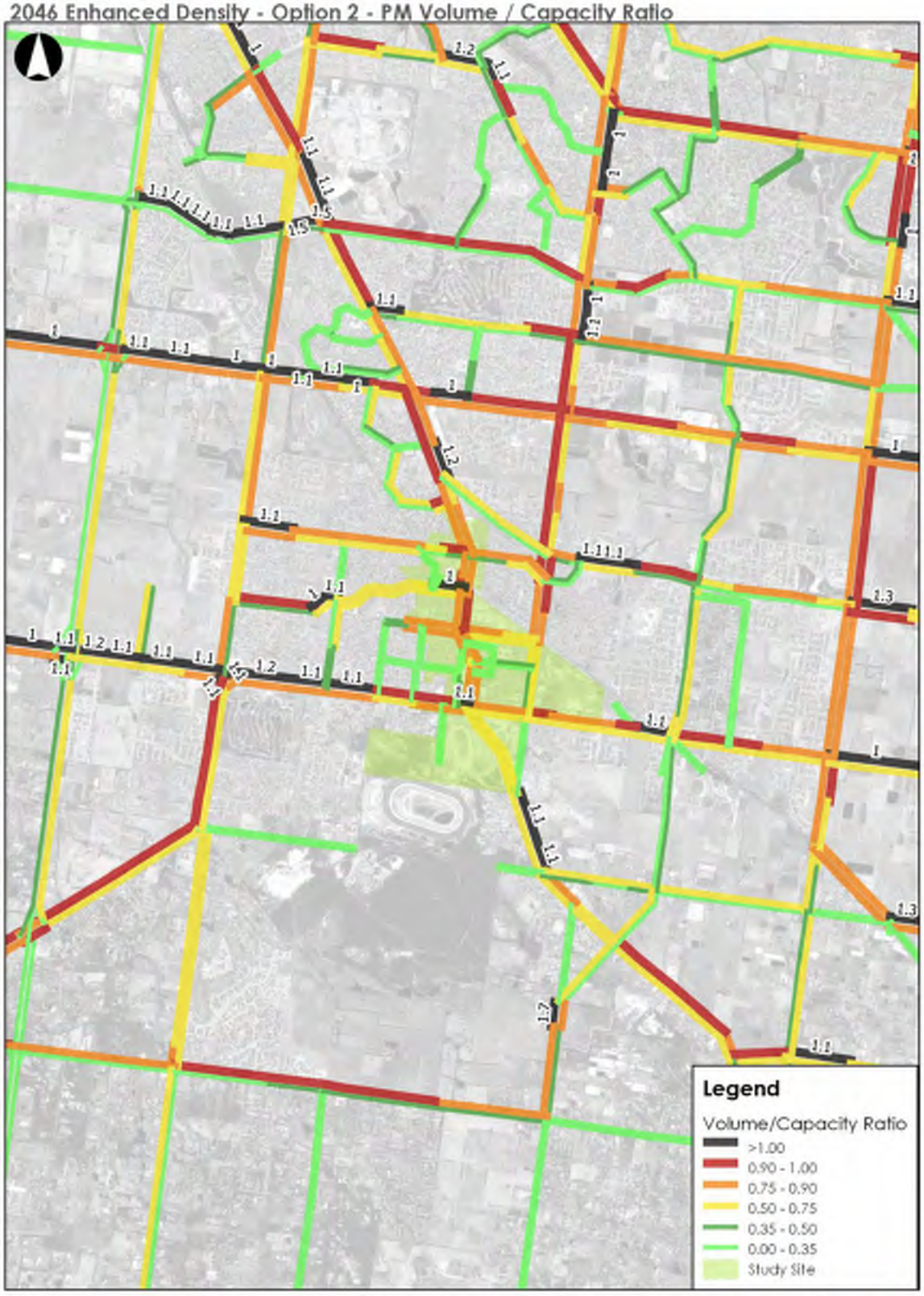

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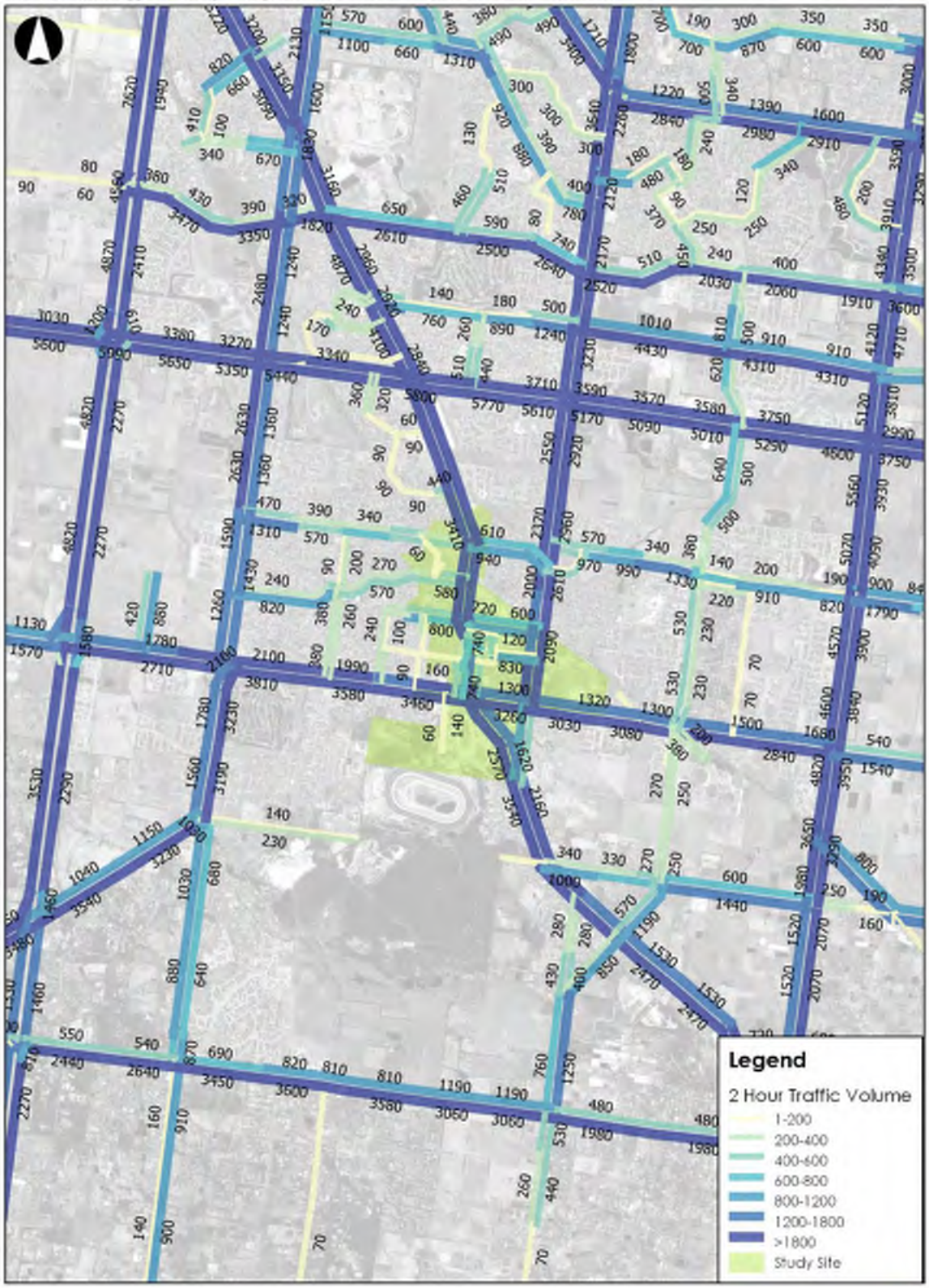
2046 Existing Density - Option 3 - AM 2 Hour Traffic Volume



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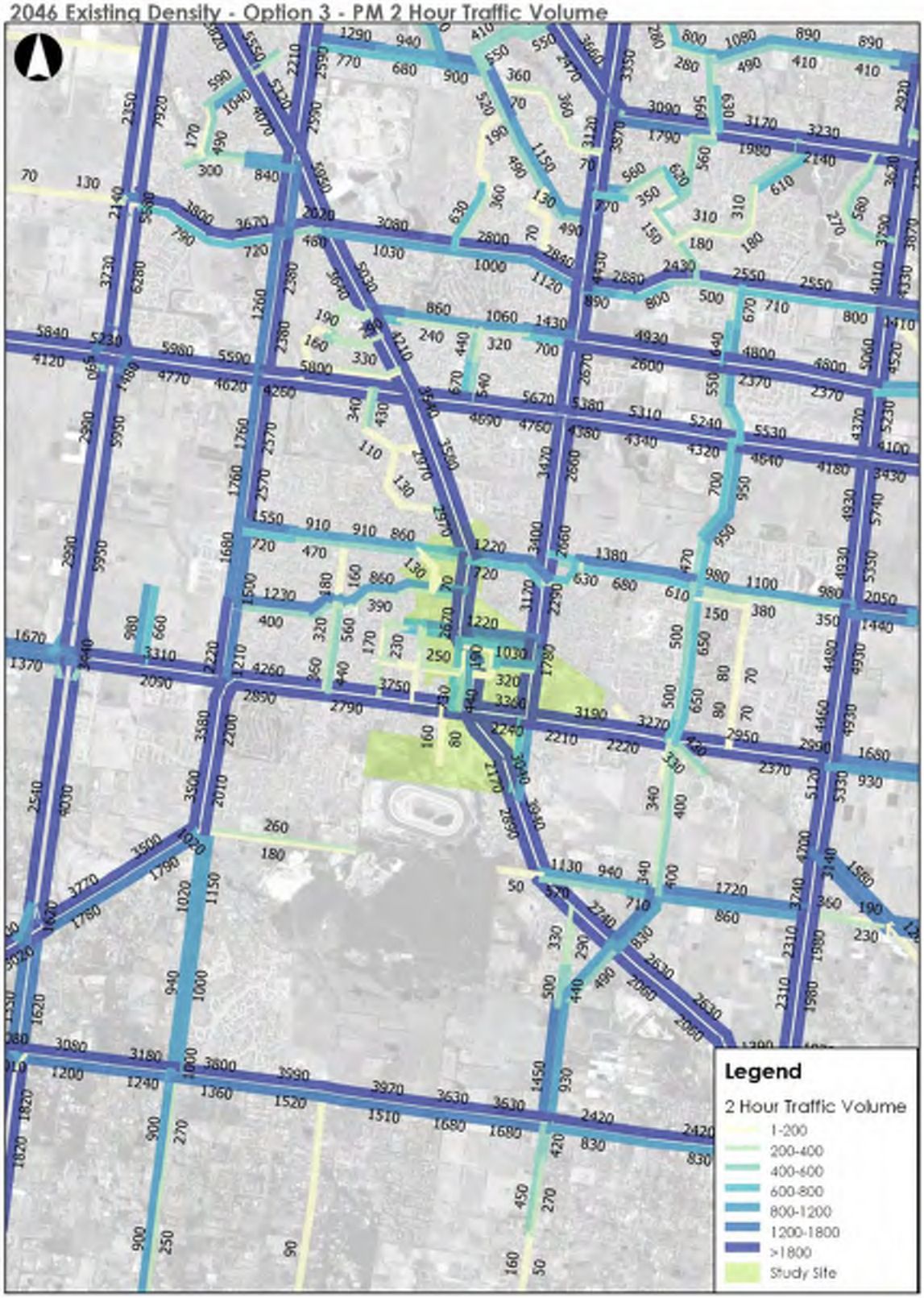
2046 Existing Density - Option 3 - PM 2 Hour Traffic Volume



