



Beveridge North West PSP Strategic Transport Modelling Assessment

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1. Introduction

1.1 Background

The Beveridge North West Precinct Structure Plan (BNW PSP) is located within the Mitchell Shire, to the west of the Hume Freeway, north of Camerons Lane, west of Old Sydney Road and south of Wallan. The site is currently farming land with approximately 15 properties and a total of 1,259 hectares (gross). The site is planned to be converted to mainly residential dwellings with natural landscape buffers along the north and west boundary. It is expected to accommodate over 14,000 residential lots.

Traffic Modelling for BNW PSP was completed by GTA in 2014 for the VPA. Since that time, a revised Urban Structure and development mix has been prepared, requiring an update to the assessment.

1.2 Purpose of this Report

GTA Consultants (GTA) have been engaged by the Victoria Planning Authority (VPA) to undertake an update to the strategic transport modelling for the BNW PSP. The outputs will be used to:

- Inform the extent of road infrastructure required to be constructed to support the BNW development for an interim (2031) scenario.
- Inform the ultimate lane requirements to enable the construction of final road infrastructure for the ultimate (2046+) scenario.

This report sets out the methodology and assumptions for the assessment.

1.3 References

In preparing this report, reference has been made to a number of background documents, including:

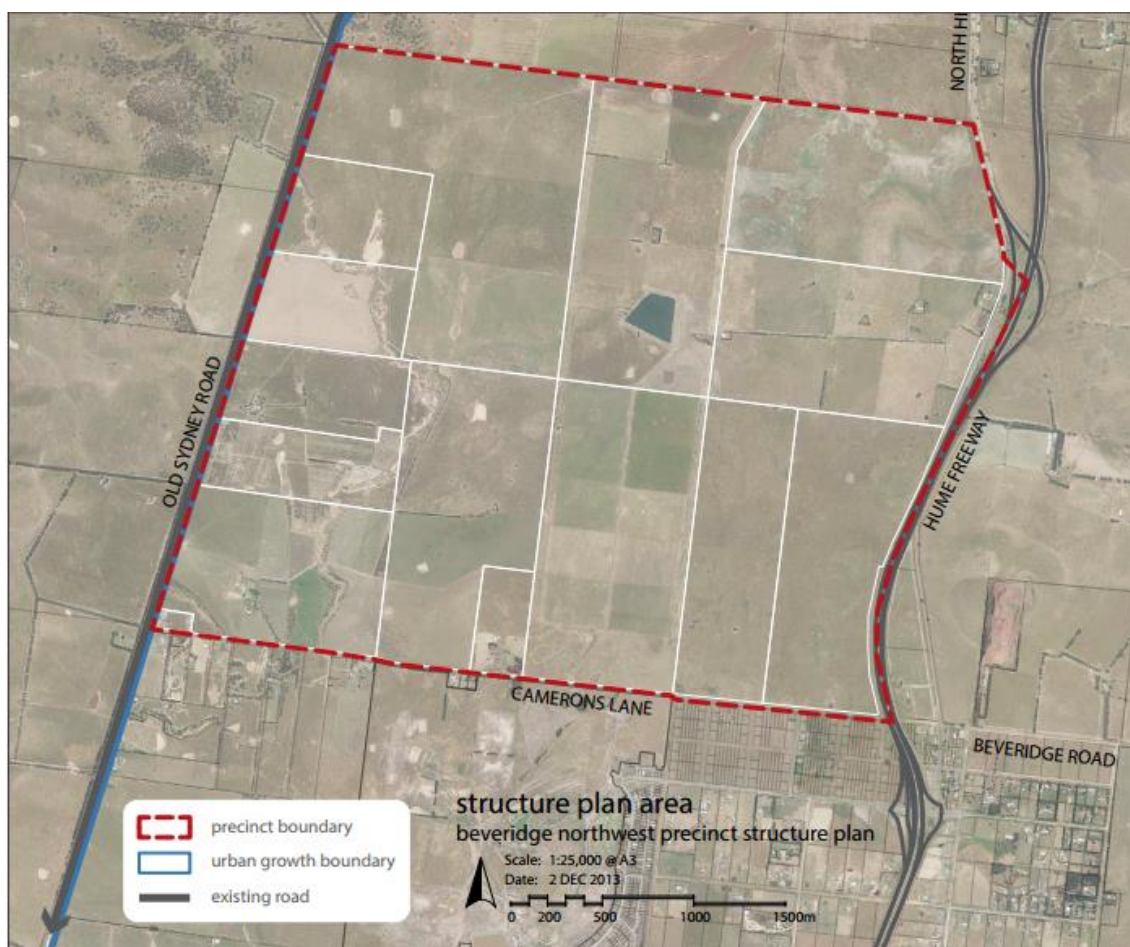
- Future Urban Structure (FUS) Plan for the PSP prepared by Victoria Planning Authority
- Traffic Modelling for PSP 1059 BNW (GTA Report Reference: 14M2340000)
- The Victorian Integrated Transport Model (VITM) 2016V2
- The VITM Northern Growth Corridor Model 2012
- Various technical data as referenced in this report.

2. PSP Context

2.1 Subject Site and Proposed Future Structure Plan

The BNW PSP is located in Beveridge and bounded by the Wallan South PSP boundary to the north, the Old Sydney Road to the west, Camerons Lane to the south, and the Hume Freeway to the east. The PSP boundary is shown in Figure 2.1.

Figure 2.1: Beveridge North West PSP Boundary and Related Study Area



The indicative Future Urban Structure Plan (draft) for the Beveridge North West PSP is shown in Figure 2.2. The plan was developed by VPA as part of the structure planning process.

Figure 2.2: Beveridge North West Precinct Draft Future Urban Structure



2.2 Existing and Proposed Arterial Roads

The BNW PSP includes a total of four Local Town Centres (LTC's) that comprise a mix of retail, educational and community facilities. Access is provided by two north-south arterial roads, three north-south connectors as well as a series of east-west connectors.

2.2.1 Hume Freeway

The Hume Freeway corridor along the eastern boundary of the precinct is the most significant north – south corridor linking northern Victoria with the Melbourne CBD. The freeway cross section is generally configured with two traffic lanes and an emergency lane in each direction separated by a 30m central median. The 50 metre carriageway (approx.) is set within a 75 metre road reserve (approx.). The large road reserve allows for additional traffic lanes to be added to the corridor to cater for future growth.

2.2.2 Camerons Lane

Camerons Lane is located on the southern boundary of the precinct and is currently configured as a two-lane rural cross-section (one lane in each direction) adjacent to the site and will remain as a local two lane road for interim scenario in this study. The North Growth Corridor Plan identifies that sections of Camerons Lane will be upgraded to Arterial Standard with up to two lanes in each direction (considered for ultimate case in this study).

2.2.3 Old Sydney Road

Old Sydney Rd is a two-way partly sealed, partly unsealed road aligned in a north-south direction, located to the west of the subject site. It provides direct access to Wallan and will ultimately consist of a two lane cross section (one lane in each direction) through the study area.

2.2.4 Proposed Hadfield Road¹

Hadfield Road is proposed to be located north of the precinct and is the boundary separating Beveridge North West and Wallan South. It will ultimately be configured as a four-lane cross section (two lanes in each direction).

2.2.5 Proposed Internal Road Network

The internal road network is underpinned by a grid network of arterial, connector and connector boulevard road types that provide internal connectivity to local town centres as well as the external network. Key features of the network by 2046 include:

- Two new north-south arterial roads (Proposed Western North-South (WNS) Arterial Road and Patterson Road) located west of Hume Freeway connecting to Camerons Lane and the new east-west arterial road bordering Wallan (Hadfield Road). The initial stage between the Hume Freeway of Patterson Road will need to be configured as four lanes.
- One new north-south local connector, between old Sydney Road and WNS Arterial Road, connecting to Camerons Lane and Hadfield Road. The connection through the landscape values area to Hadfield Road is indicative and only provides the connection through the landscape value areas to the north.
- An additional two new north-south local connectors will be provided between the WNS Arterial Road and the Hume Freeway.
- Three new east-west local connectors located north of Camerons Lane that will pass through the BNW PSP.
- The rest of the network is comprised of local streets the future residents will live on and provide local connectivity and access.

The refined road network as depicted in the VITM model is shown in Figure 2.3 - Figure 2.6.

¹ Hadfield Road was previously referred to as Stockade Road in previous reports.

Figure 2.3: BNW PSP VITM Road Network Link Class (2031)



Figure 2.4: BNW PSP VITM Road Network Number of Lanes (2031)

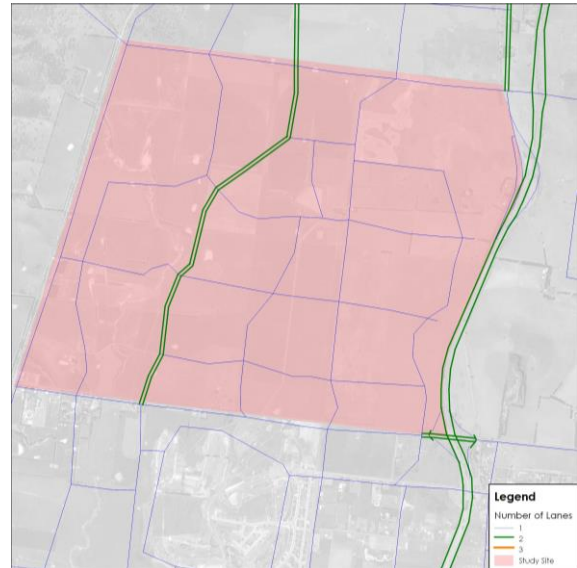
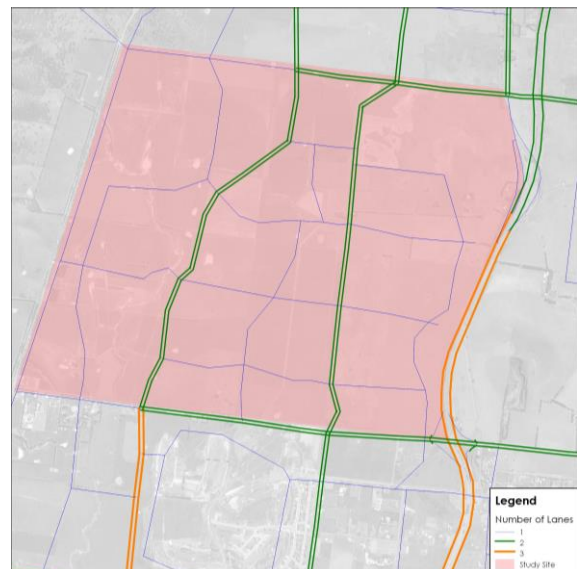


Figure 2.5: BNW PSP VITM Road Network Link Class (2046)



Figure 2.6: BNW PSP VITM Road Network Number of Lanes (2046)

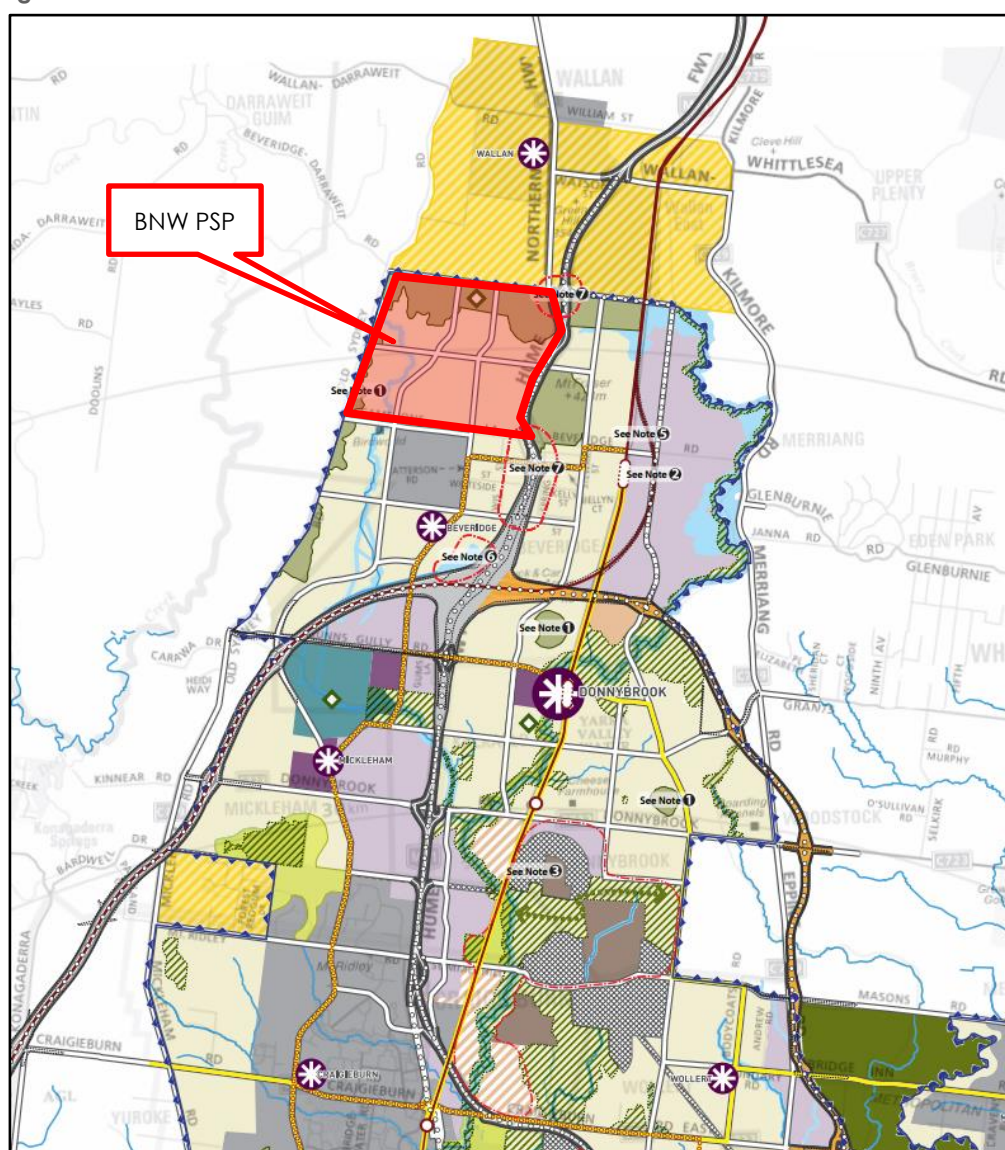


3. Study Area Context

3.1 Study Area

The BNW PSP is located within the Northern Growth Corridor (NGC). The NGC creates new town centres and employment areas that contribute to the ongoing diversification and growth of the northern region's economy. To the east of the BNW PSP, on the other side of the Hume Freeway, is the approved Lockerbie North PSP. Beveridge Central and Mandalay are located to the south of the precinct, with Wallan located to the north. The location of the BNW PSP in relation to the wider NGC and its local context are illustrated in Figure 3.1.

Figure 3.1: BNW PSP in the context of the Northern Growth Corridor²



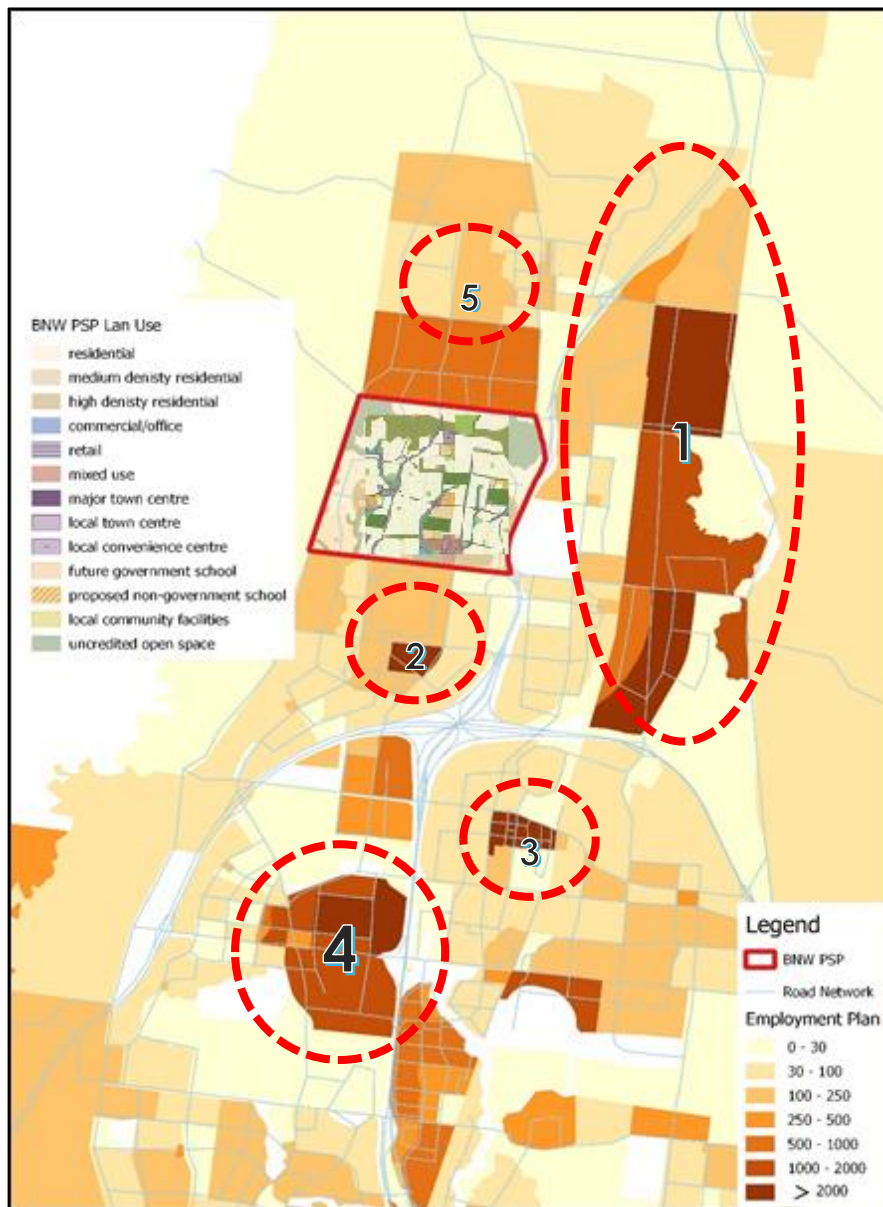
² Source: VPA website.

The NGC plan is a high level integrated land use plan. It has identified a number of town centres and industrial parks shown in Figure 3.2, which has been prepared to show the relationship of the BNW PSP to the key employment nodes in the NGC, including the:

1. Beveridge Interstate Freight Terminal (BIFT) and the Wallan East Industrial Land, located to the east of the BNW PSP
2. Beveridge town centre
3. Cloverton town centre
4. Merrifield town centre (located to the south of BNW PSP)
5. Wallan.

A high level of employment is planned to be located at these locations, attracting trips from the residential areas like Beveridge North West.

Figure 3.2: Northern Growth Corridor – Number of Jobs – 2046 by VITM Zone



4. Transport Modelling

4.1 Background

VITM is a tool developed by the Victorian Department of Economic Development, Jobs, Transport and Resources (DEDJTR) to assist in the planning of road and public transport infrastructure in Victoria. It is a multimodal strategic model that uses future population, employment and land use data projections and travel costs 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 Northern Growth Corridor (NGC) Model was developed in 2014 to understand the transport infrastructure requirements for the development of the PSP's. Input into the development of the model has been provided from a range of stakeholders including the VPA, Hume City Council, Whittlesea City Council and VicRoads.

The model version that used for this project was VITM2012_V120110 GAA NGC which was obtained from Transport for Victoria (TfV).

This model formed the basis for the VITM modelling undertaken as part of this package of work.

4.2 Design Years - Interim (2031) vs. Ultimate (2046)

Both interim (2031) and ultimate (2046) traffic volumes are presented in this report. The interim volumes are used to inform the extent of road infrastructure required to be constructed to support the BNW development, whilst the ultimate volumes are used to validate the provision of ultimate road reserve requirements within the PSP.

4.3 Model Inputs

Both the road network and land use inputs have been refined to represent BNW PSP's Future Urban Structure before running the strategic model.

4.3.1 GTA Road Network Refinements

GTA has refined a copy of the Northern Growth Corridor version of VITM (herein referred to as the NGC VITM) and has used it in the assessment of the BNW PSP. For the purposes of this assessment the following network refinements were made to the NGC VITM (both the 2031 and 2046 models):

- additional roads and changes to road network characteristics in the study area
- refinement of the transport zones
- refinement of the zone centroid connection locations for the PSP.

The extent of the GTA network refinements are shown by comparing Figure 4.1 and Figure 4.2, noting that the final road network used in the model is Figure 4.2.

Figure 4.1: NGC VITM Road Network



Figure 4.2: BNW PSP VITM Road Network



The refinements were made to enhance how the NGC VITM reflected the likely access arrangements for the BNW PSP. It is highlighted that the GTA refinements did not result in any noteworthy changes to the 2031 and 2046 VITM network beyond the bounds of the study area.

Plots of the road network characteristics (i.e. link class, lanes etc.) are located in Appendix A.

