Metropolitan Planning Authority
25-Jul-2014

Thompsons Road, Clyde Creek and Casey Fields South (Residential) PSPs 53, 54 & 57.1 Transport Modelling

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Client: Metropolitan Planning Authority

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1.0 Introduction

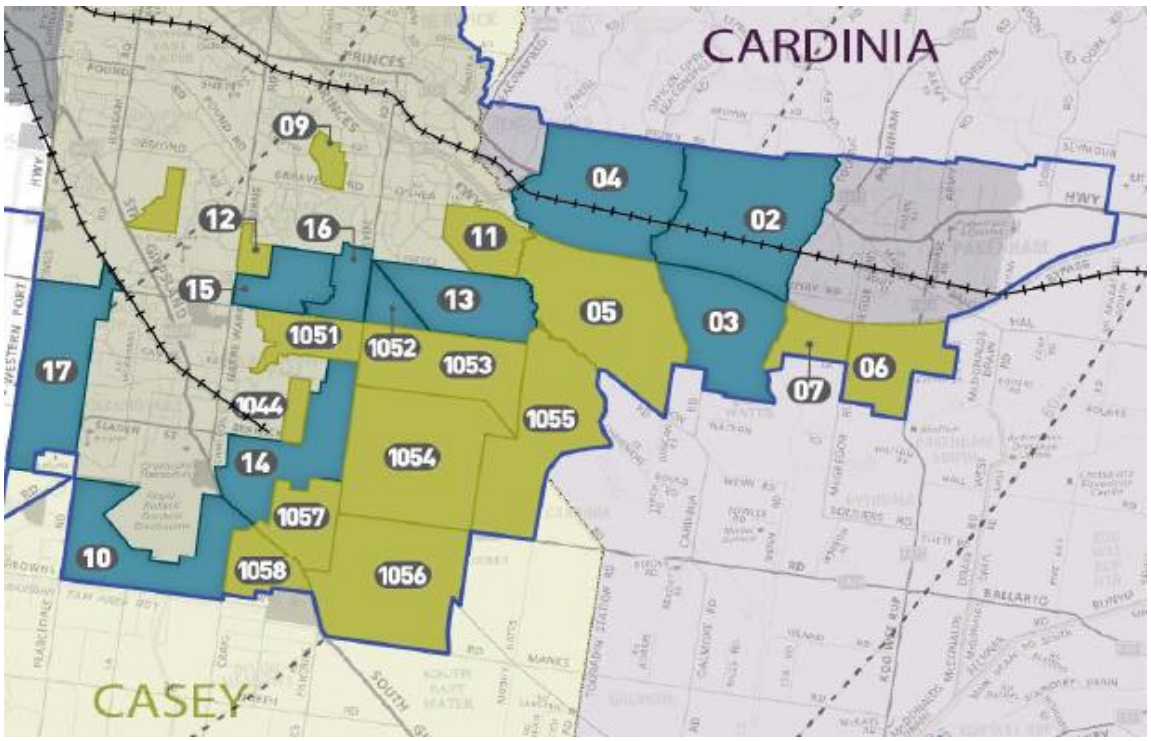
1.1 Overview

AECOM was engaged by the Metropolitan Planning Authority (MPA) to undertake strategic transport modelling for the Thompsons Road, Clyde Creek and Casey Fields South (Residential) Precinct Structure Plans. An extract from the Study Brief is attached at Appendix A.

Together with subsequent Sidra analysis, the strategic transport modelling of interim and ultimate development of the Precincts will be used to assist in the design of intersection Functional Layout Plans (FLPs), which will be included in the Clyde Development Contributions Plan (DCP). . The ultimate strategic transport modelling for 2046 plus will inform the land requirements to enable the construction of ultimate infrastructure requirements.

While the study employs the whole VITM model, the detailed strategic transport modelling was focused on the Precincts including the PSP 1053 (Thompsons Road), PSP 1054 (Clyde Creek) and PSP 1057.1 (Casey Fields South (Residential)to the north of Ballarto Road). The Precincts are shown in Figure 1.

Figure 1 South East Growth Corridor Precinct



Source: MPA

The strategic transport modelling for the Precincts was undertaken for one Interim scenario (notionally at 2026, assumed to be at 75% development) and one Ultimate scenario (notionally at 2046). The modelling work has been undertaken in close liaison with the MPA to confirm the assumptions, inputs and modelling processes.