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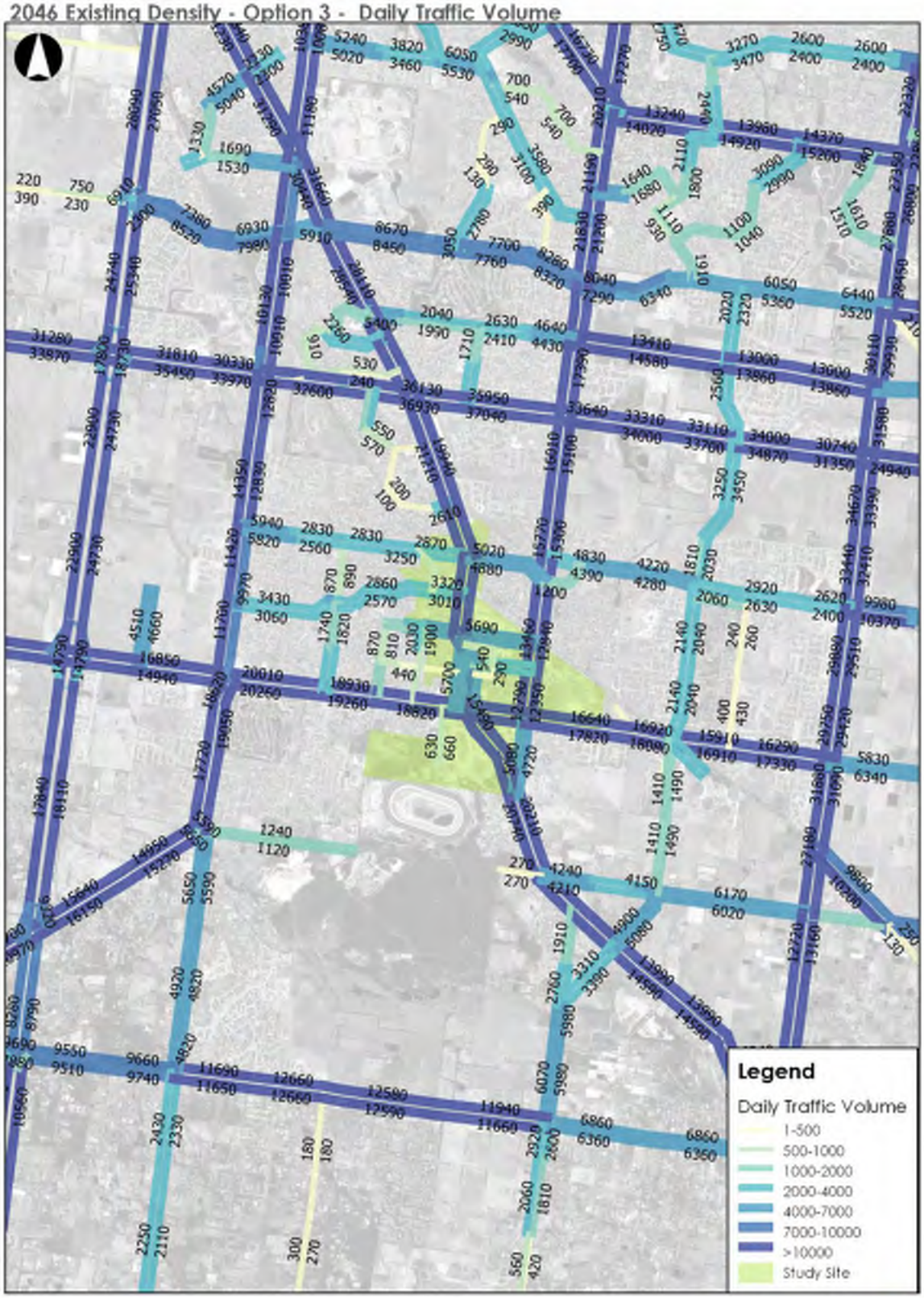
2046 Existing Density - Option 3 - Daily Traffic Volume