4.3.2 Public Transport Network

No refinements to the public transport network have been undertaken for this project which have been included in the model by TfV. The public transport network for the 2031 and 2046 design years are shown in Figure 4.3 and Figure 4.4.

Figure 4.3: Public Transport Lines (2031)

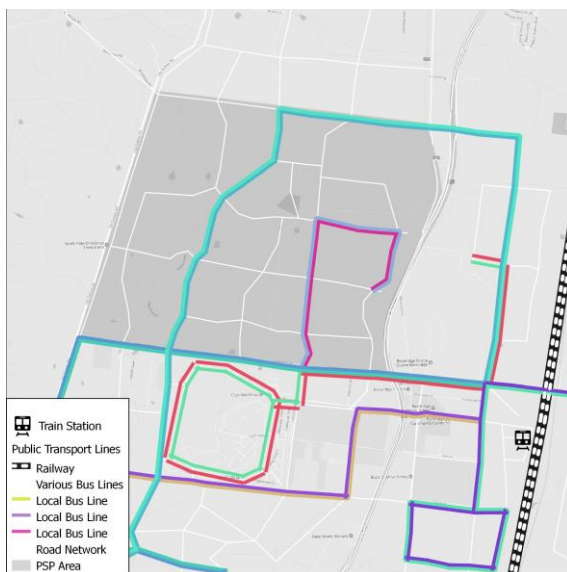
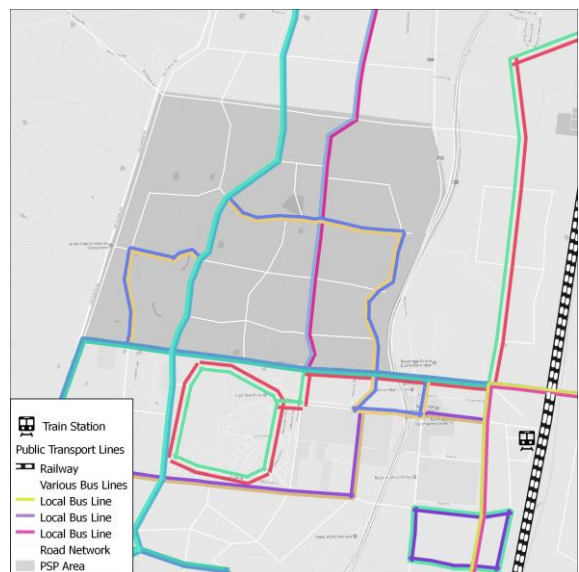


Figure 4.4: Public Transport Lines (2046)



4.3.3 Land Use Refinements

In addition to the road network refinements, the zone configuration of the PSP was disaggregated for the purpose of the traffic modelling. The zone system is based around the proposed urban structure plan's land uses and road network characteristics. The zone refinements are shown in Figure 4.5 and Figure 4.6

Figure 4.5: NGC VITM Zone Structure

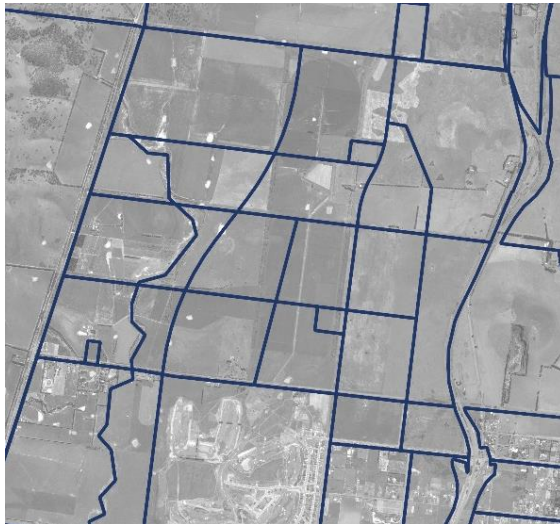


Figure 4.6: BNW PSP VITM Zone Structure



In addition, the land use specifications provided from the VPA are illustrated in Figure 4.7 and Figure 4.8 , which graphically shows the extent of population, employment and enrolment for each zone.

Figure 4.7: BNW PSP Land Use Yields by Zone (2031)

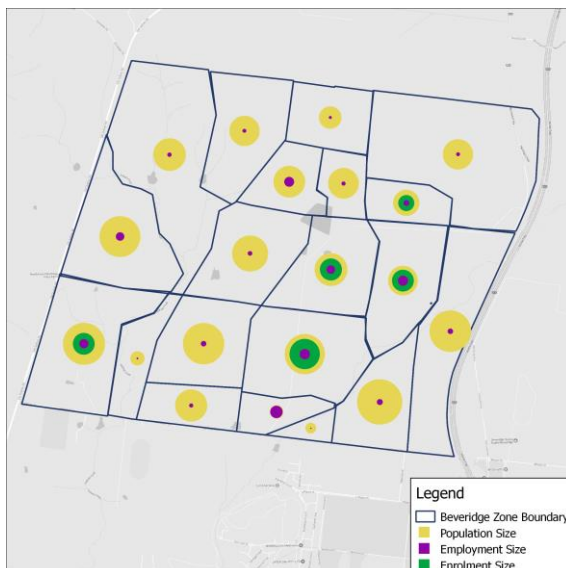
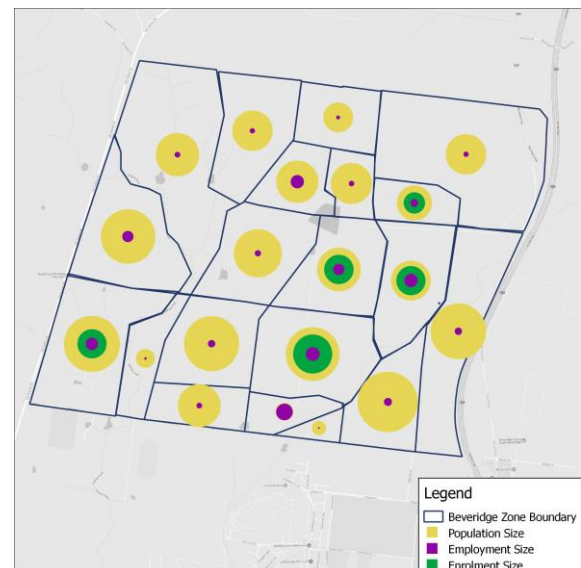


Figure 4.8: BNW PSP Land Use Yields by Zone (2046)



Overall, there are five zones that provide enrolments, which represents the location of the schools, and small levels of employment are provided within each zone across the PSP. This shows that in general most of the trips generated within the precinct will be required to travel outside of the PSP to their places of work. Table 4.1 breaks down the land use summary for 2031 and 2046.

Table 4.1: BNW PSP Land Use Summary (2031 and 2046)

BNW PSP	Population (People)	Household (Dwelling)	Employment (No. of Jobs)	Enrolment (No. of Students)
2031	29,400	10,500	1,320	3,600
2046	39,200	14,000	1,750	4,700

The BNW PSP land uses in 2031 will be around 75% of full build-out modelled in 2046. It is assumed that there will be the same number of schools in both interim and ultimate year with 1100 more enrolments in 2046 compared to 2031. The ratio of residents to jobs within the PSP is relatively low compared to the 2016 census data for Greater Melbourne of 2.23³ persons/job, which, as previously mentioned, means the majority of residents would need to travel outside the precinct for work.

4.4 Model Outputs

Model outputs in terms of travel demand and network performance are analysed in this section to inform the road network requirements at full development.

4.4.1 Travel Demand Analysis

Trip Generation

Based on the land use inputs listed in Table 4.1, the BNW PSP will generate approximately 101,000 daily trips in 2031 and 134,000 daily trips in 2046.

Mode Share

Figure 4.3 and Figure 4.4 show the Public Transport Lines (including both bus line and train line) within and around BNW PSP in 2031 and 2046. The proportion of mode share for car and public transport in 2031 and 2046 are tabulated in Table 4.2.

Table 4.2: VITM Trip Mode Split

Mode Share	2031	2046
Car Trip	87%	87%
Public Transport Trip	13%	13%

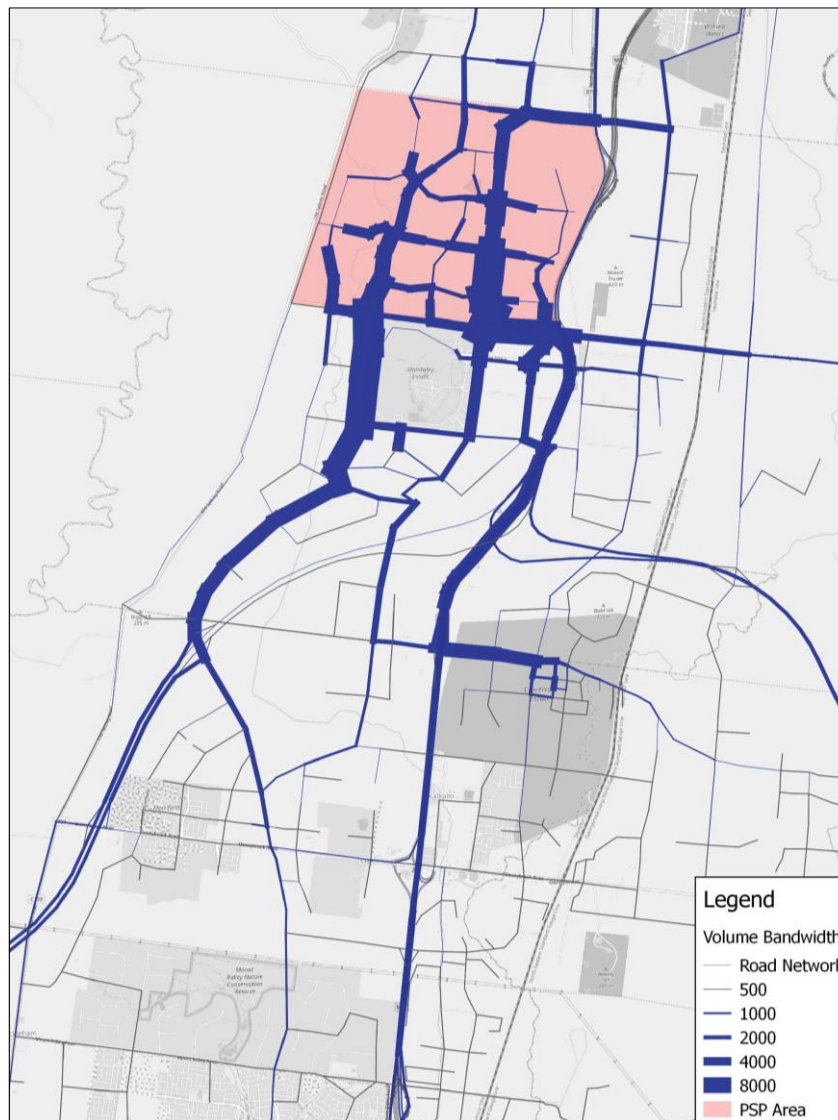
The modal share results show that car is the main travel mode for BNW PSP and is not expected to change between 2031 and 2046. This proportion indicates that about 116,000 trips would be undertaken by Car by 2046.

Trip Distribution

Figure 4.9 is a select link analysis for the entire BNW PSP, which shows the distribution of car trips generated and attracted to the PSP at full development in 2046. The thickness of the blue line indicates the level of traffic volume on a particular link in the road network travelling to and from the PSP. The thickness of the link is a direct correlation to the proportion of volume.

³ Source: http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/2GMEL

Figure 4.9: Select Link Analysis of BNW PSP in 2046



The plot shows that the majority of trips travelling to and from the PSP travel to the southern areas to access jobs and retail trips in areas such as Cloverton, Merrifield and the established areas of Melbourne via the Hume Freeway and OMR.

Table 4.3 has been prepared to summarise the proportion and direction of trips to and from BNW.

Table 4.3: Trip Distribution

Motorized Trip Distribution by Destination	2031	2046
Within BNW PSP	35%	29%
NGC North of Hadfield Road	1%	1%
NGC East (BIFT)	3%	5%
NGC South (Beveridge, Cloverton and Merrifield)	15%	16%
Rest of Metropolitan Melbourne	46%	49%
Total	100%	100%

The 2031 results show that 35% of daily car trips travel within the BNW PSP, 3% of daily car trips travel to and from the NGC East (including the BIFT) and 61% of daily car trips travel to and from the south (including NGC South and rest of Metropolitan Melbourne).

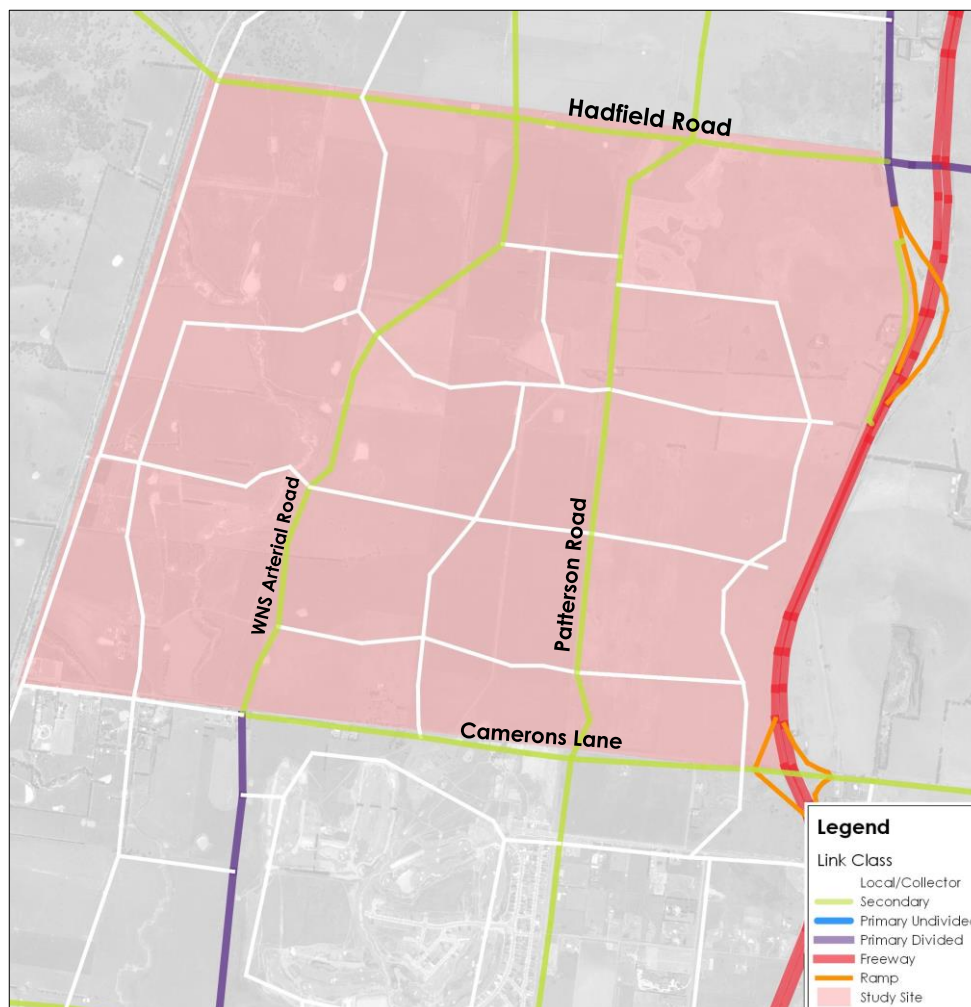
By 2046 a total of 29% daily car trips will be contained within the BNW PSP, 5% daily car trips will travel to and from the NGC East (including the BIFT) and 65% of daily car trips will travel to and from the south (including NGC South and rest of Metropolitan Melbourne).

The reduced share of internal trips is caused by increased population of 2046 leaving the of the PSP to their places of employment.

4.4.2 Network Performance Analysis

Four key arterial roads within the PSP have been identified to report on a range of outputs including volumes and capacity information and are annotated in Figure 4.10.

Figure 4.10: Transport Network with Key Locations



Degree of Saturation for Peak Period

The volume to capacity ratio (degree of saturation) is a good indicator as to the operation of the network at specific link locations. The volume to capacity ratio (VCR) is also able to be correlated with the Level of Service Definitions as defined in Austroads outlined in Table 4.4.

Table 4.4: Level of Service Definitions

LOS	Definition	Volume to Capacity Ratio
A	Conditions of free flow, speed is controlled by driver's desires, speed limits or physical Roadway conditions	0.0-0.35
B	Conditions of stable flow, operating speeds begin to be restricted, little or no restrictions on manoeuvrability from other vehicles	0.35-0.50
C	Conditions of stable flow, speeds and manoeuvrability more closely restricted, occasional backups behind left-turning vehicles at intersections	0.50-0.75
D	Conditions approach unstable flow, tolerable speeds can be maintained but temporary restrictions may cause extensive delays, little freedom to manoeuvre	0.75-0.90
E	Conditions approach capacity, unstable flow with stoppages of momentary duration, manoeuvrability severely limited	0.90-1.00
F	Forced flow conditions, stoppages for long periods, low operating speeds	1.00 or >1.00

The VCR outputs for the key locations, as identified in Figure 4.10 have been extracted from the model and are summarised in Table 4.5.

Table 4.5: Peak Period (two hour) Volume to Capacity Outputs and Level of Service

No	Road Name	2031		2046	
		AM	PM	AM	PM
1	Proposed WNS Arterial Road north of Camerons Lane NB	A	C	A	C
	Proposed WNS Arterial Road north of Camerons Lane SB	B	A	C	B
2	Patterson Road north of Camerons Lane NB	B	F	A	D
	Patterson Road north of Camerons Lane SB	E	C	D	B
3	Camerons Lane west of Hume HWY EB	D	C	D	B
	Camerons Lane west of Hume HWY WB	C	F	A	D
4	Hadfield Road west of Hume HWY EB	A	A	A	B
	Hadfield Road west of Hume HWY WB	A	B	A	D

The information presented in Table 4.5 indicates that proposed arterial roads within BNW PSP will experience severe congestion on Patterson Road and Camerons Lane in 2031. The congestion will be relieved when both Patterson Road and Camerons Lane are upgraded from two lanes to four lanes in the ultimate case. The proposed roads within BNW PSP perform at acceptable levels of service (D or better) in both peak periods in 2046.

Daily Volume vs Capacity Limit

Based on the outcomes of the VITM modelling, the expected two-way daily traffic volumes on key roads for 2046 are summarised in Table 4.6. The volumes reported are for the Ultimate Base Scenario.

Table 4.6: Summary of Ultimate Daily Volumes on Key Roads (2046)

No.	Road Name	Expected Daily Traffic Volume	Proposed Classification and No. lanes	Austrroads Capacity Limit (based on No. lanes) [1]	Proposed Classification is Considered Appropriate?	Recommended No. Lanes (Two Ways)
1	Proposed WNS Arterial Road (north of Camerons Lane)	19,000	Secondary Arterial (4 lanes)	36,000vpd	Yes	4 Lanes
2	Proposed Patterson Road (north of Camerons Lane)	21,700	Secondary Arterial (4 lanes)	36,000vpd	Yes	4 Lanes
3	Camerons Lane (West of Hume Hwy)	23,000	Secondary Arterial (4 lanes)	36,000vpd	Yes	4 Lanes
4	Hadfield Road (West of Hume Hwy)	11,000	Secondary Arterial (4 lanes)	36,000vpd	Yes	2 Lanes

[1] Capacity limits sourced from Austrroads Standards "Guide to Traffic Management – Part 3 Traffic Studies and Analysis" document from Table 4.3 as follows: 2-lane road: 18,000vpd, 4-lane road: 36,000vpd, 6-lane road 54,000vpd.

[2] It is noted that Hadfield Road is indicated as a primary arterial on the plans in Section 3 of this report.

As shown in Table 4.6 the proposed road classifications align with the daily traffic volume ranges associated with the classification and Austroads based road capacity limits. The volumes experienced on all of the roads listed within the table are lower than the theoretical capacities provided.

Indeed, the capacity afforded on some roads in the northern sections of the PSP, such as the WNS Arterial Road and Patterson Road could be reduced and still perform at acceptable operating conditions. Further investigation of the usage of the allocated road space should be undertaken through the PSP design process, including consideration of road management within local town centres and through school precincts as well as their role in supporting the Hume Freeway. This could be understanding the appropriate and best use of road space in the form of lane management, parking management and Public Transport Priority.

Intersection Performance

The modelling shows that approximately 8,000 vehicles per day will travel through the intersection of Murray Street/Lewis Street and Lithgow Street by 2046. As this intersection is a staggered intersection, the geometric constraints will likely limit the ability for a high volume of traffic that is able to travel through the intersection. Strategic models do not explicitly assess the performance of intersections, including the delay that will be experienced from operational features such as signal control and vehicle priority.

The model shows that there is capacity afforded on adjacent north south links such as Patterson Road (which will be two lanes in each direction by 2046) that are able to accommodate any redistribution of traffic due to intersection capacity constraints.