An extract of turning volumes at all arterial/arterial and all connector/arterial intersections within the Precincts from each Interim and Ultimate scenario was undertaken and provided to MPA for use in subsequent Sidra analysis.

1.2 Key Objectives

Key objectives of this study are to:

- Review of the existing VITM for the South East Growth Corridor, particularly focusing on the area within PSPs (shown in Figure 1) and surrounding PSPs for at least 1.6 kilometres. The process involved reviewing the proposed road network in the model, the proposed bus network, the VITM transport zones and zone centroid links within the Precincts.
- Use the model to develop an Ultimate scenarios (2046) and Interim scenarios (2026). In the process, the proposed land use form and proposed road network contained in the Precincts were coded into the model in consultation with MPA. Adjustments and refinements to the South East Growth Corridor model were made to better reflect actual and proposed conditions, and improve the modelled bus network to service the Precincts
- Produce appropriate outputs of the model such as volume plots, volume over capacity plots for the AM and PM periods for the road networks within the studied Precincts. This process was undertaken interactively with MPA to allow adjustments to the land use and road network within the Precincts
- Produce a report that discusses the assumptions made, the analysis undertaken and the modelling results for the Ultimate and Interim scenarios.

This report is structured as follows:

- Section 2 describes the model review
- Section 3 describes the development of Ultimate scenario
- Section 4 describes the development of Interim scenarios
- Section 5 presents conclusions

2.0 Model Review

An inception meeting was held with MPA, VicRoads and Casey City Council representatives, in order to formally commence the study. At the meeting, the study methodology was confirmed in addition to timeframes and contact procedures. Relevant background information and study area were also discussed at the meeting.

The study area for the strategic transport modelling for this study was be defined to include PSPs 1053, 1054 and 1057.1, plus future PSP areas to the south and east of the three core PSPs..

The VITM adopted for this study was the version that has been applied for the South East Growth Corridor (SEGC) study, and subsequently to the Werribee Area Growth study. The model has been enhanced over time with a capability to facilitate the expansion of zone system.

At the beginning of this study, there were two approaches to develop the road network for the study. The first approach was to utilise the SEGC network which has disaggregated zones within the study area, and completed in the end of 2011. If this network was adopted, it would be necessary to identify and code all update improvements to the road network and public transport (PT) lines of the Melbourne Metropolitan area, that have been undertaken by the DTPLI Modelling section over the last two years.

The second approach was to employ the latest highway and PT network that was provided by DTPLI at the beginning of the study (i.e. May 2013 version), and disaggregate again the zone system and road network for the study and surrounding area.

The latter approach was adopted because it ensured that the 2046 network and PT lines would include all latest developments and improvements by DTPLI at that time. Secondly the latest land use proposed by MPA for the study area has been changed substantially since the completion of the SEGC study, therefore if the SEGC network were to be used, its zone system would need to be revised and recoded substantially.

The VITM model developed for this Thompsons Road, Clyde Creek and Casey Fields South (Residential) PSPs is called the Thompsons Road model.

3.0 Development of Ultimate Scenario Model

This section documents the development of the model within and outside of the Precincts for the Ultimate scenario.

3.1 Development of zone system

The original VITM had a total of 2959 zones which was disaggregated into 3069 zones for the Thompsons Road model. In the process, 40 original zones were split into 150 zones consisting of 110 new zones added to the model. Appendix B shows a relationship between the 40 existing VITM zones and the new 150 zones for the Thompsons Road model.

The zone disaggregation was undertaken in close consultation with MPA, considering the future road network, natural boundary and future development. In addition separate zones were provided for retail centre such as shopping and neighbourhood centres to represent realistically traffic movements attracted to these areas. MPA provided AECOM with a proposed structure plan for the Precinct PSPs. The zone disaggregation was carried out mainly for the Thompsons Road and Clyde Creek area, and surrounding areas such as Cranbourne East, Clyde North and Casey Central Town Centre.

The Casey Central Town Centre included two original VITM zones: 2057 and 2058, which were split into 7 zones: 2057, 2058 and 3064 to 3068 so that the model would be able to represent more accurately future traffic demand attracted to the Centre.

Figure 2 shows a preliminary draft future urban structure plan for the wider study area that was used during the early phase of the project to develop the zone system and future road network for the Thompson Road model. It should be noted that the future urban structure in the PSP area to the east and south of the study area is preliminary and high-level in nature, and will be subject to refinement when detailed structure planning is undertaken for these precincts.