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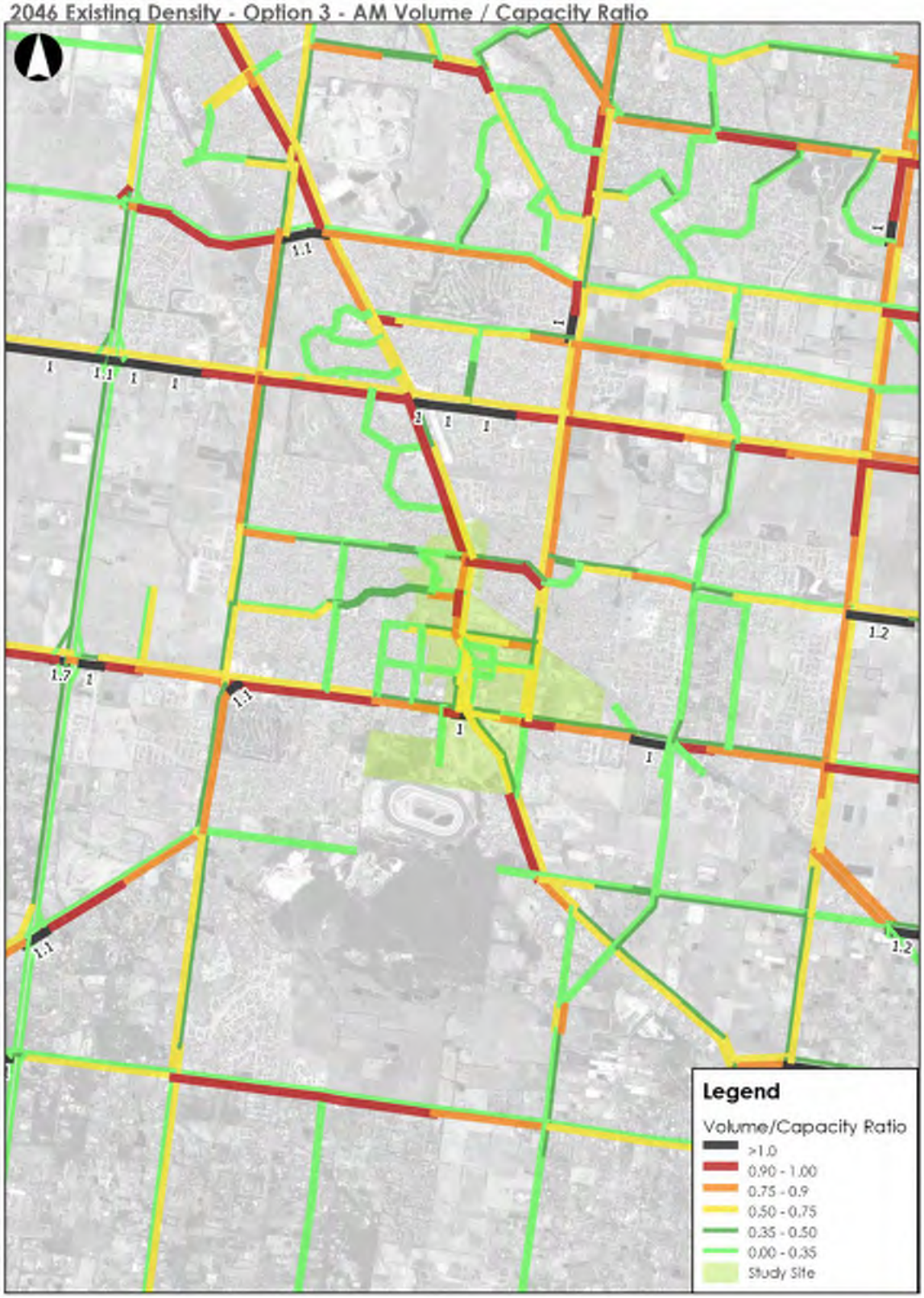
2046 Existing Density - Option 3 - AM Volume / Capacity Ratio