4.5 Model Plots

A range of other outputs have been extracted from the model to assist in the understanding of travel demand for the two design years (2031 and 2046). These outputs are located within Appendix B and Appendix C, and include the following:

- AM and PM Peak Period 1 Hour Vehicle Volume
- Degree of saturation for the AM and PM peak
- Daily volume plots
- Select Link Analysis.

The volume plots demonstrate that, as expected, there is a large proportion of traffic from the PSP travelling to the employment areas (shown in Figure 3.2) and arterial road network to the south. The WNS Arterial Road carries the highest daily volumes to/from South, whilst Camerons Lane's section near the Hume Freeway carries approximately 75% east-west bound traffic volume.

4.6 Northern Highway On-Ramp Scenario

An additional scenario was completed in consultation with VicRoads and the VPA to test the impact of additional lanes on the Northern Highway southbound on ramps to the Hume Freeway. The modelling consisted of increases to the link capacities and speeds between the Hume Freeway and Hadfield Road.

The scenario utilised the same networks and land uses detailed within this report and the network changes and model outputs are documented in Appendix D of this report. The results of this test

show that, as expected, the increased capacity attracts additional traffic of up to 25% when compared to the current arrangements.

4.7 Northern Highway Traffic Modelling

Since the completion of the modelling for BNW, modelling of the Northern Highway has been completed for VicRoads. The modelling involved updating the land use inputs for the land parcels immediately north of the Beveridge NW PSP which included providing a more refined (disaggregated) zone structure for this area.

The modelling was completed for 2046 and included increases in the employment numbers (particularly retail employment) in Wallan South which are summarised in Table 4.7.

Table 4.7: Demographic Input Comparison (2046)

Model	Population	Households	Retail Employment	Total Employment	School Enrolments
BNW	15,183	5,100	1	710	2,400
Northern Highway Modelling	15,183	5,100	1,420	1,935	2,400
	+0	+0	+1,419	+1,225	+0

Other differences between the models included changes to the speed of the proposed WNS arterial road being increased from 60km/hr to 80km/hr.

The modelling completed as part of the Northern Highway resulted in changes to the expected travel patterns through BNW on some key roads, which has been compared in Table 4.8.

Table 4.8: Summary of Ultimate Daily Volumes on Key Roads (2046)

No.	Road Name	Expected Daily Traffic Volume (BNW PSP Model)	Expected Daily Traffic Volume (WS PSP Model)	Proposed Classification and No. lanes	Classification still Appropriate?
1	Proposed WNS Arterial Road (north of Camerons Lane)	19,000	36,900	Secondary Arterial (4 lanes)	No
2	Proposed Patterson Road (north of Camerons Lane)	21,700	23,600	Secondary Arterial (4 lanes)	Yes
3	Camerons Lane (West of Hume Freeway)	23,000	25,500	Secondary Arterial (4 lanes)	Yes
4	Hadfield Road (West of Hume Freeway)	11,000	27,600	Secondary Arterial (4 lanes)	Yes

The resultant volumes on the key links within BNW are generally higher in the Northern Highway model, with more motorists travelling through the PSP rather than directly to the Hume Freeway. The larger increase in traffic flows are due to the refined zone structure for the western sections of Wallan South that has resulted in higher proportion of external trips travelling through the corridor. This attractiveness is also due to the WNS Arterial Road having a higher speed.

All of the volumes do not exceed the theoretical daily capacities set out in Table 4.6, with the exception of the Proposed WNS Arterial Road, which is marginally (2.5%) over the 36,000vpd threshold. The location of where the daily volume is recorded is at the southern end of the BNW PSP, which is the highest volumes along the stretch of road, with lower volumes experienced in the northern parts of the PSP closer to Hadfield Road.

When considering the broader north south movement through the PSP, the expected volumes on Patterson Road are considerably lower than its threshold and collectively the two roads have ample capacity to accommodate the overall expected north-south demands. In practice, as

the other north-south links have spare capacity, it is likely that road users would adjust their trips to use one of the less congested north-south roads should the capacity be exceeded.

Overall, the refinements undertaken in the Northern Highway model provides an even distribution of traffic into the future and as a result the overall network and performs with an improved level of performance. In this regard, the BNW modelling represents a conservative set of outputs and there is no evidence to suggest that the modelling undertaken for the Northern Highway will change the recommendations within this report.

5. Conclusion

Strategic transport modelling of the BNW PSP has been undertaken using the Victorian Integrated Transport Model (VITM) for the future years 2031 and 2046. The information presented within this report outlines the land use inputs, assumptions and resultant transport demands for the proposed road network.

Key considerations are:

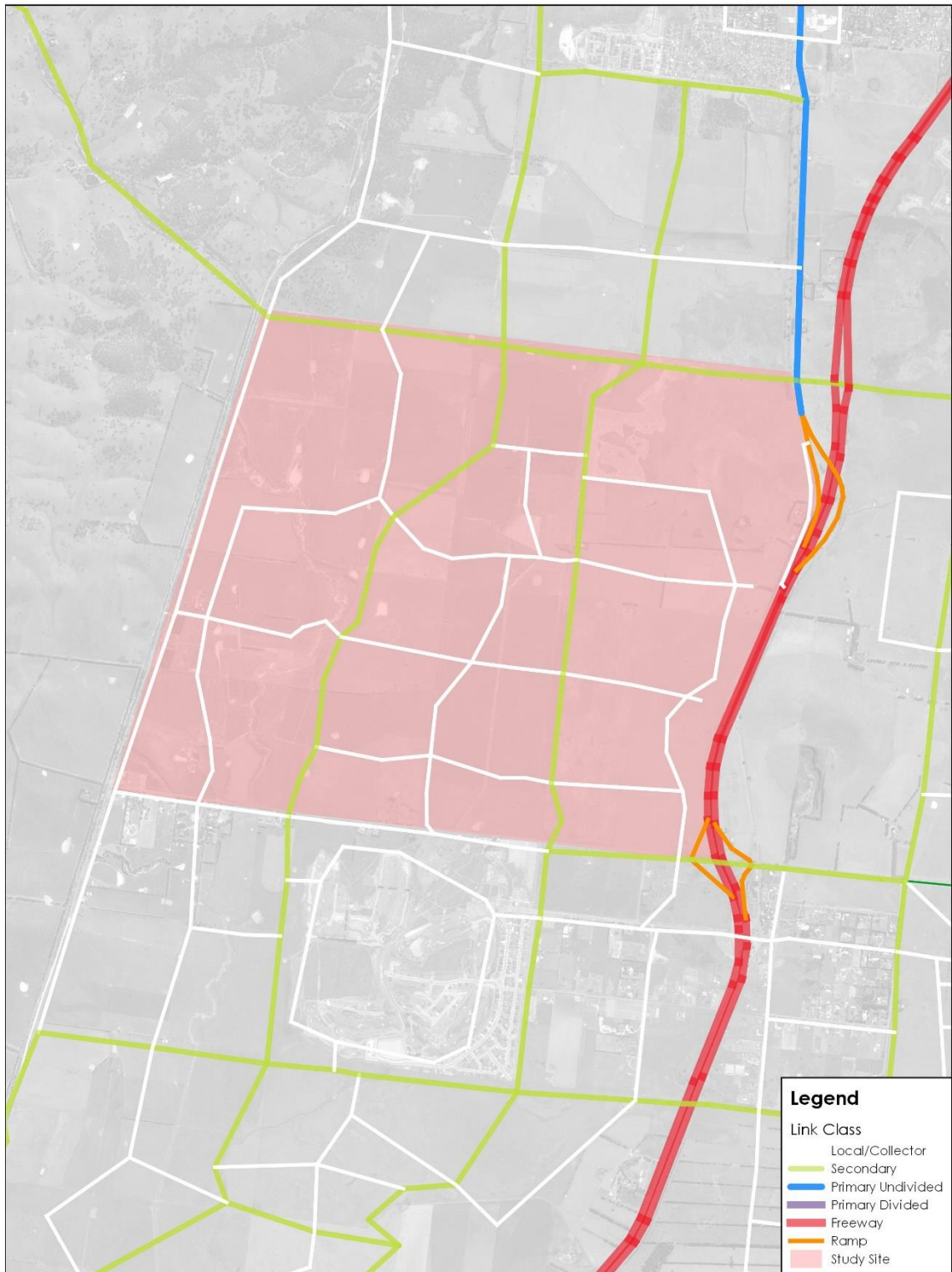
- The PSP is mostly residential, and the level of employment in the PSP is relatively low, therefore the majority of residents need to travel outside the precinct for work.
- The resultant traffic demands are a result of the delivery of land use which is assumed to be delivered by 2046.
- The interim model assumes that 75% of land use will be delivered by 2031.
- Most employment is located to the south of the PSP, which results in most AM peak period trips being southbound, whilst the majority of PM peak period trips are northbound.
- Approximately half of the trips travel to areas outside the Northern Growth Corridor and the majority of them will access the PSP via Hume Freeway and the Outer Metropolitan Ring Road through the arterial road network.
- The interim 2031 network will experience congestion on Patterson Road and Camerons Lane and may require these roads to be upgraded from two lanes to four lanes to mitigate the congestion.
- The proposed arterial and connector roads perform at acceptable levels in 2046.

Overall, the proposed future (ultimate) road network within BNW PSP will perform at acceptable levels by 2046 based on traffic capacity. Further investigation into appropriate roads space management of the road network will be undertaken, in consultation with key agencies and stakeholders, as part of the detailed design and delivery of the PSP.

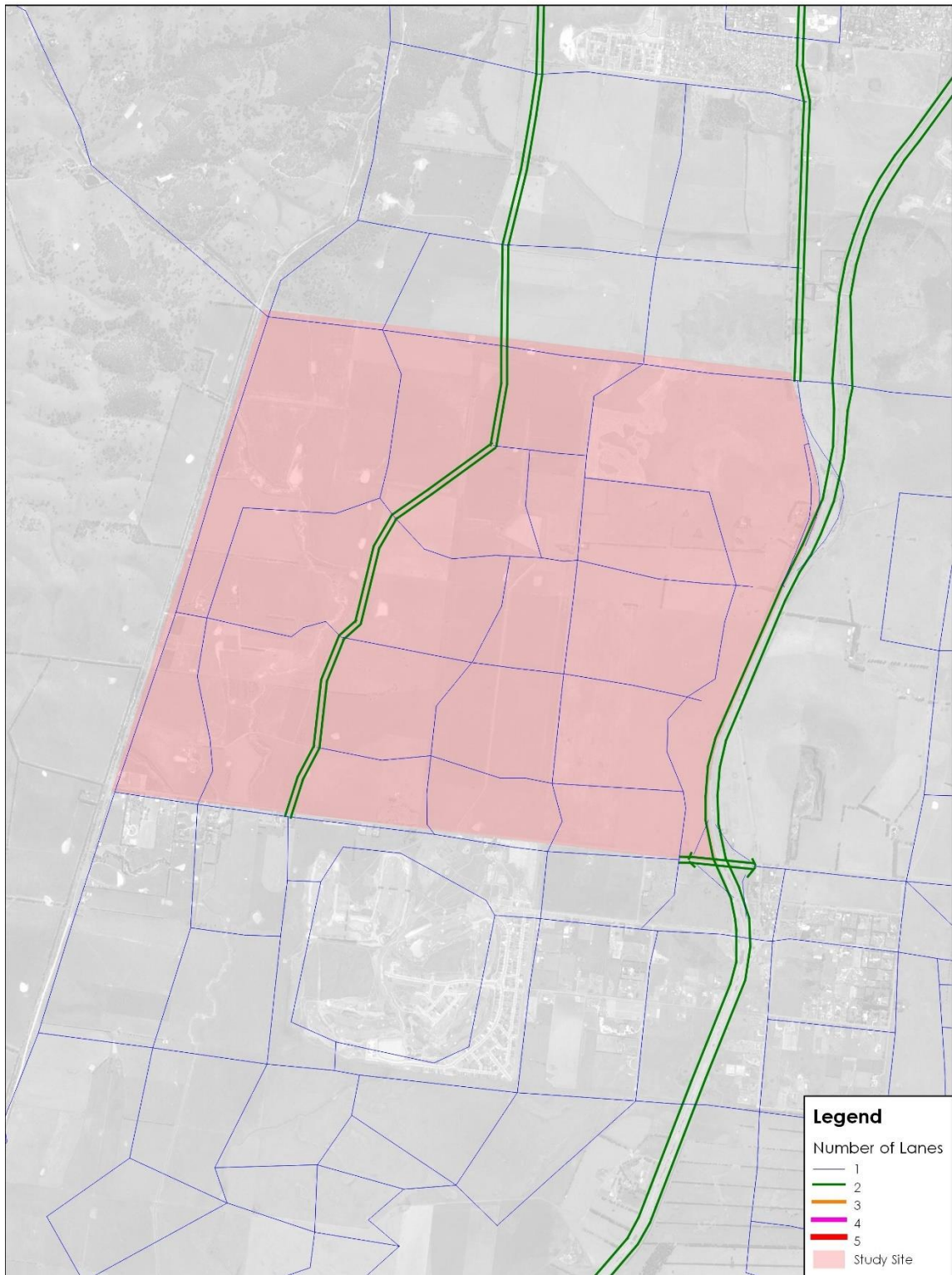
Appendix A

Model Inputs

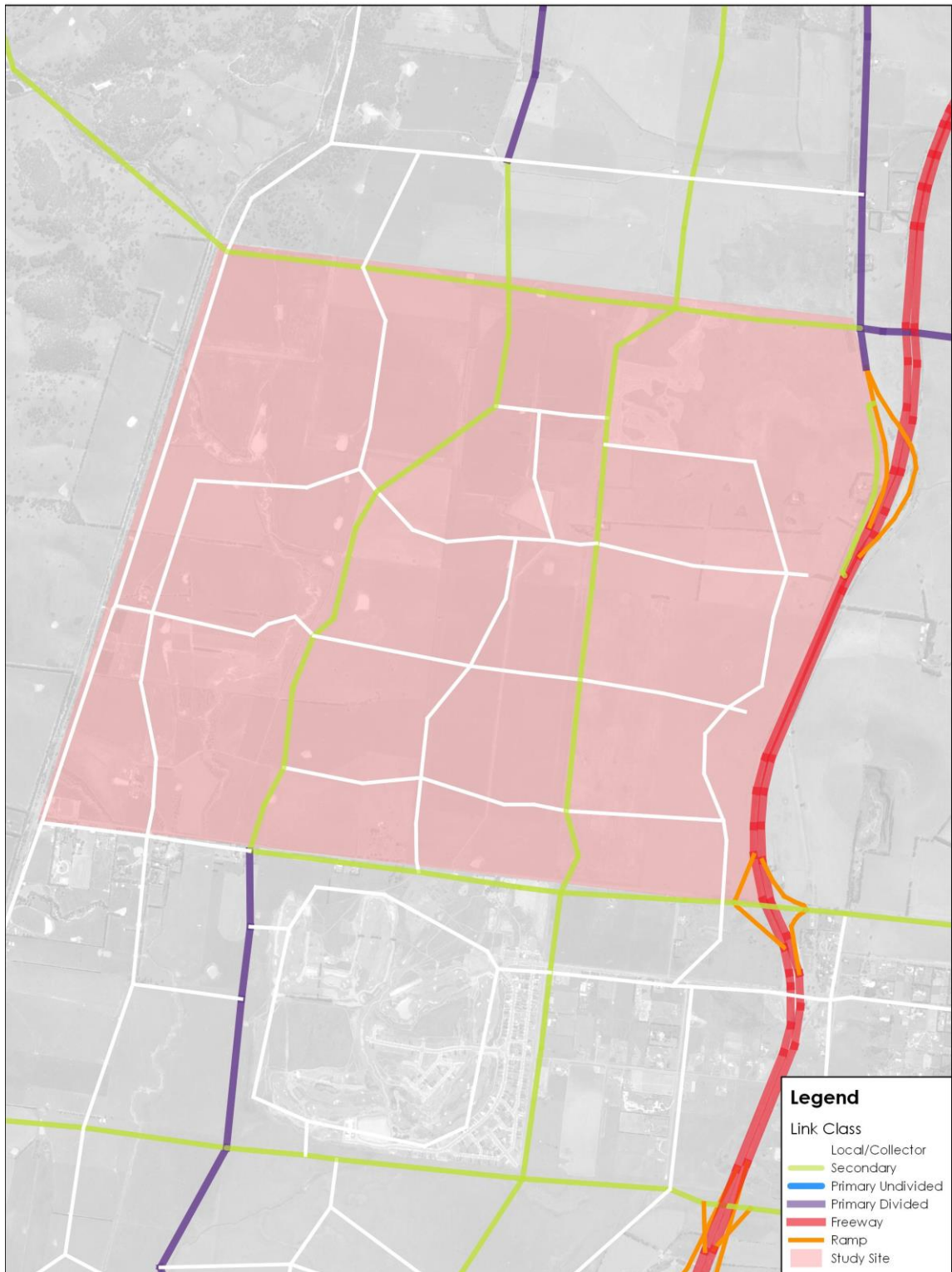
Beveridge North West, Beveridge
2031 - Base Case - Link Class



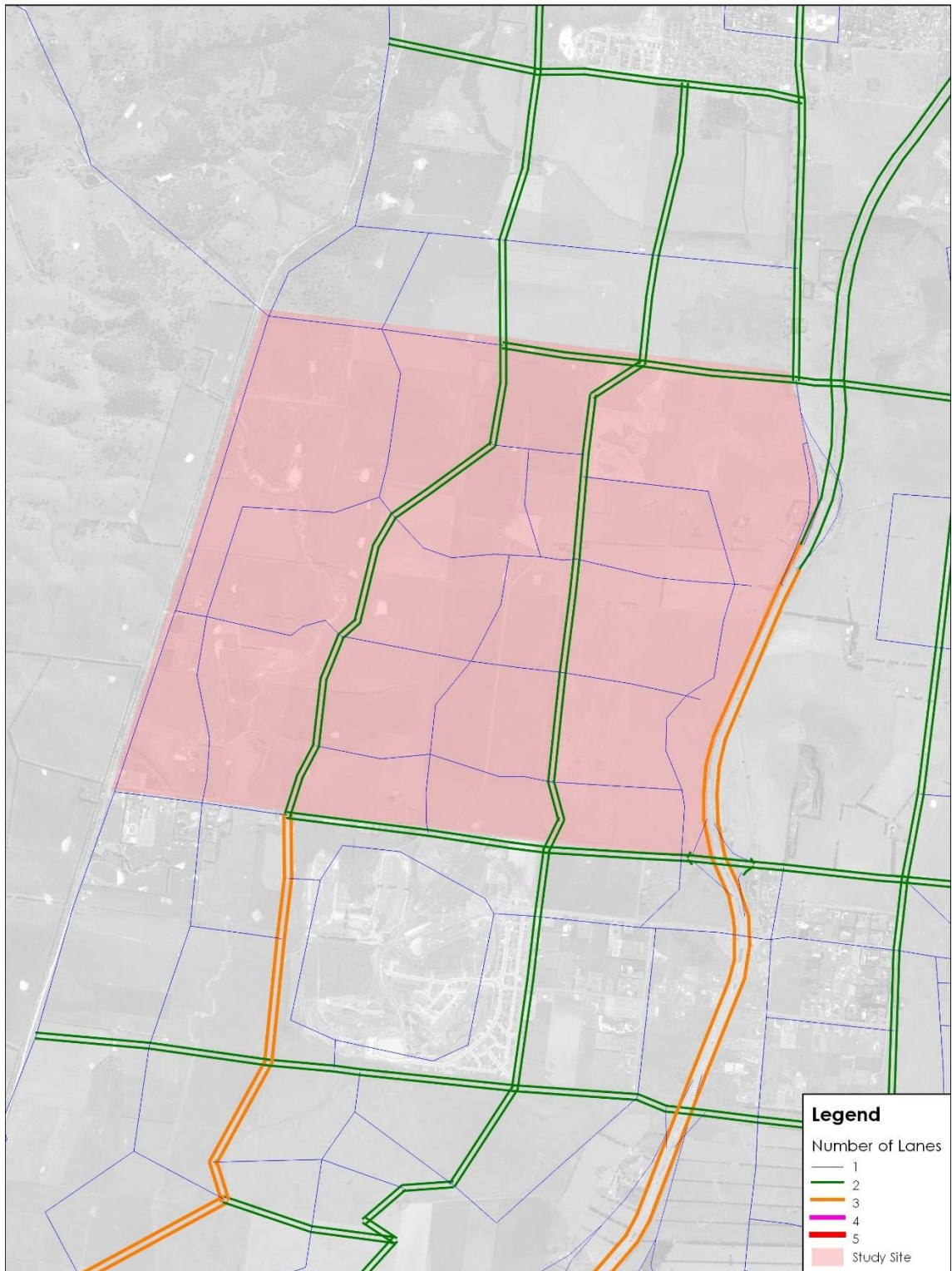
Beveridge North West, Beveridge
2031 - Base Case - Number of Lanes