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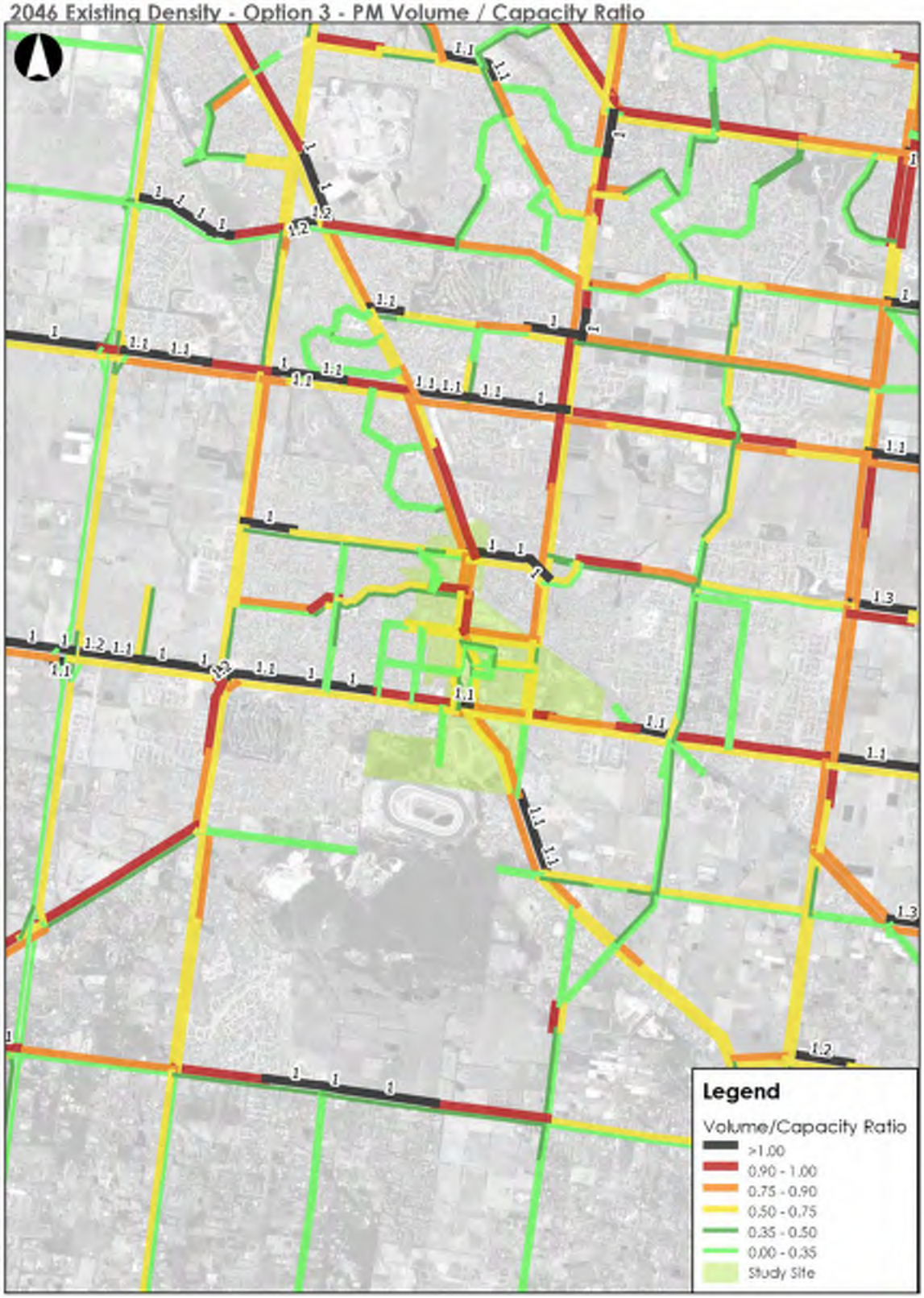
2046 Existing Density - Option 3 - PM Volume / Capacity Ratio