Beveridge North West, Beveridge
2046 - Base Case - Link Class



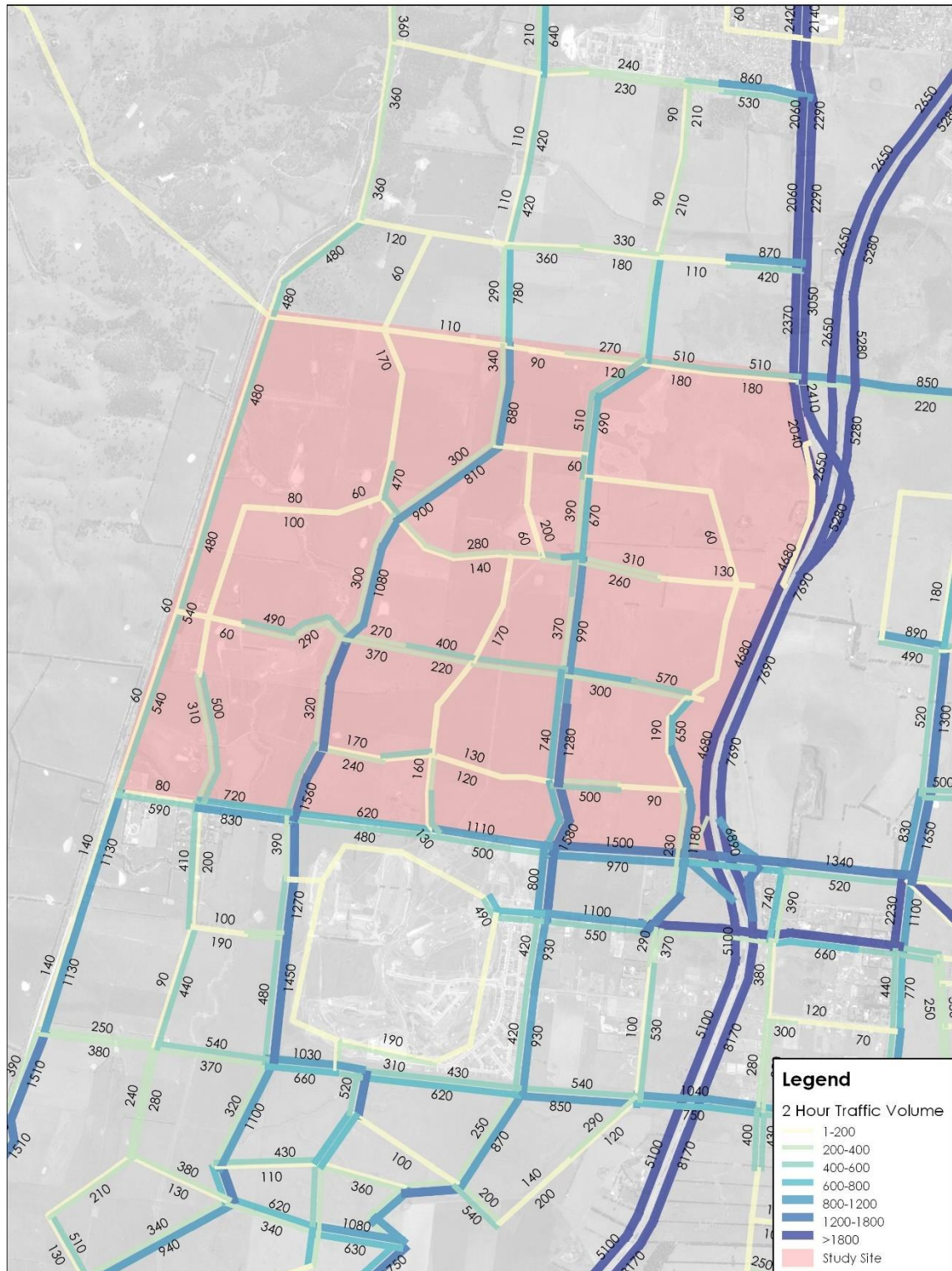
Beveridge North West, Beveridge
2046 - Base Case - Number of Lanes



Appendix B

Model Outputs

Beveridge North West, Beveridge
2031 - Base Case - AM 2 Hour Traffic Volume

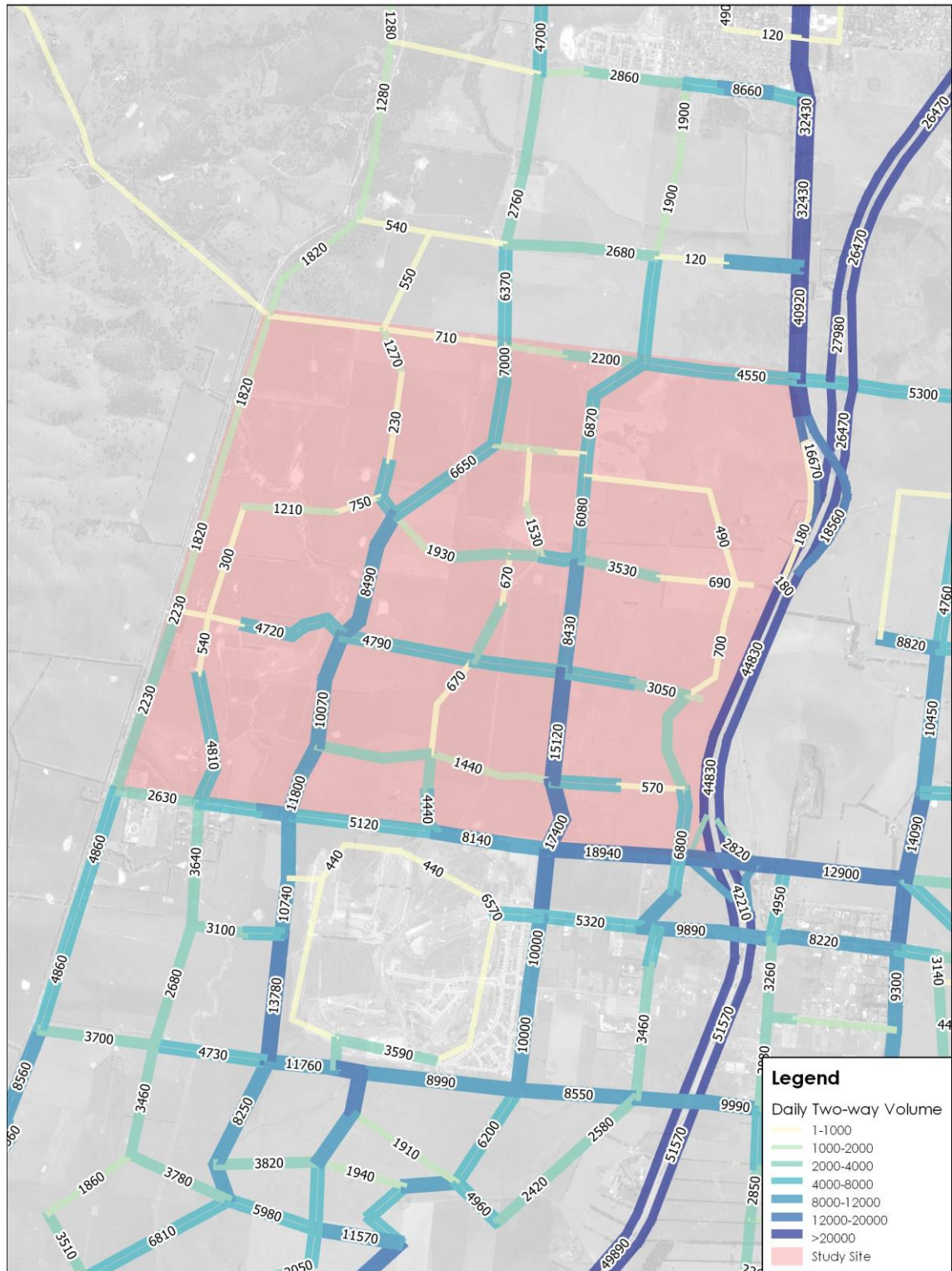


Legend

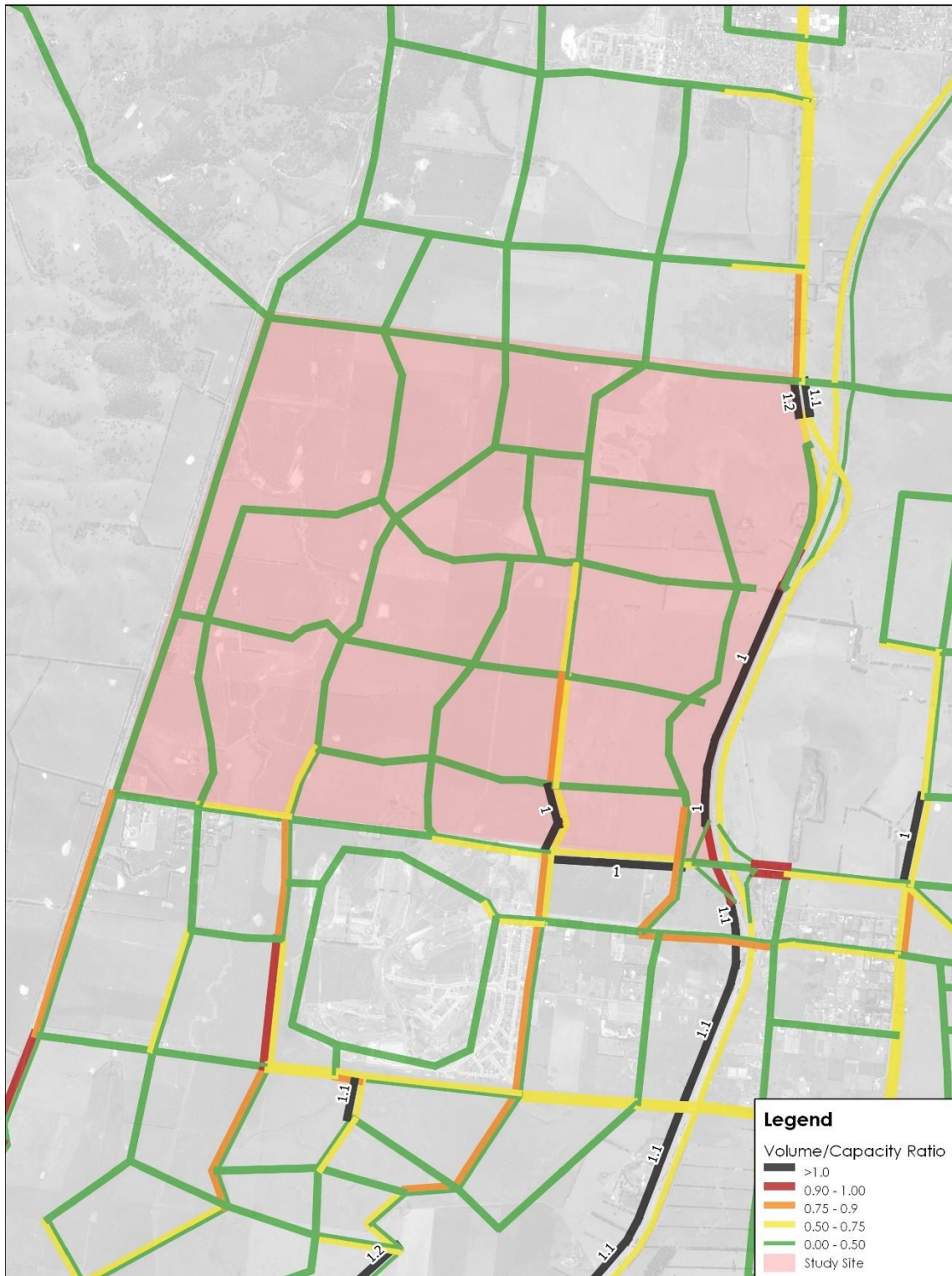
2 Hour Traffic Volume

- 1-200
- 200-400
- 400-600
- 600-800
- 800-1200
- 1200-1800
- >1800
- Study Site

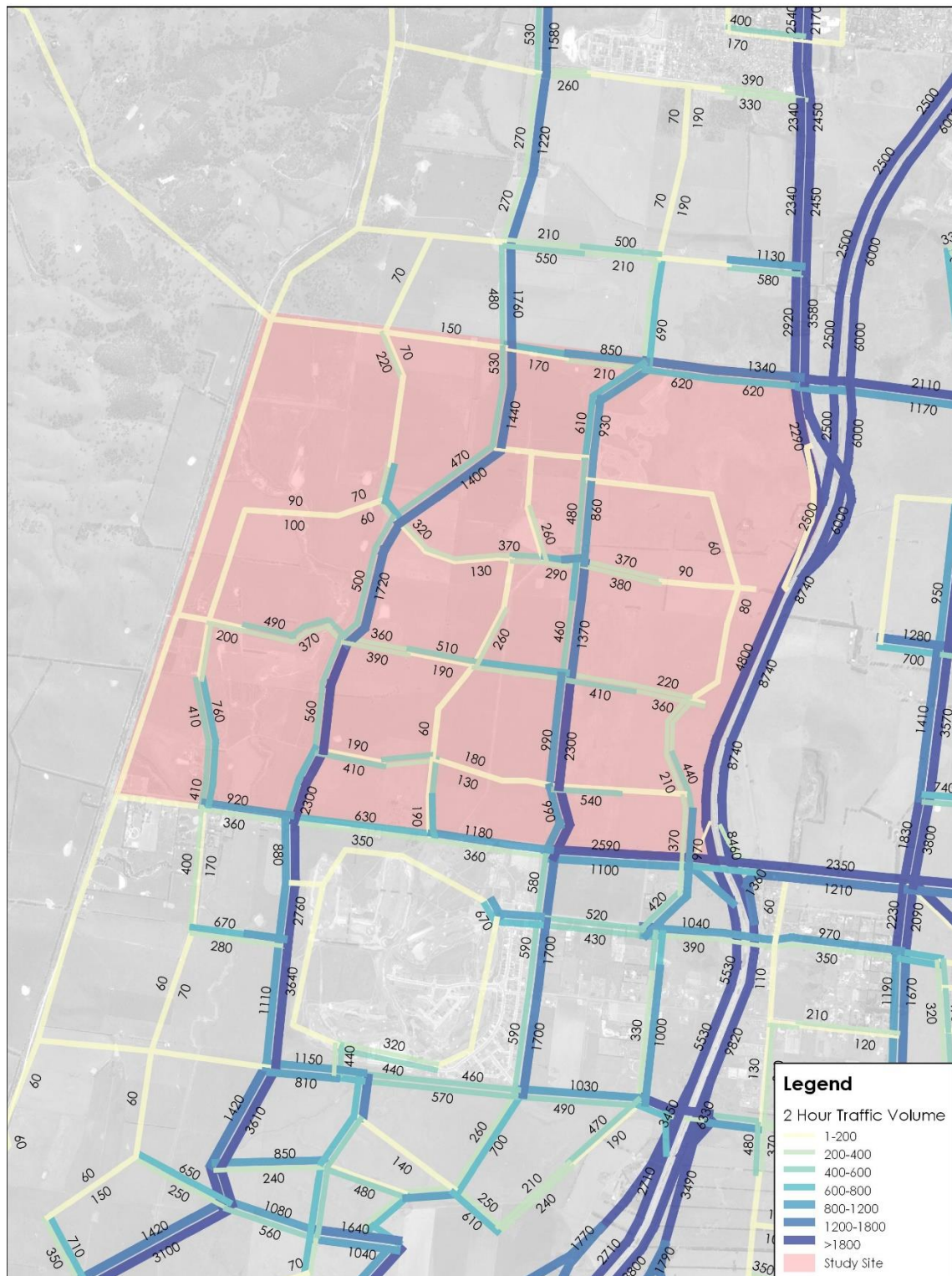
**Beveridge North West, Beveridge
2031 - Base Case - Daily Two-way Volume**



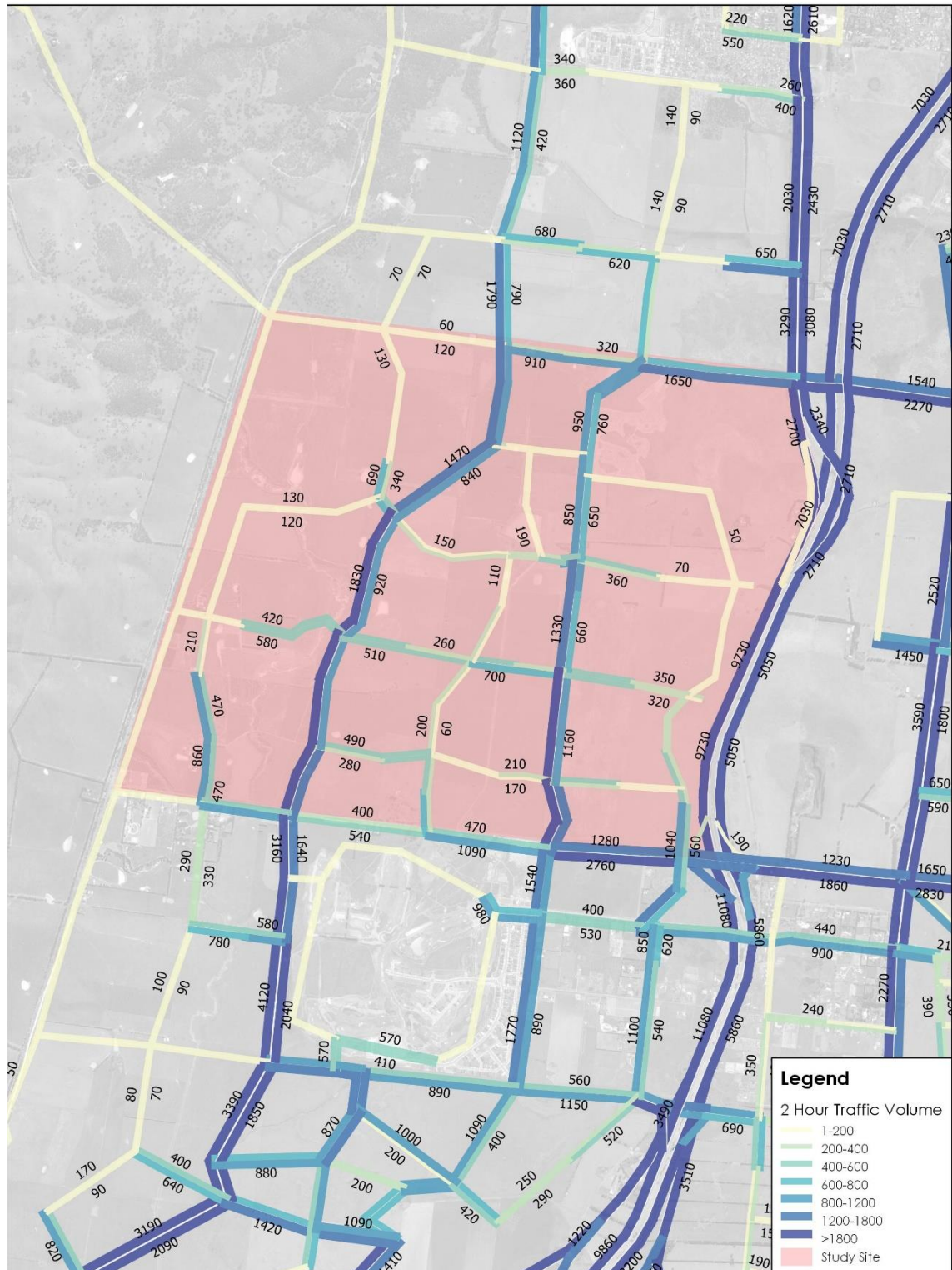
Beveridge North West, Beveridge
2031 - Base Case - PM Volume / Capacity Ratio



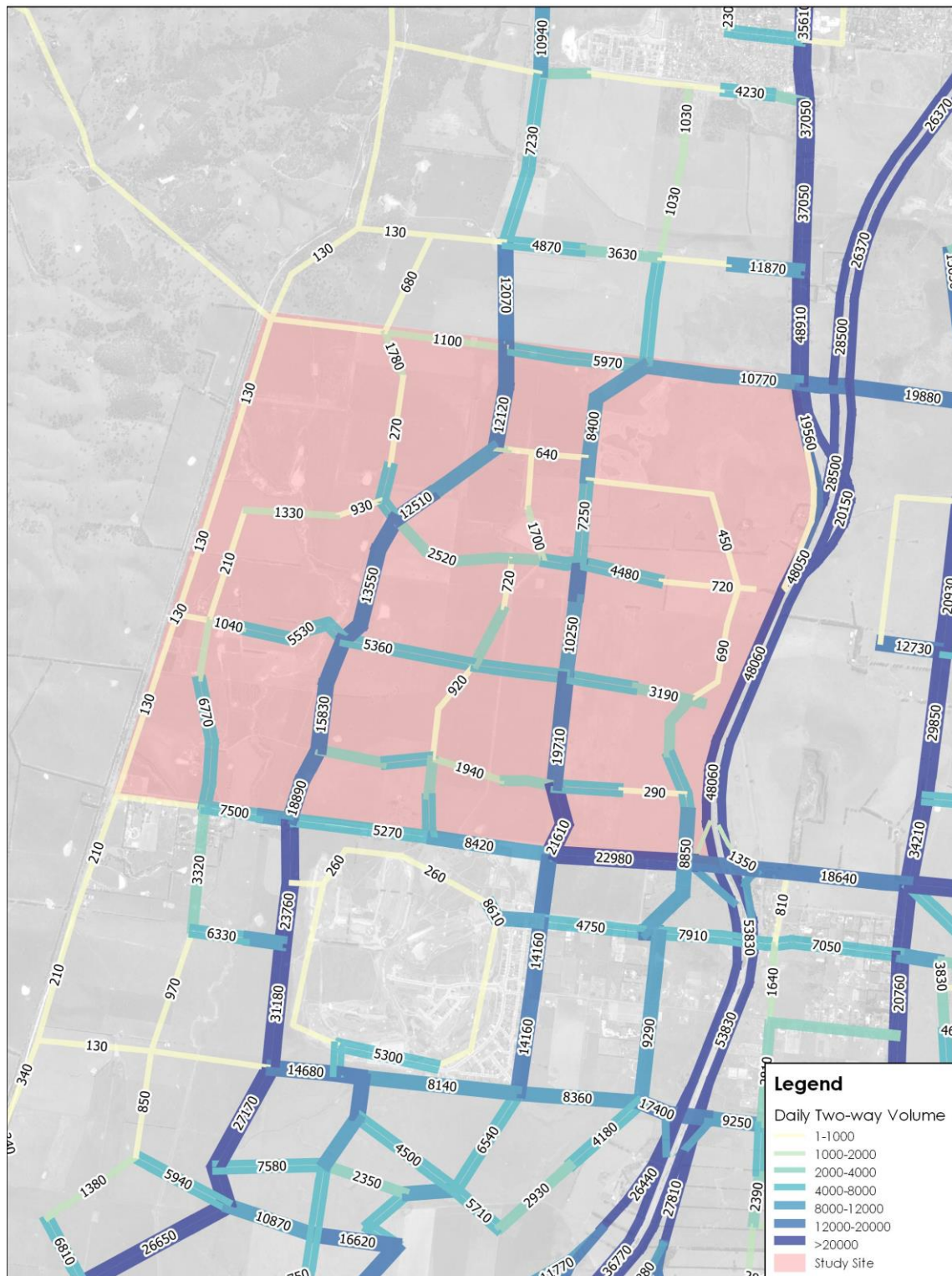
Beveridge North West, Beveridge
2046 - Base Case - AM 2 Hour Traffic Volume



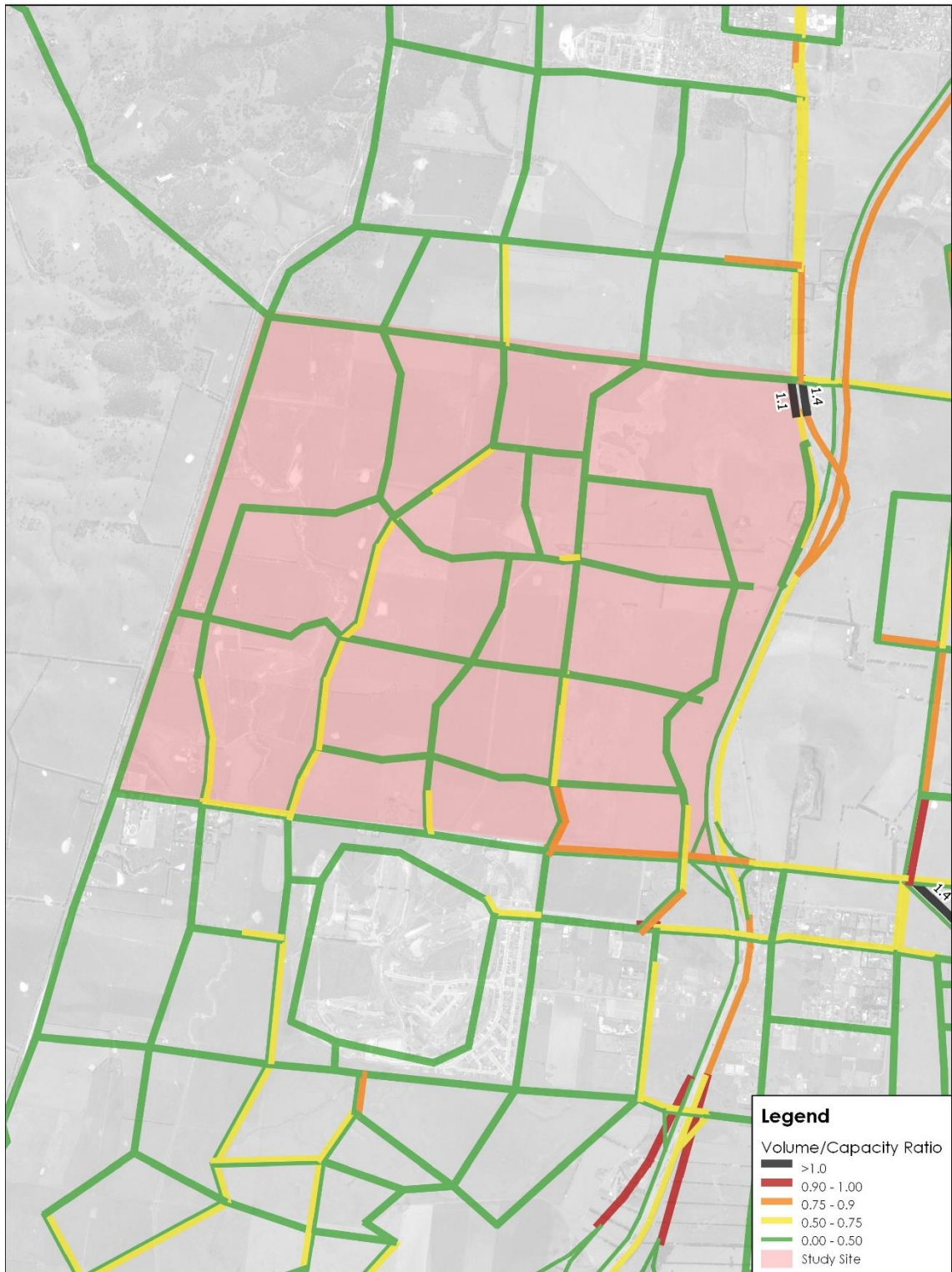
Beveridge North West, Beveridge
2046 - Base Case - PM 2 Hour Traffic Volume



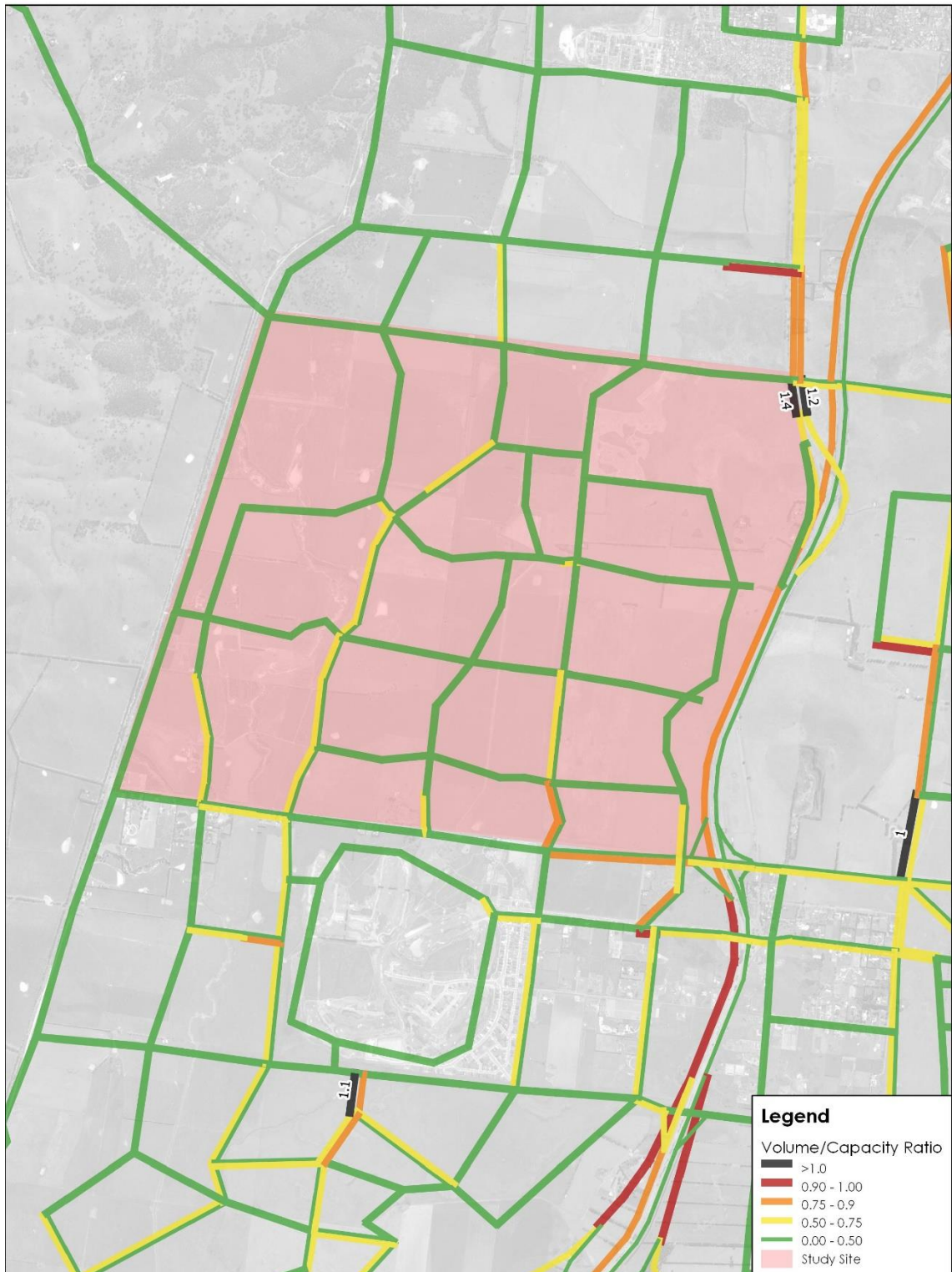
**Beveridge North West, Beveridge
2046 - Base Case - Daily Two-way Volume**



Beveridge North West, Beveridge
2046 - Base Case - AM Volume / Capacity Ratio



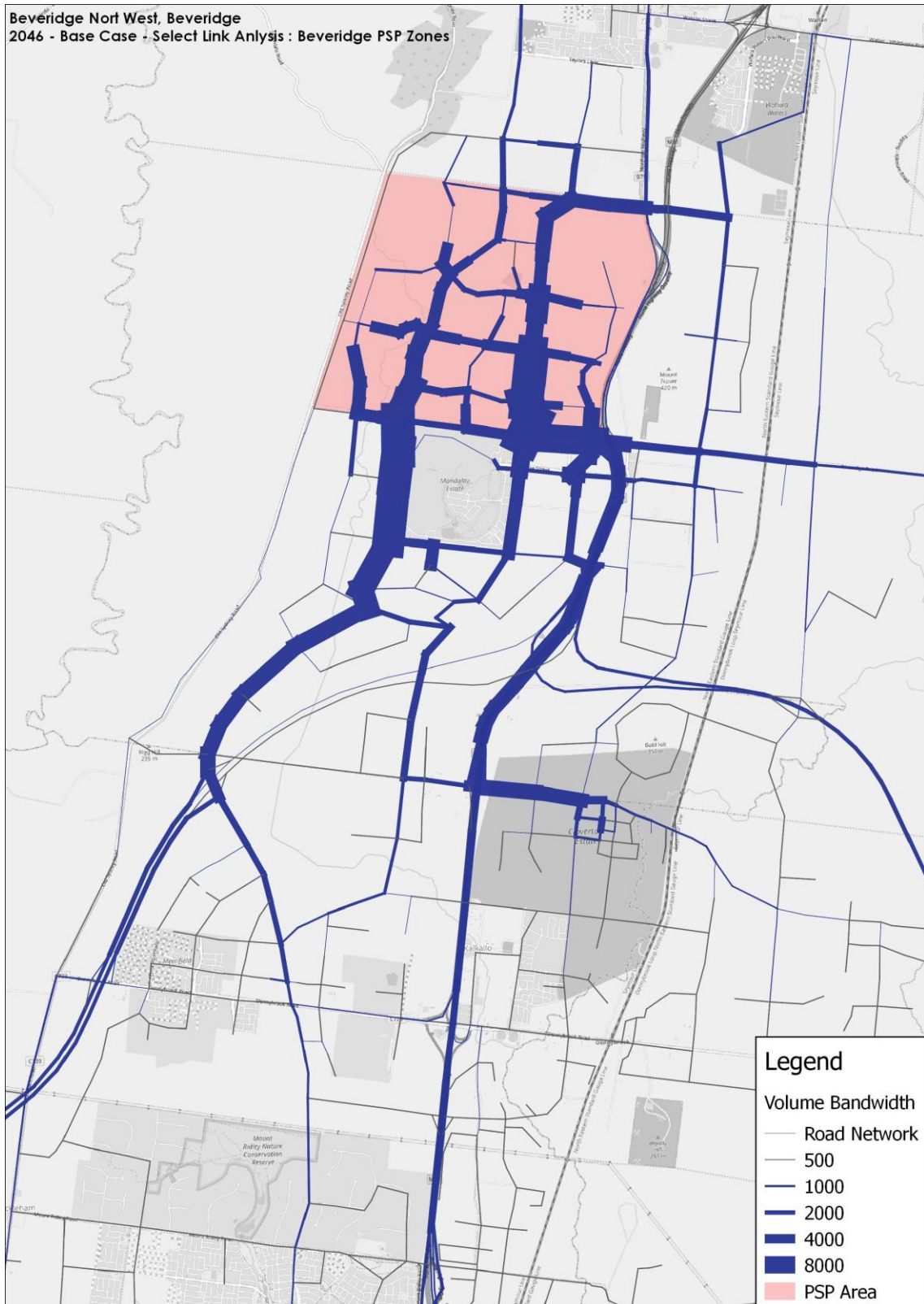
Beveridge North West, Beveridge
2046 - Base Case - PM Volume / Capacity Ratio



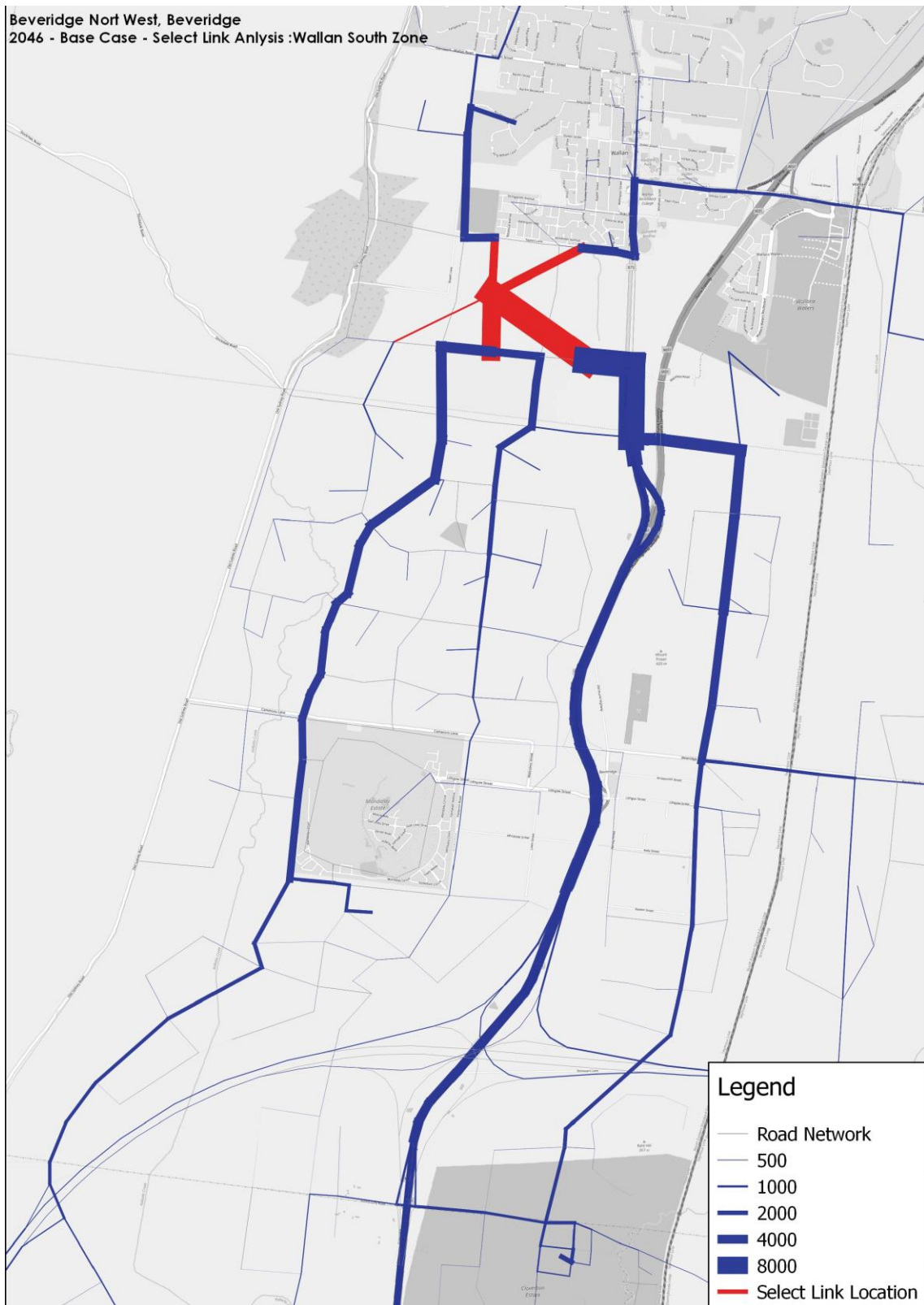
Appendix C

Select Link Analysis

Beveridge North West, Beveridge
2046 - Base Case - Select Link Analysis : Beveridge PSP Zones



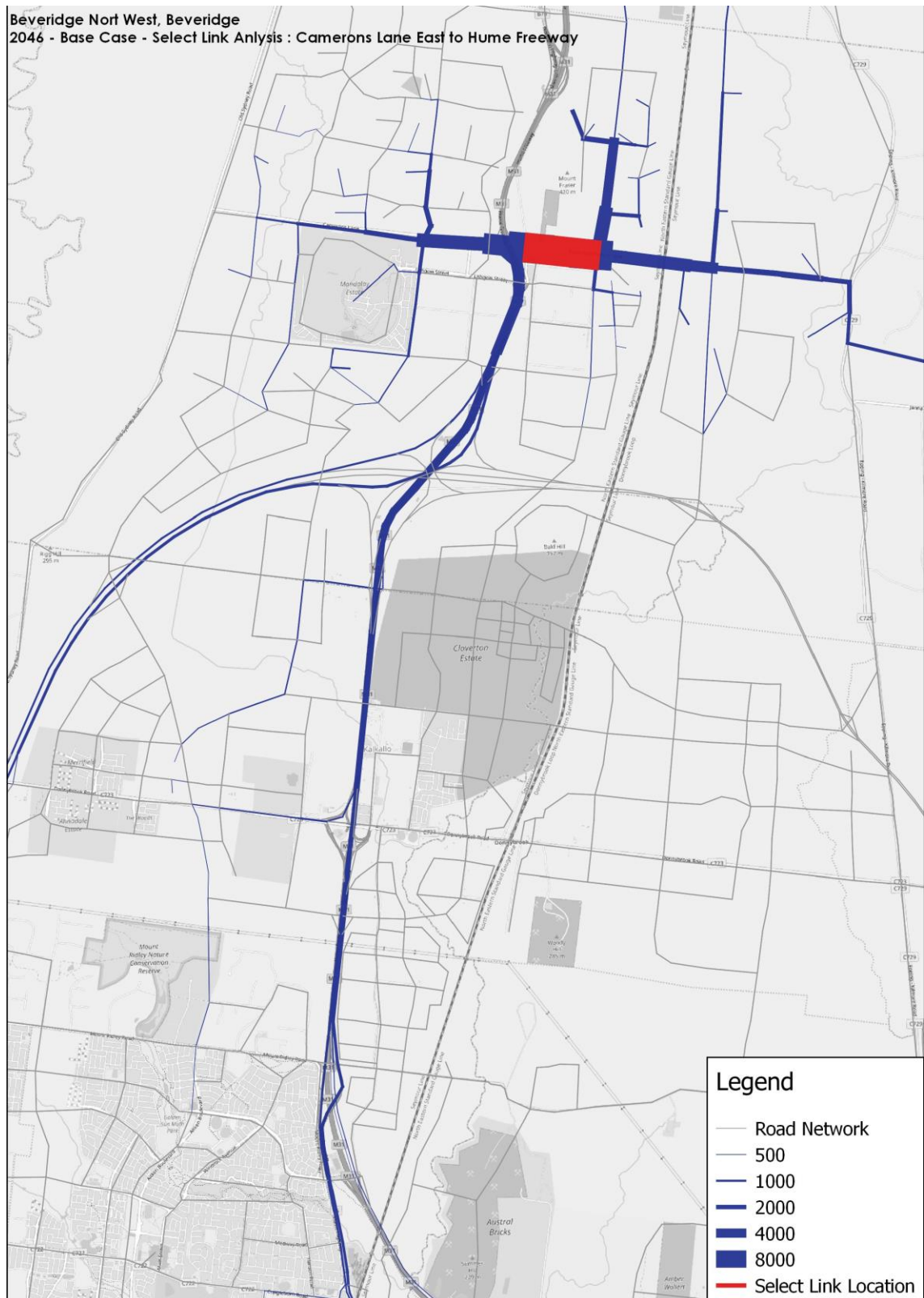
Beveridge North West, Beveridge
2046 - Base Case - Select Link Analysis : Wallan South Zone