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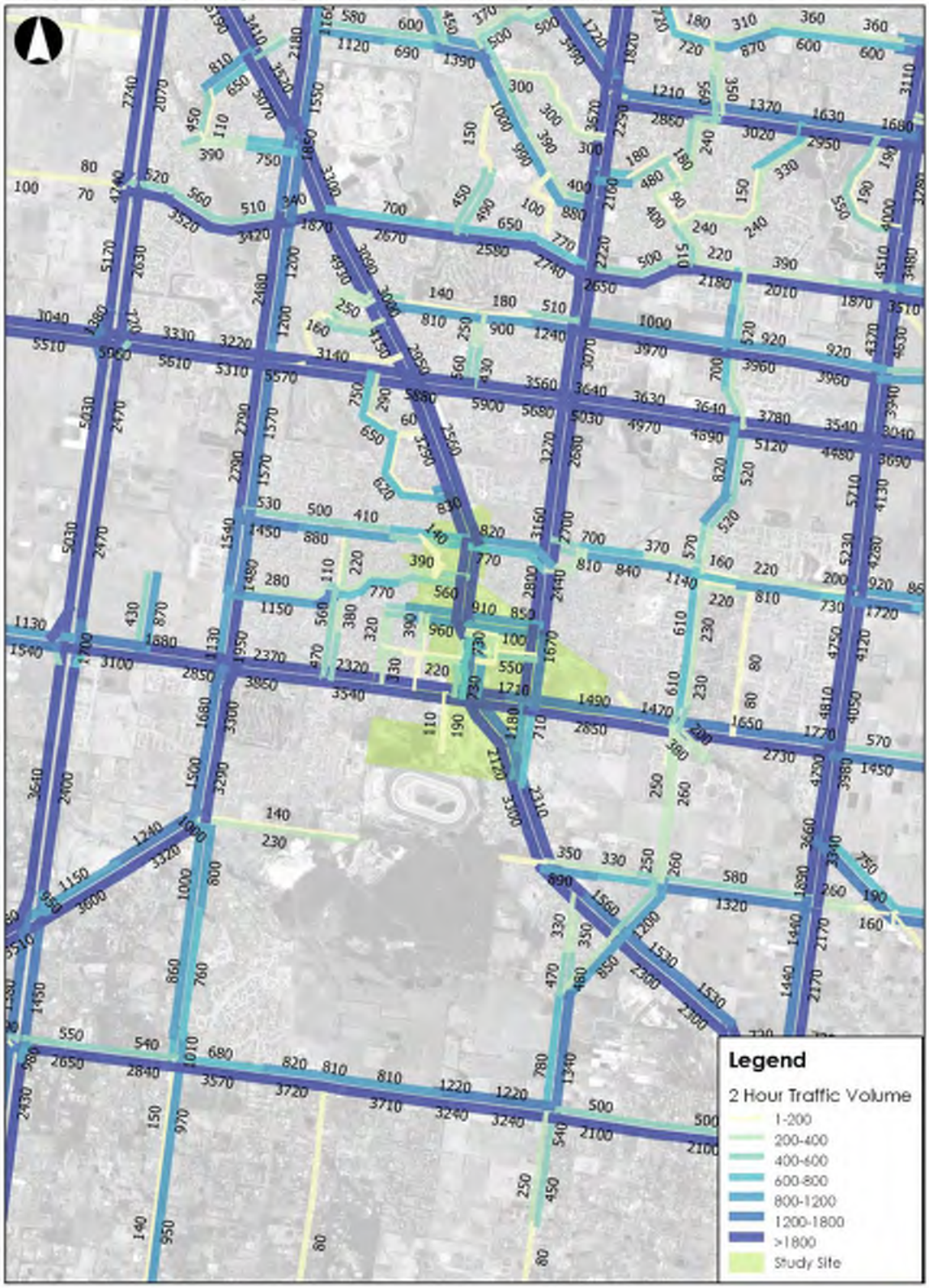

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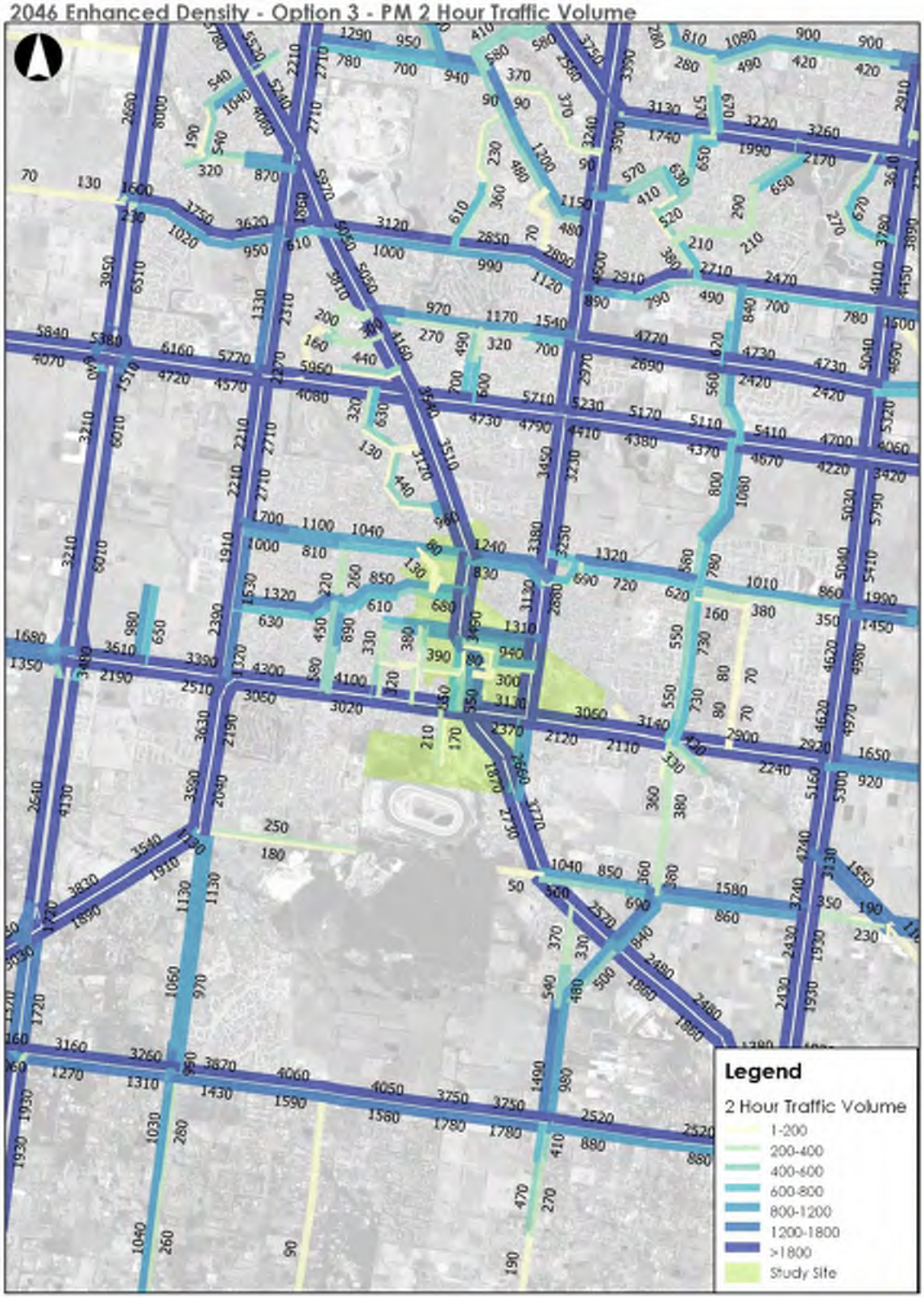