Beveridge North West, Beveridge
2046 - Base Case - Select Link Analysis : The Grade Separation West to Hume Freeway/Cameron's Lane Intersection



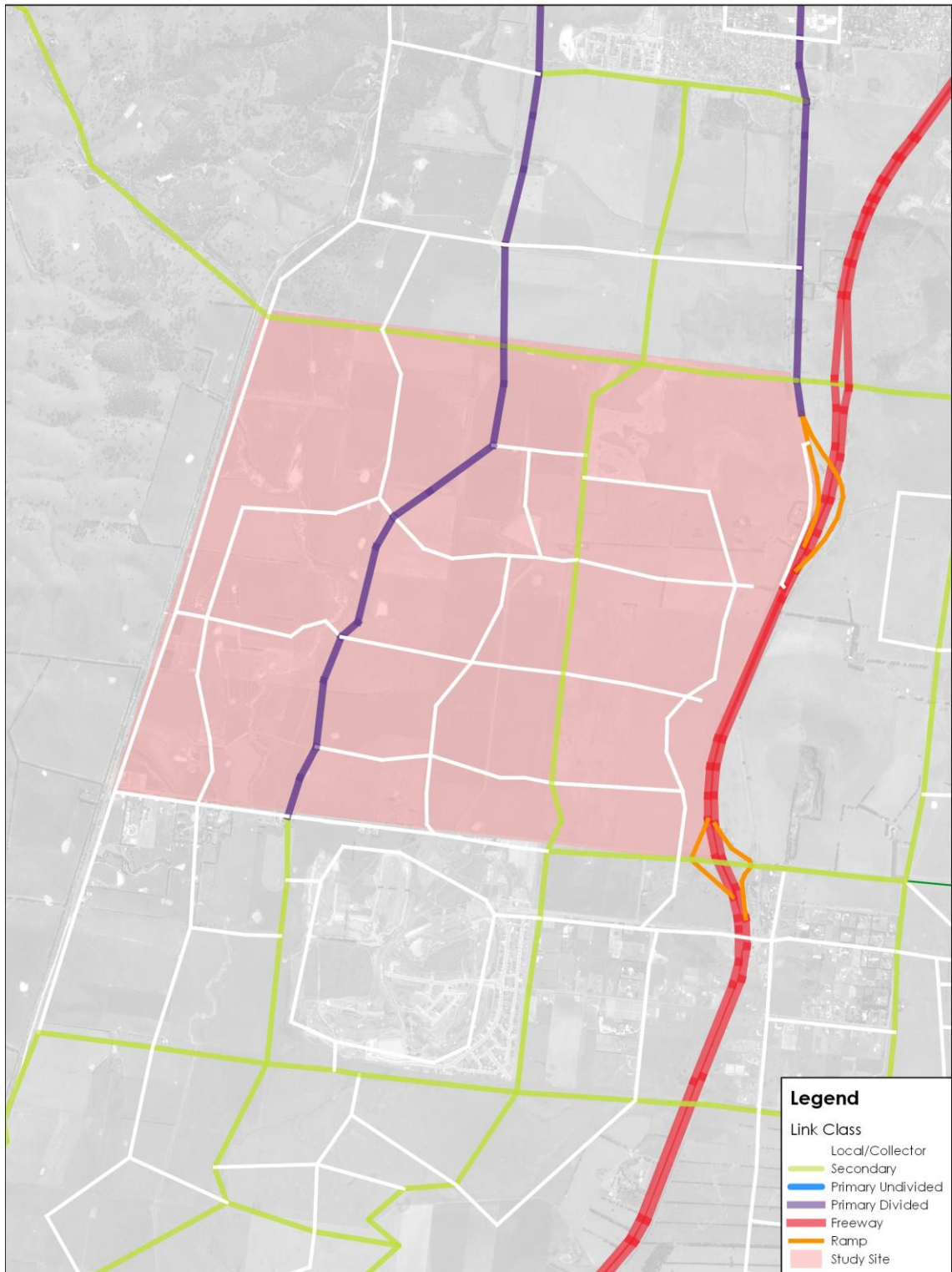
Beveridge North West, Beveridge
2046 - Base Case - Select Link Analysis : Camerons Lane East to Hume Freeway



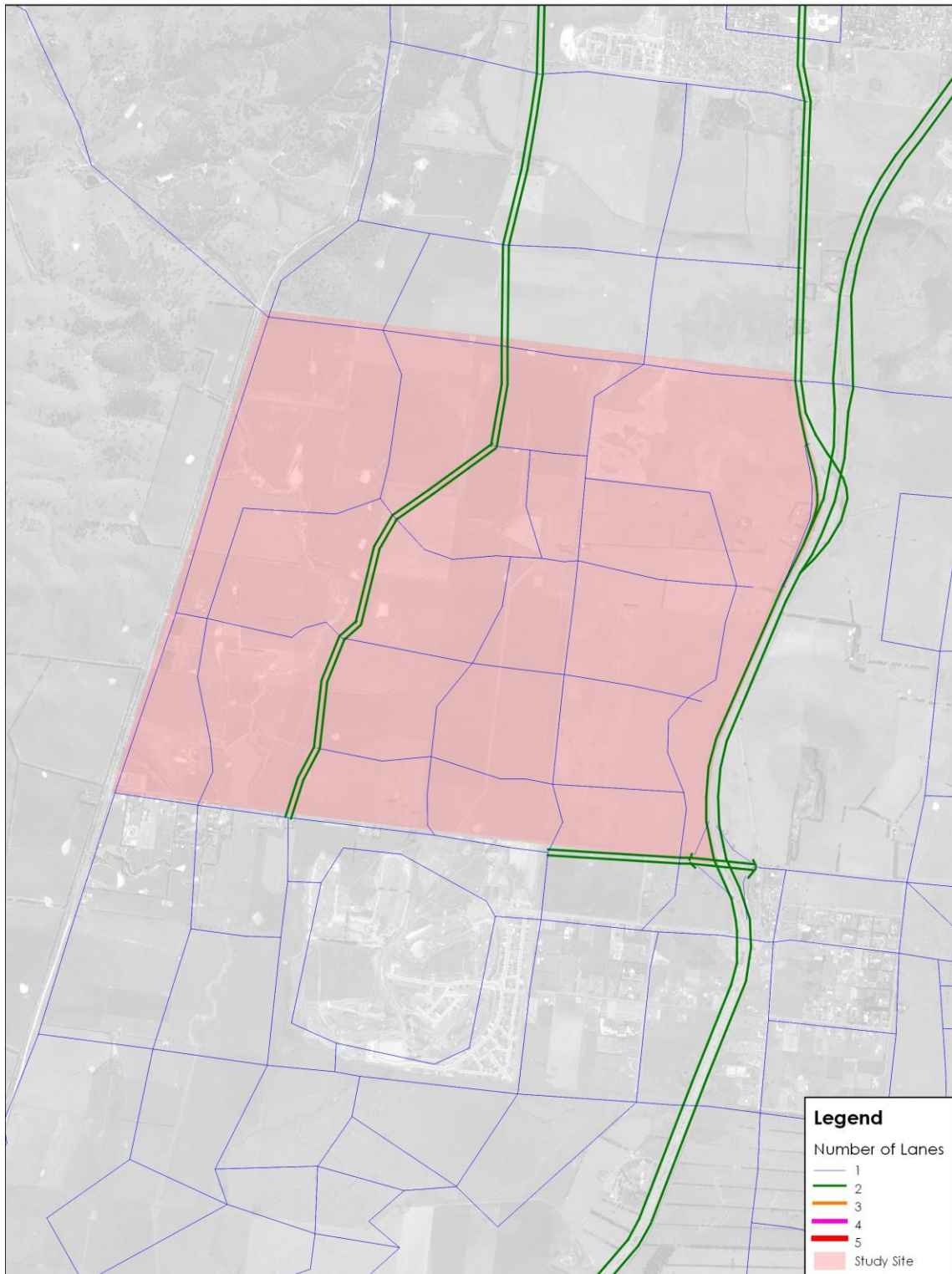
Appendix D

Northern Highway On Ramp Scenario

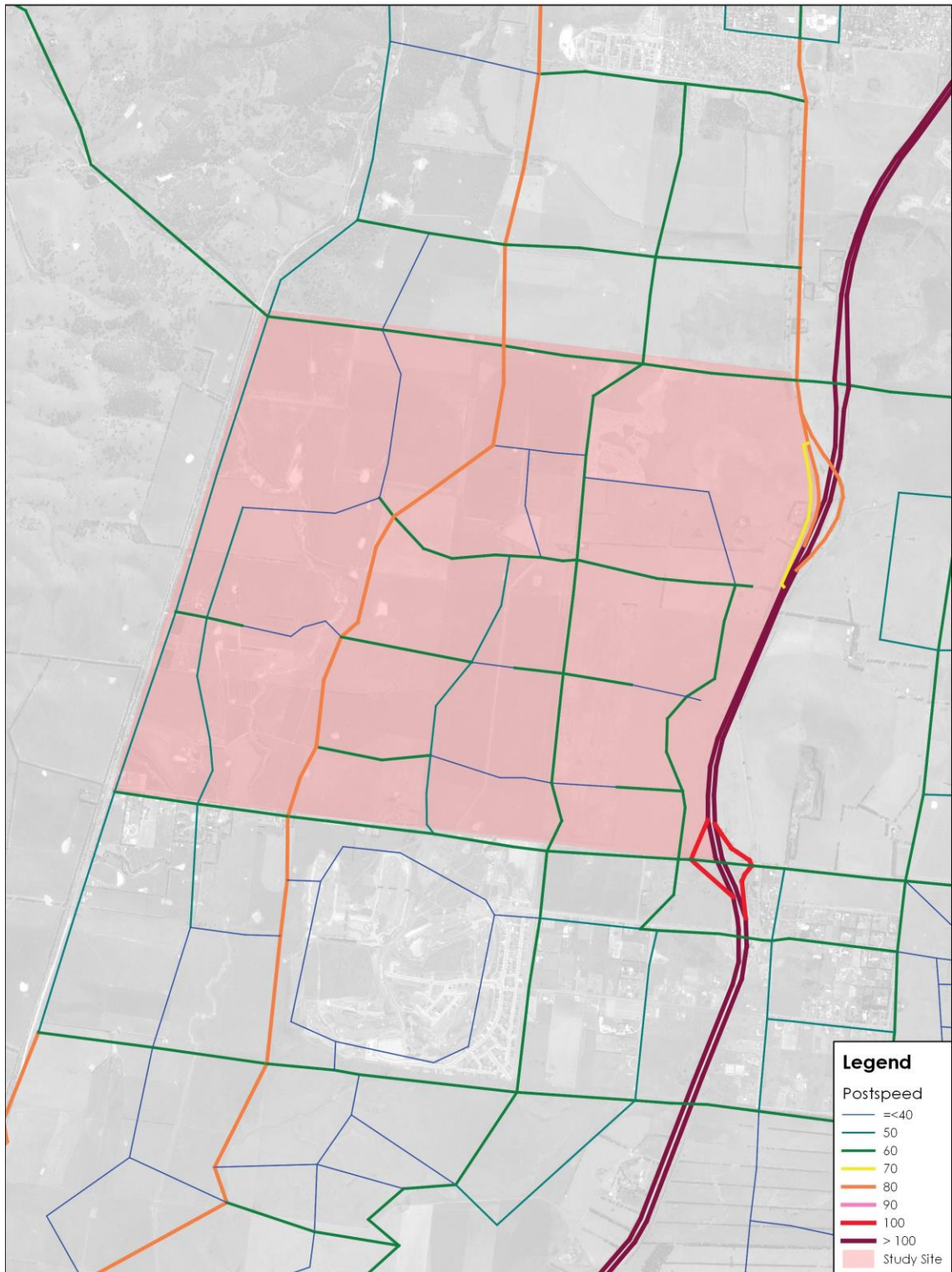
Beveridge North West Beveridge S
2031 - Base Case_E14 Higher Posted Speed - Link Class



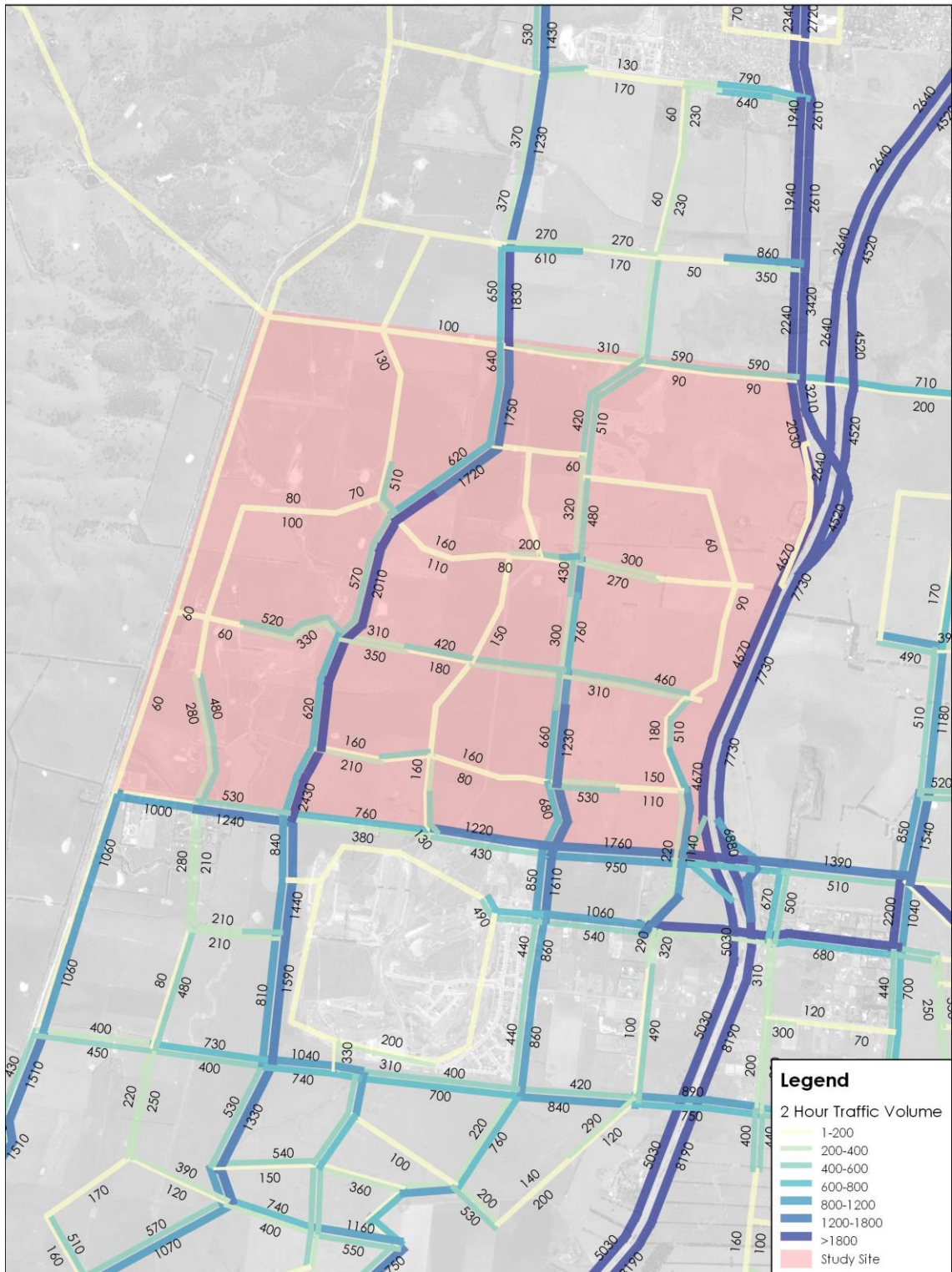
Beveridge North West Beveridge S
2031 - Base Case_E14 Higher Posted Speed - Number of Lanes



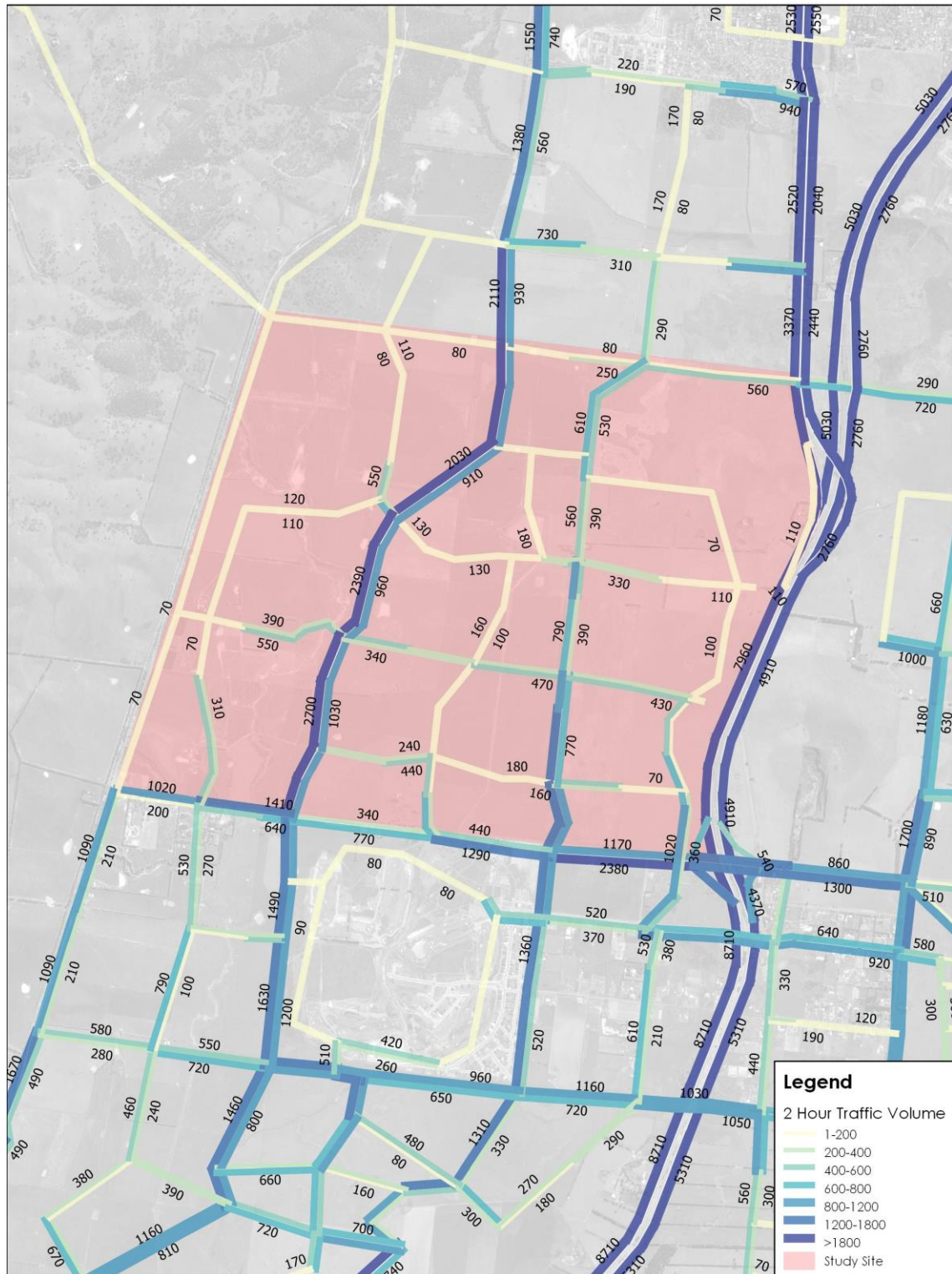
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2031 - Base Case_E14 Higher Posted Speed - Posted Speed



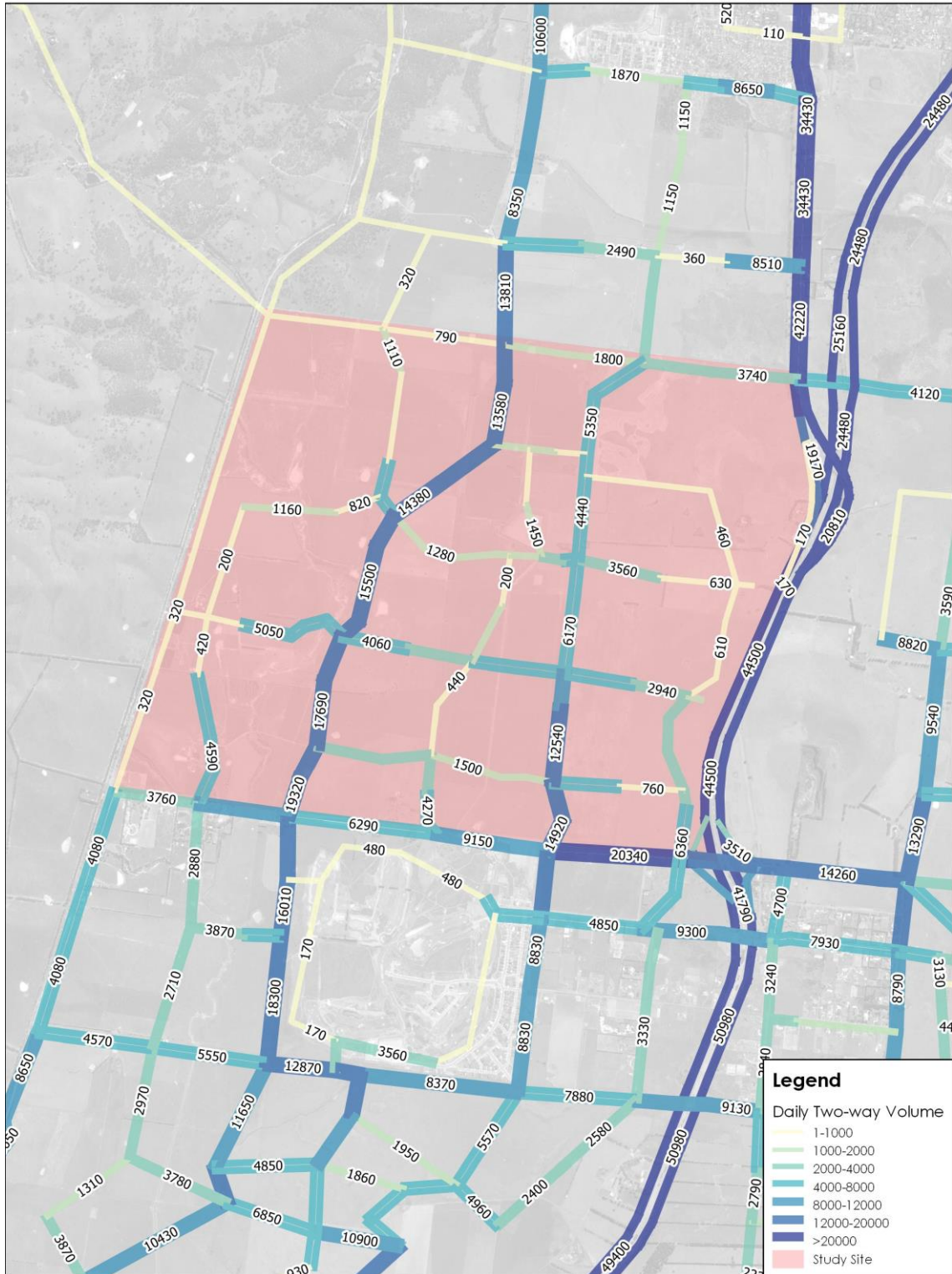
Beveridge North West Beveridge S
2031 - Base Case_E14 Higher Posted Speed - AM 2 Hour Traffic Volume



Beveridge North West Beveridge S
2031 - Base Case_E14 Higher Posted Speed - PM 2 Hour Traffic Volume



Beveridge North West Beveridge S
2031 - Base Case_E14 Higher Posted Speed - Daily Two-way Volume

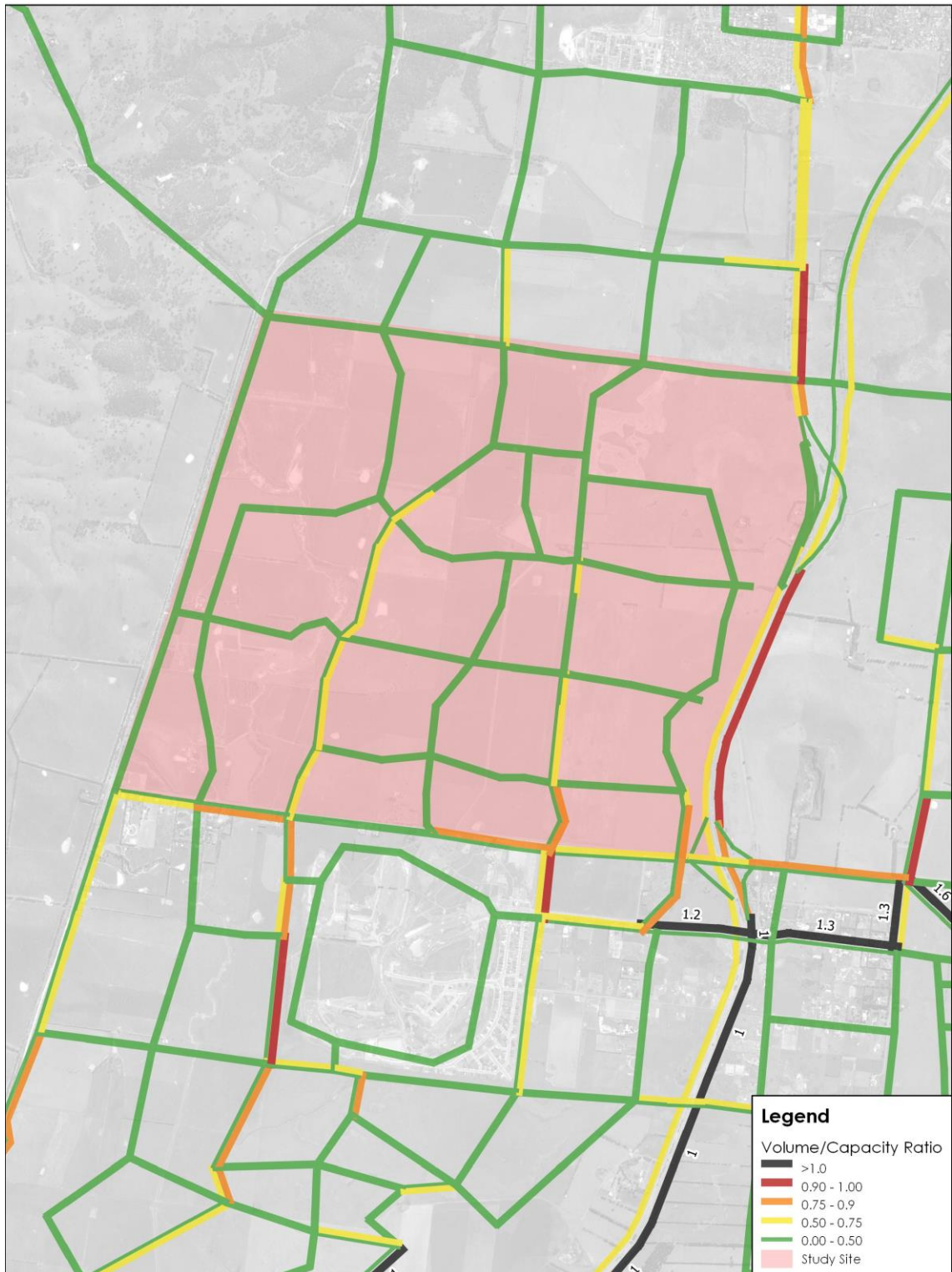


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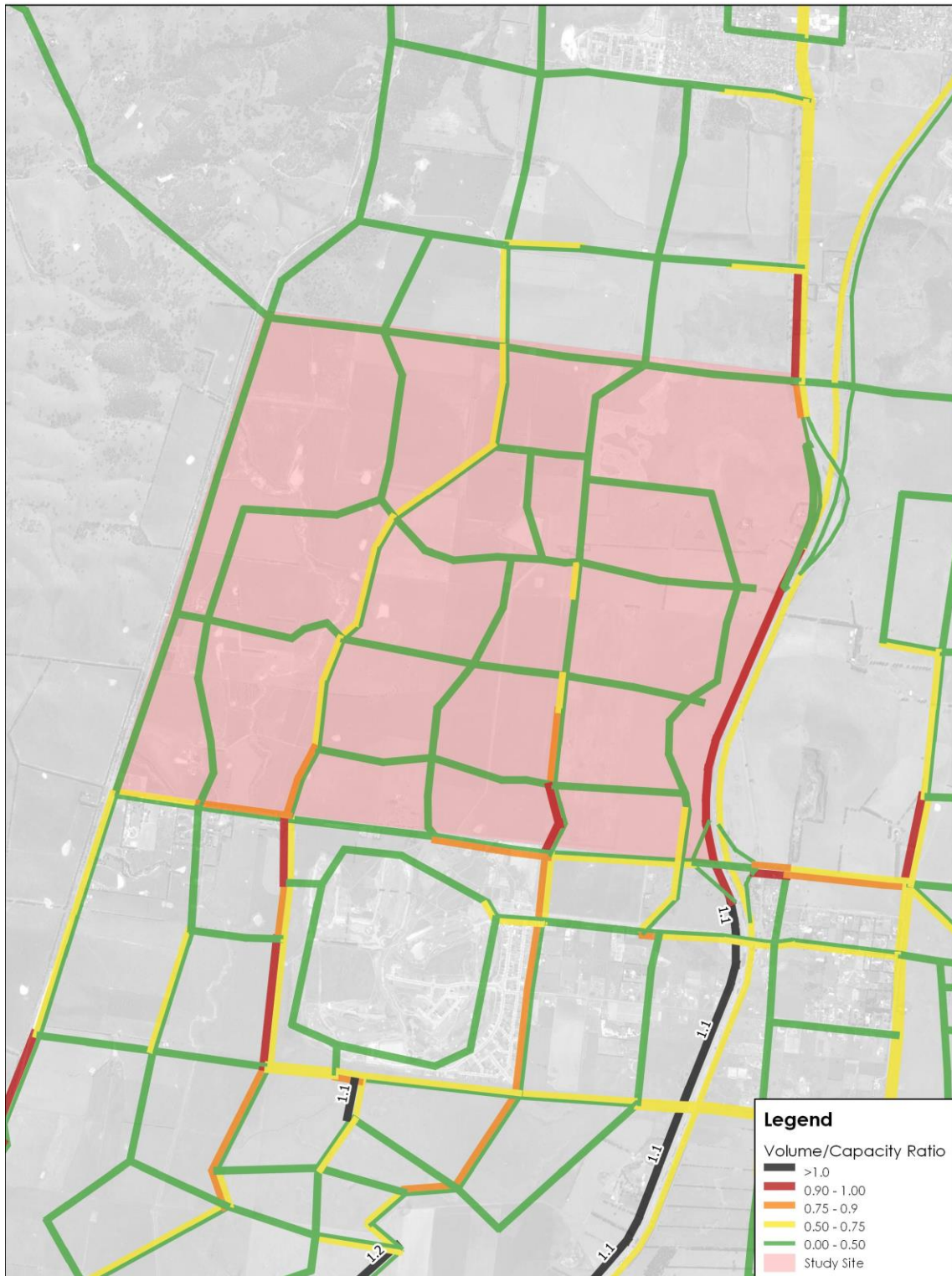
Strategic Transport Modelling Assessment // Issue: A

Beveridge North West PSP

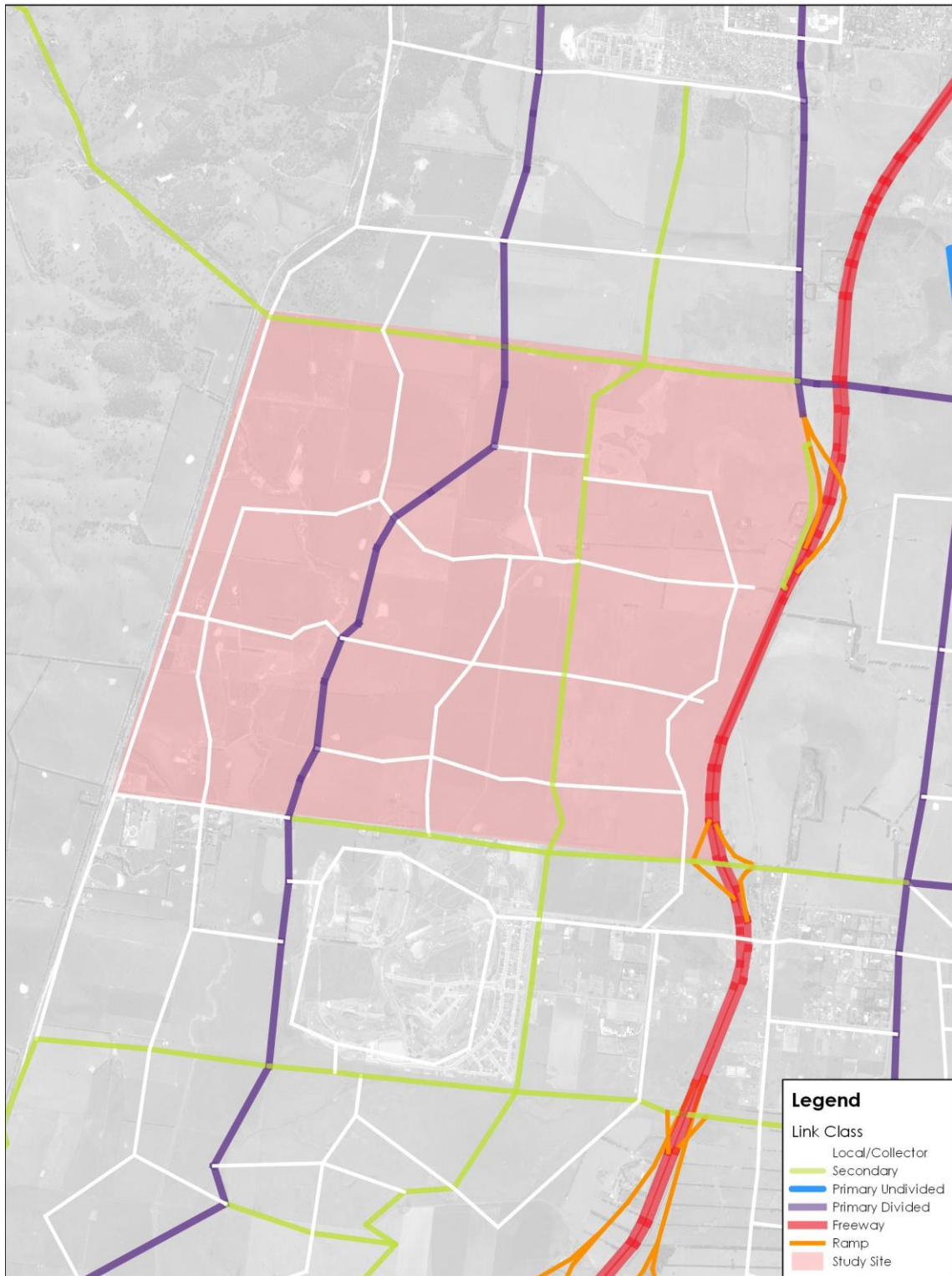
Beveridge North West Beveridge S
2031 - Base Case_E14 Higher Posted Speed - AM Volume / Capacity Ratio



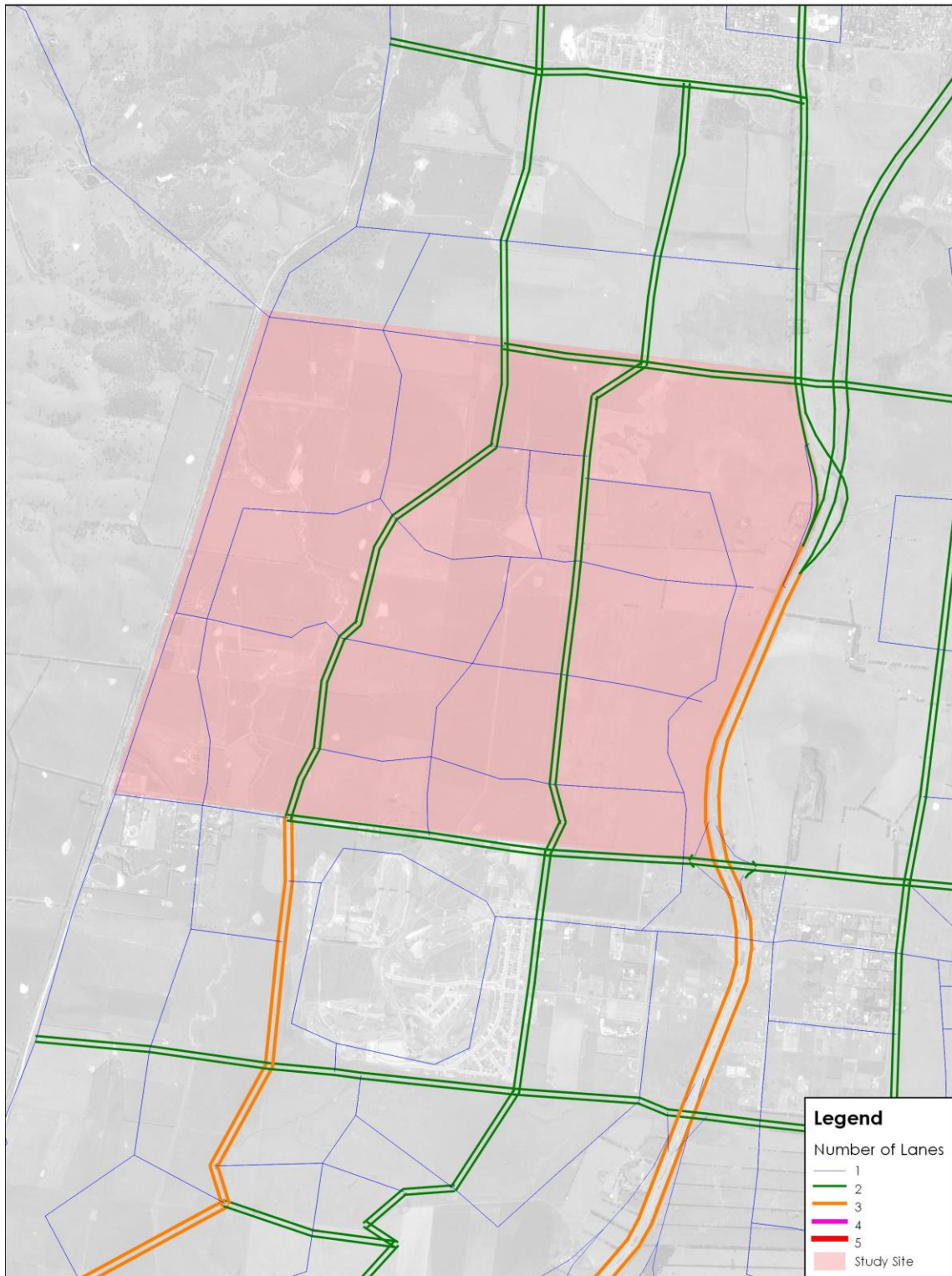
Beveridge North West Beveridge S
2031 - Base Case_E14 Higher Posted Speed - PM Volume / Capacity Ratio



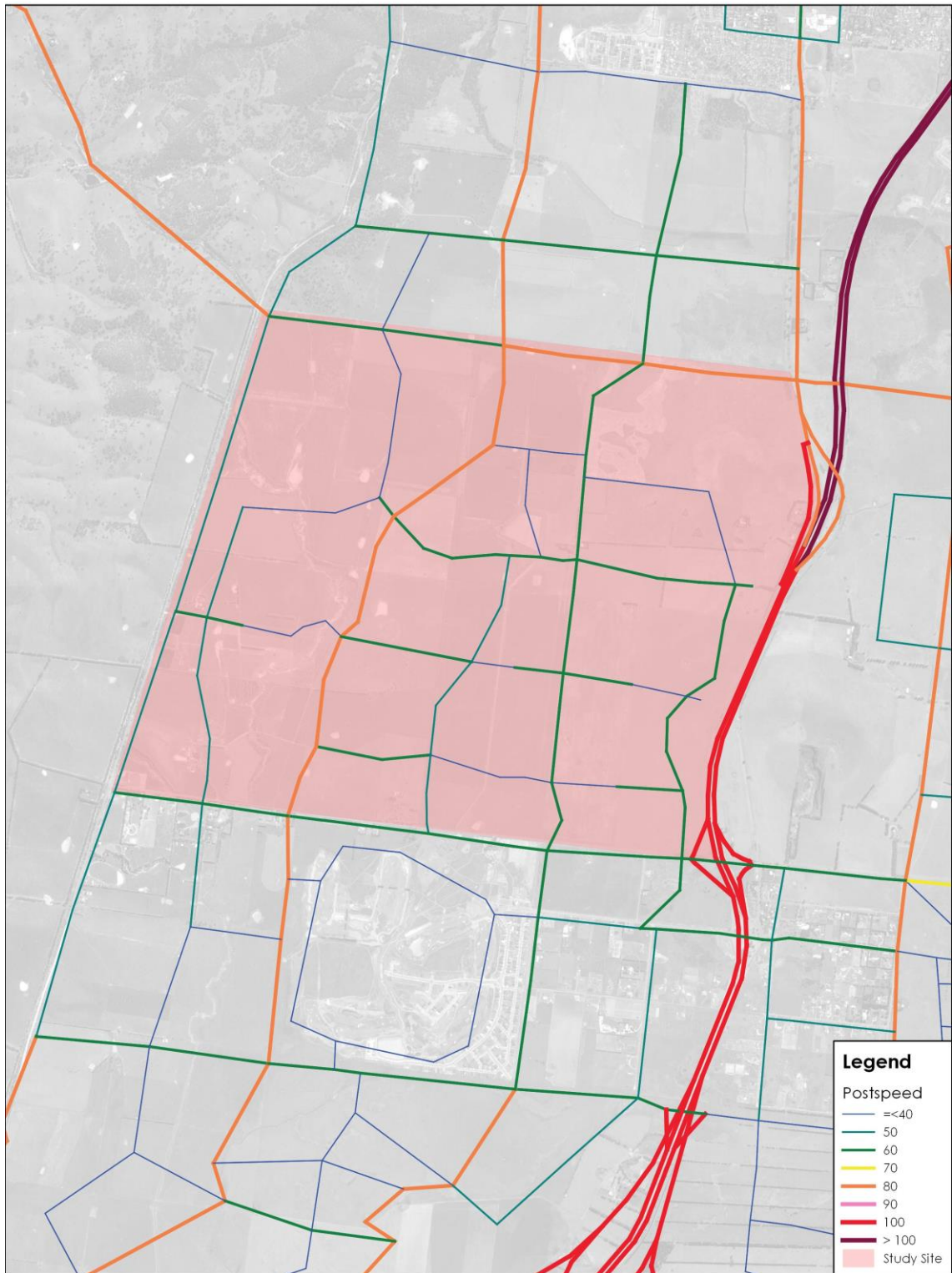
Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - Link Class