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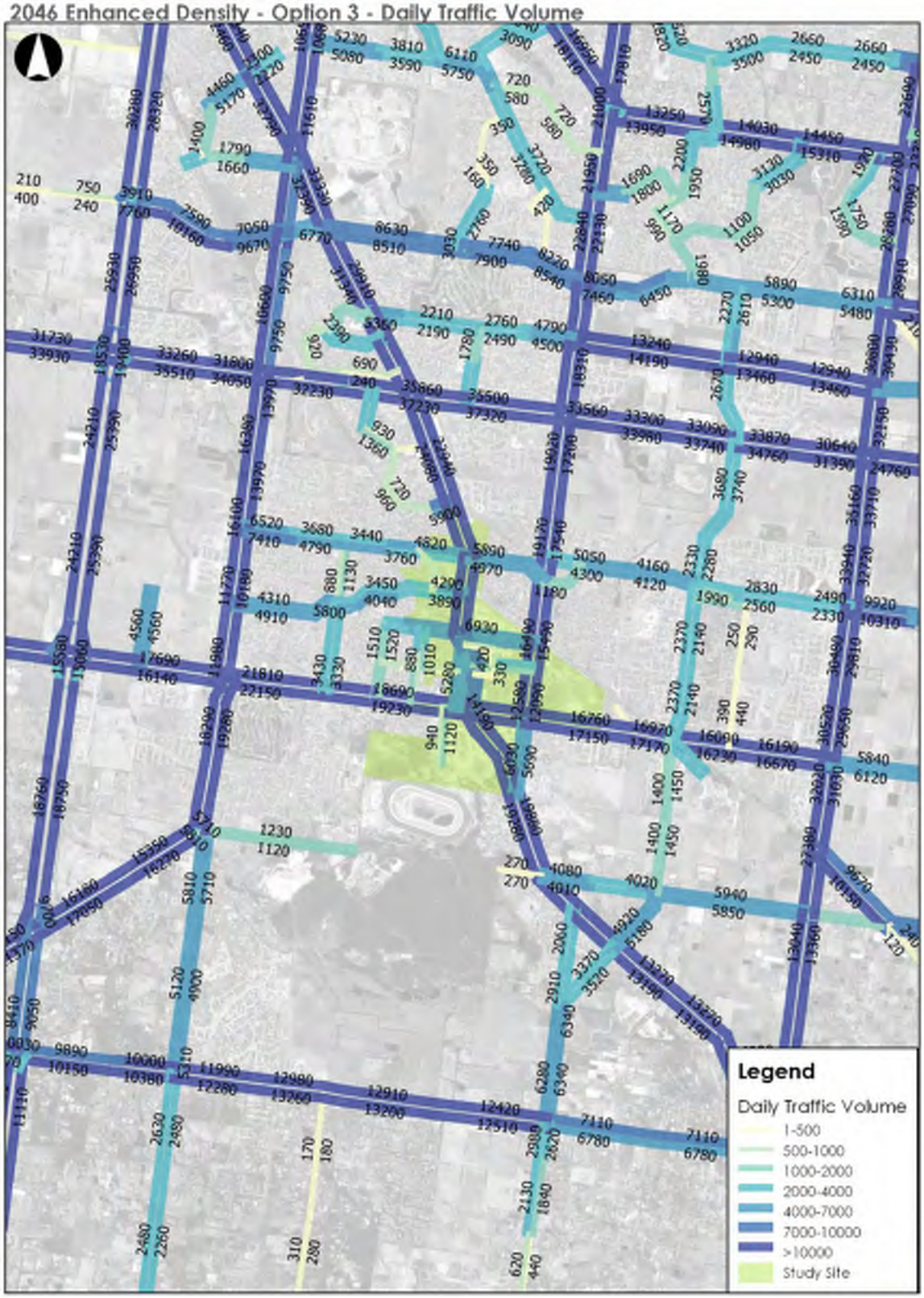

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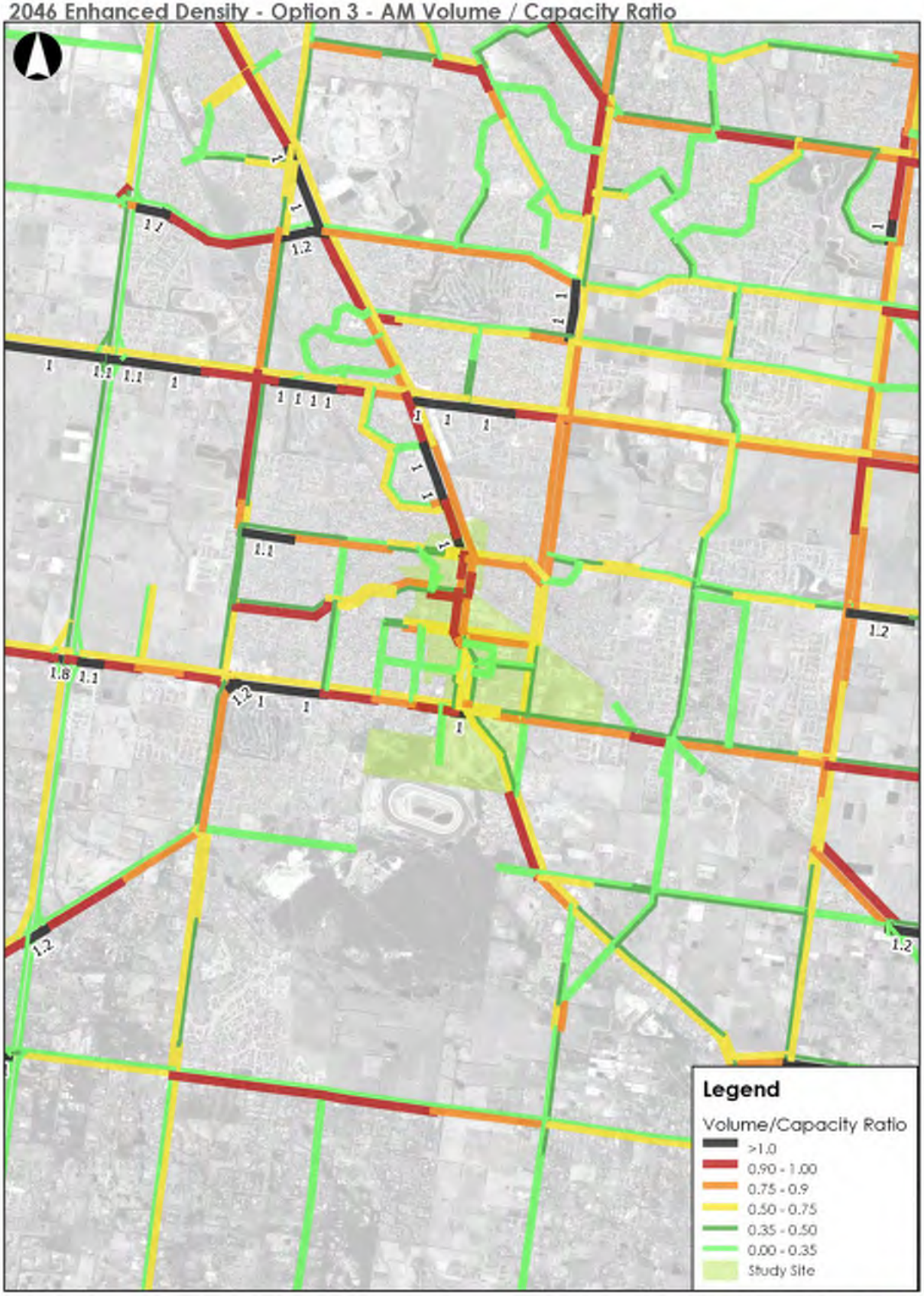