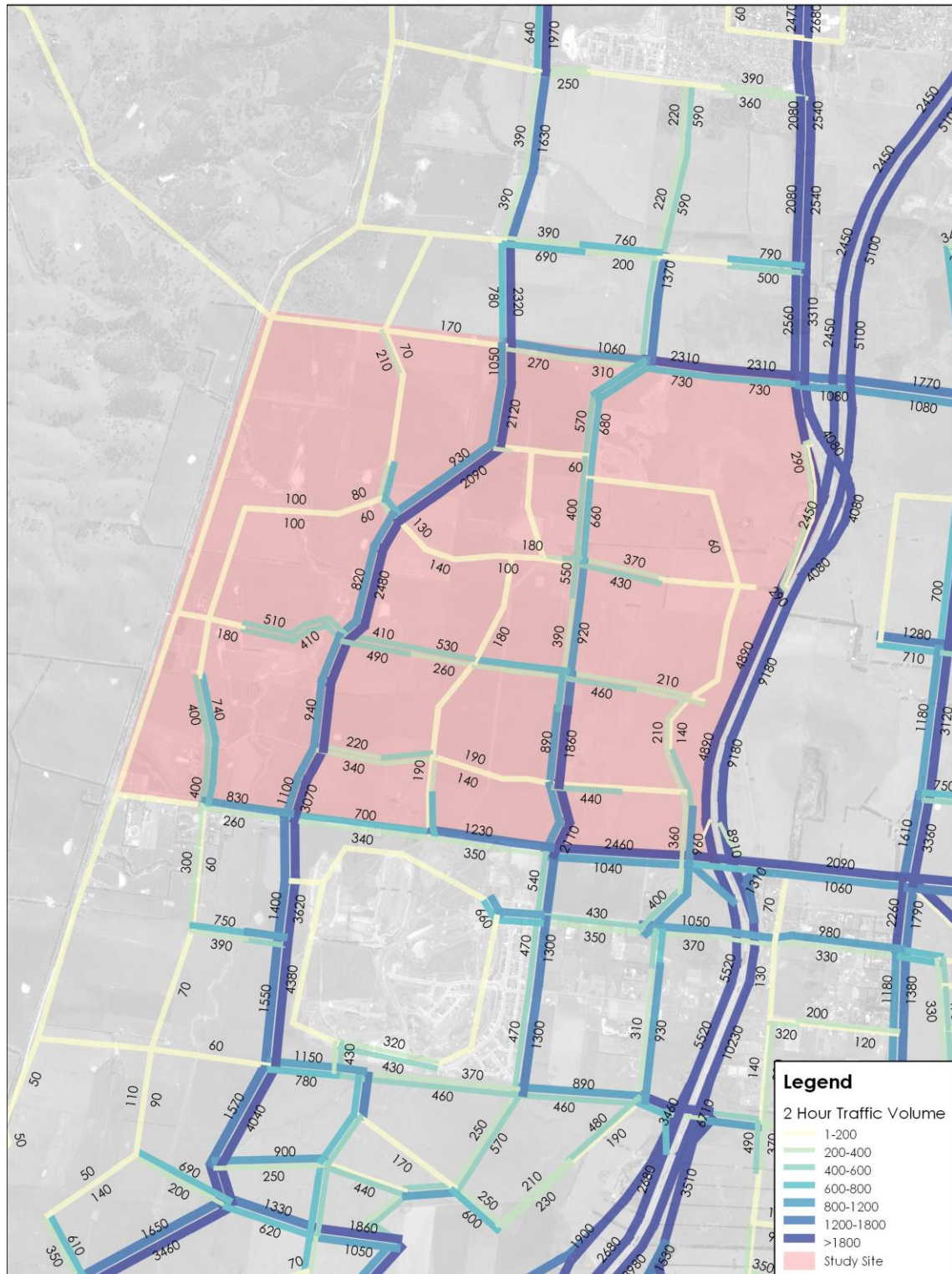
Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - Number of Lanes



Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - Posted Speed



Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - AM 2 Hour Traffic Volume

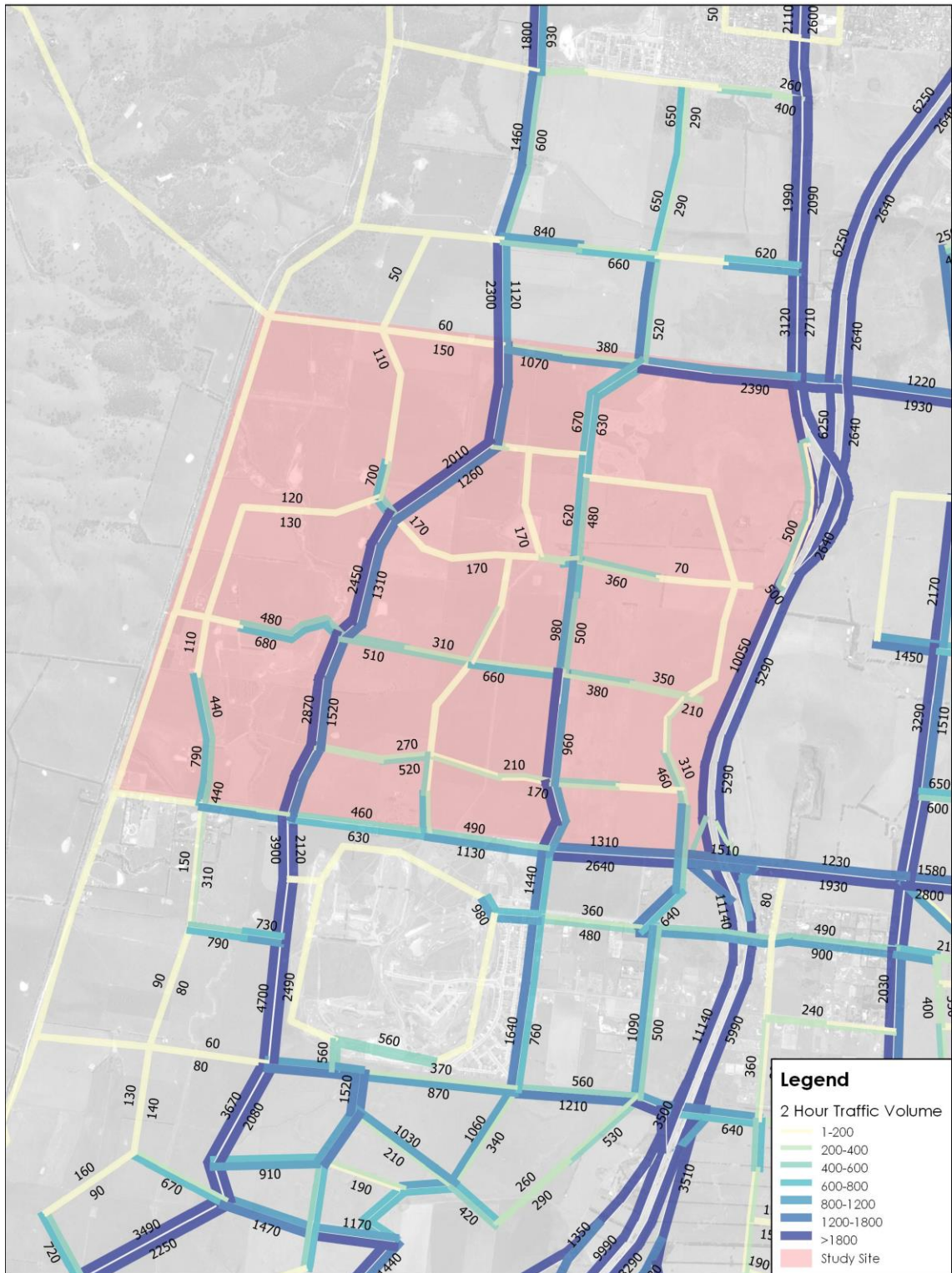


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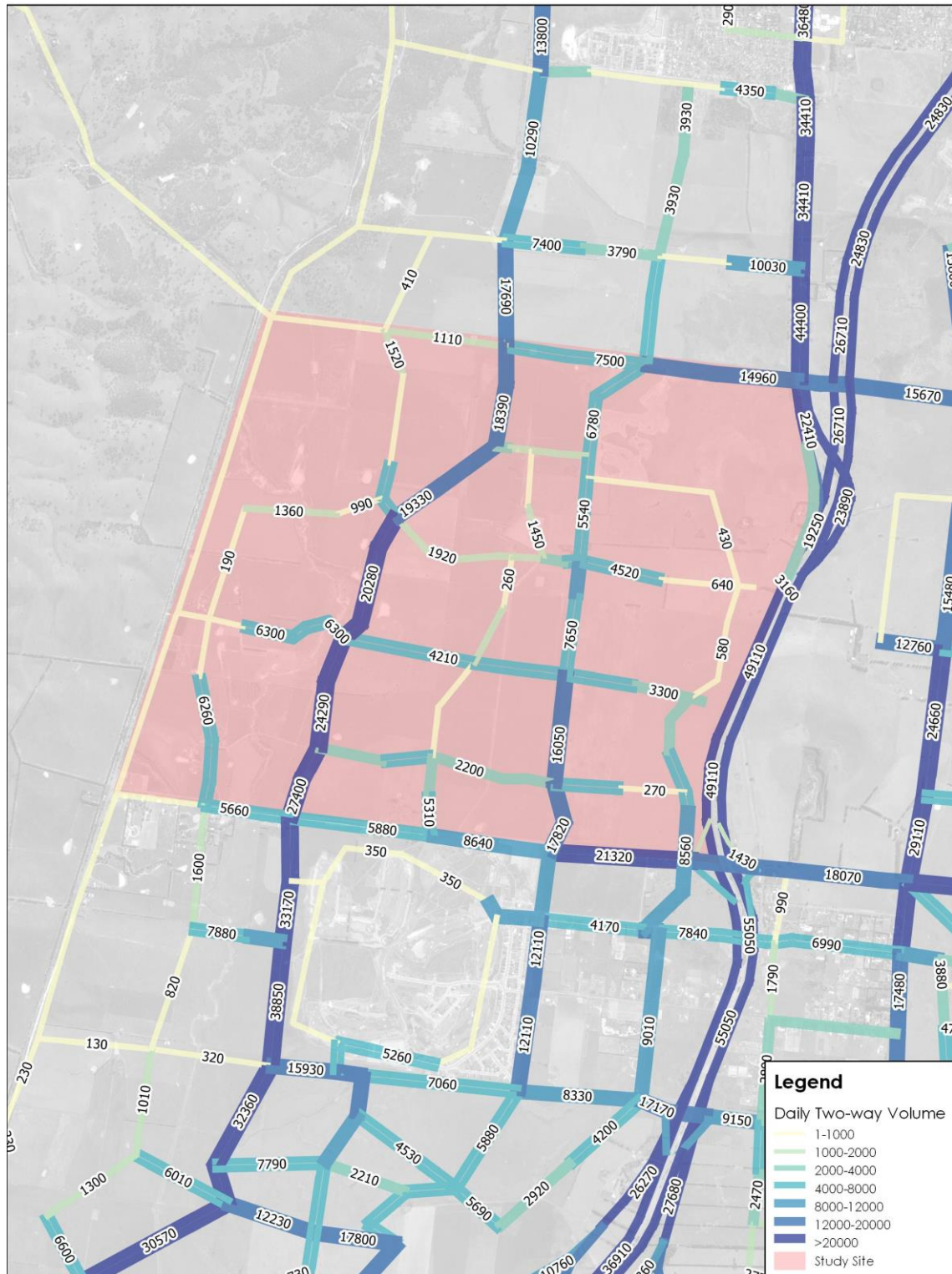
Strategic Transport Modelling Assessment // Issue: A

Beveridge North West PSP

Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - PM 2 Hour Traffic Volume



Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - Daily Two-way Volume

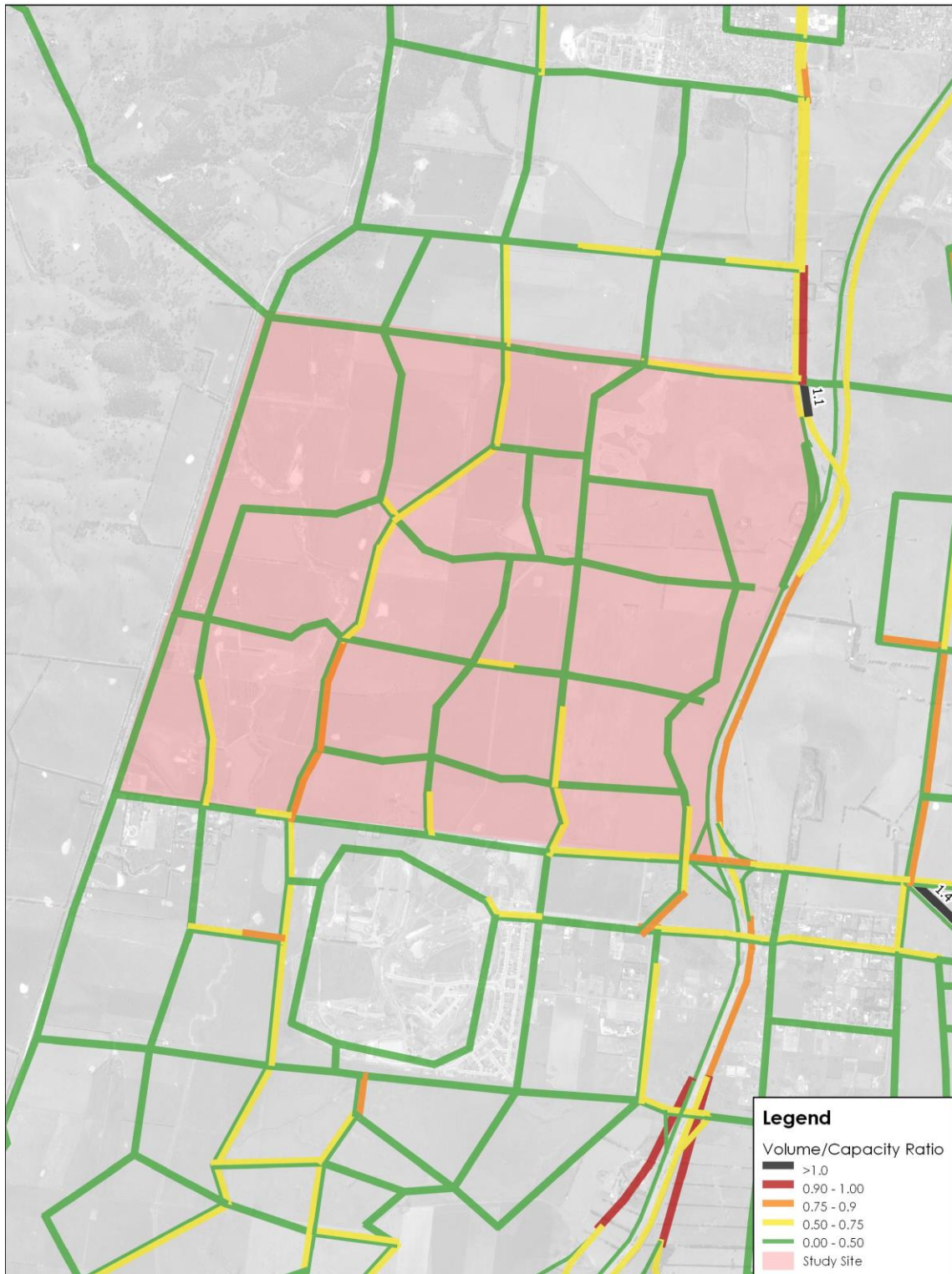


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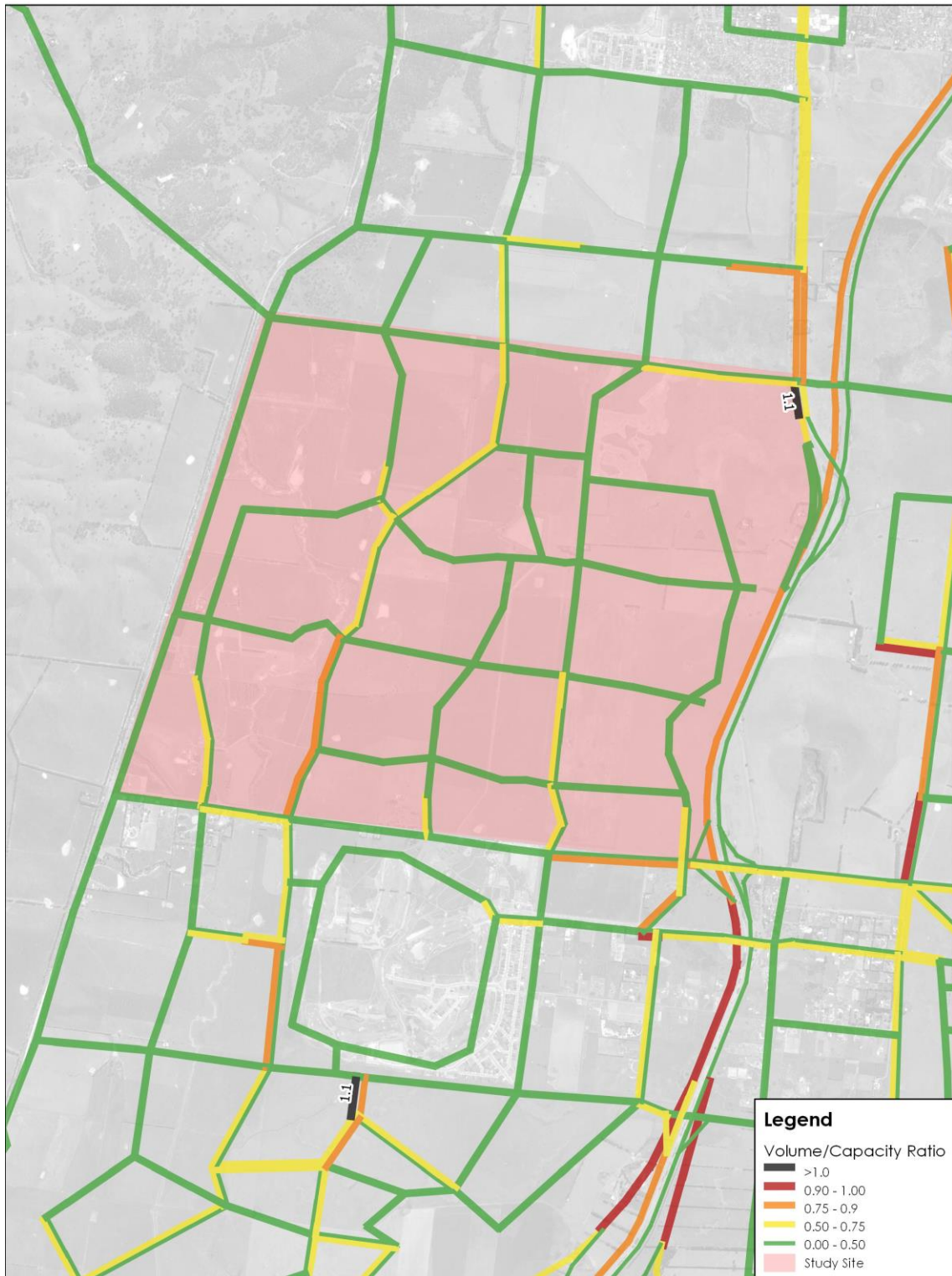
Strategic Transport Modelling Assessment // Issue: A

Beveridge North West PSP

Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - AM Volume / Capacity Ratio



Beveridge North West Beveridge S
2046 - Base Case_E14 Higher Posted Speed - PM Volume / Capacity Ratio



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