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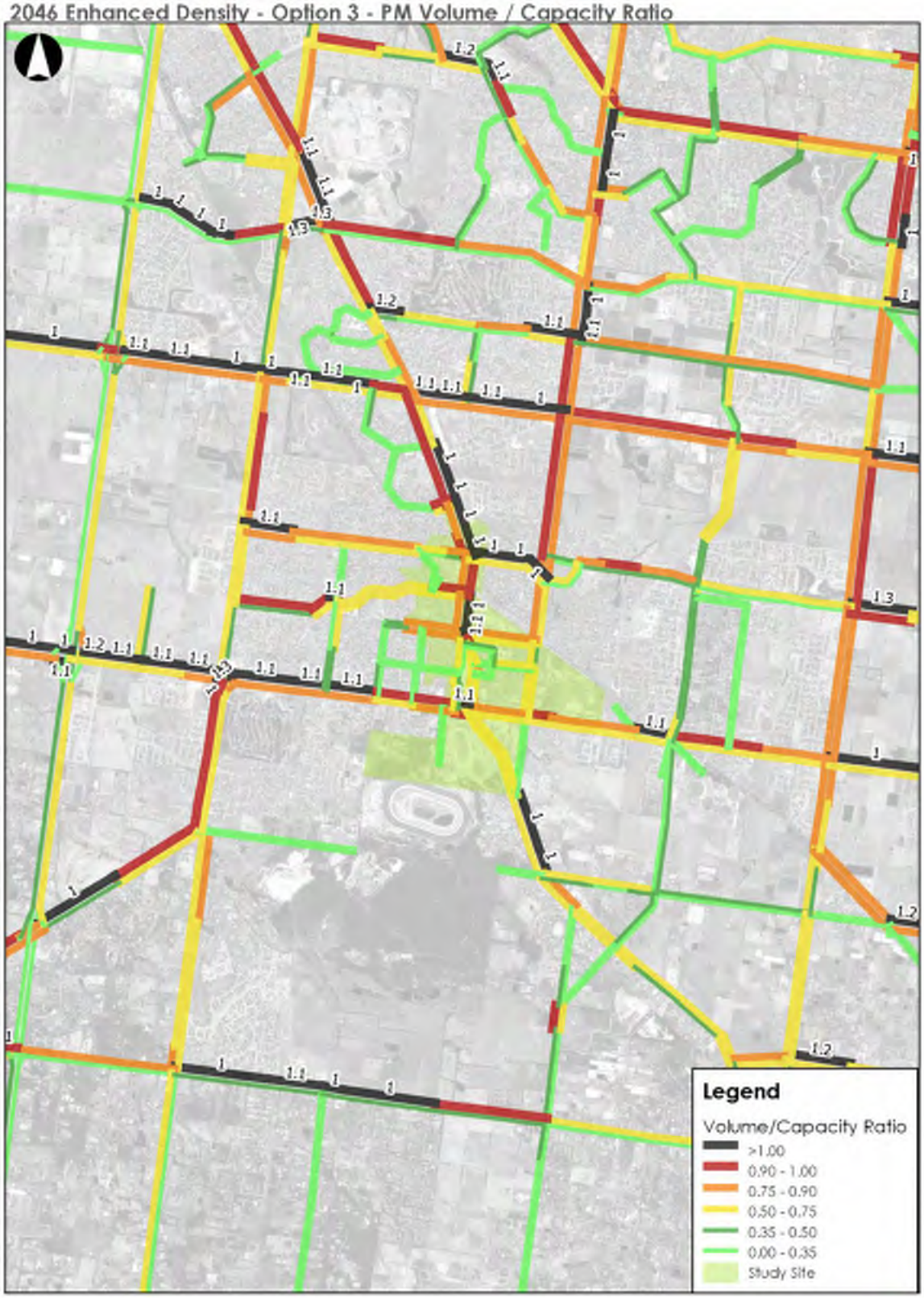

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