Subsequently, the zone system was revised taking into account the latest draft future urban structure of PSPs in the study area, and comments from MPA and City of Casey. Figure 3 shows the final zone boundary for the wider study area.

To aid the zone disaggregation process AECOM has created an application with VITM that processes all of the input files required by the model that refer to zones. This application makes it easy to check and update the model and reduces the likelihood of errors due to the misallocation of zones.

Figure 2 Preliminary draft future urban structure extract – Clyde Creek

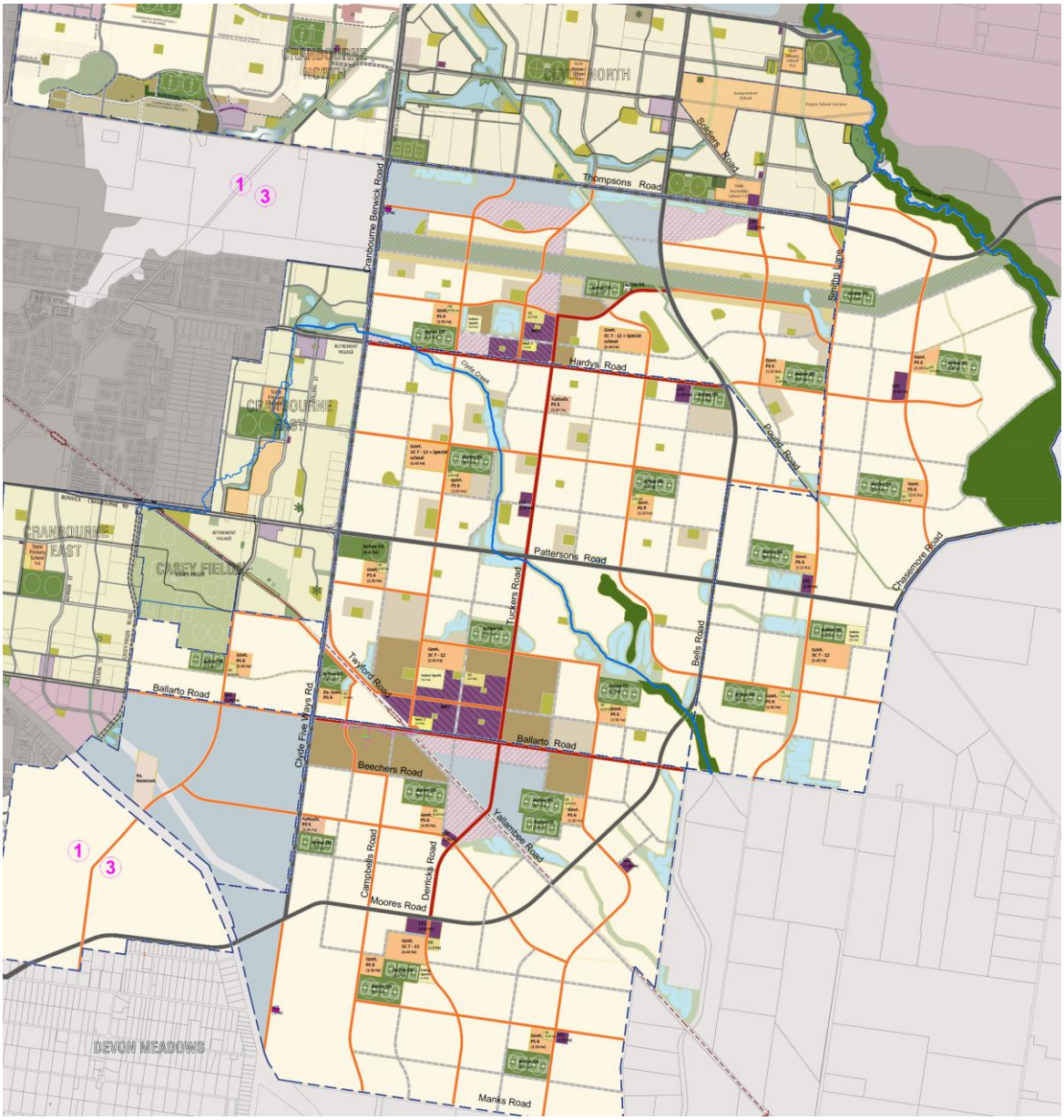
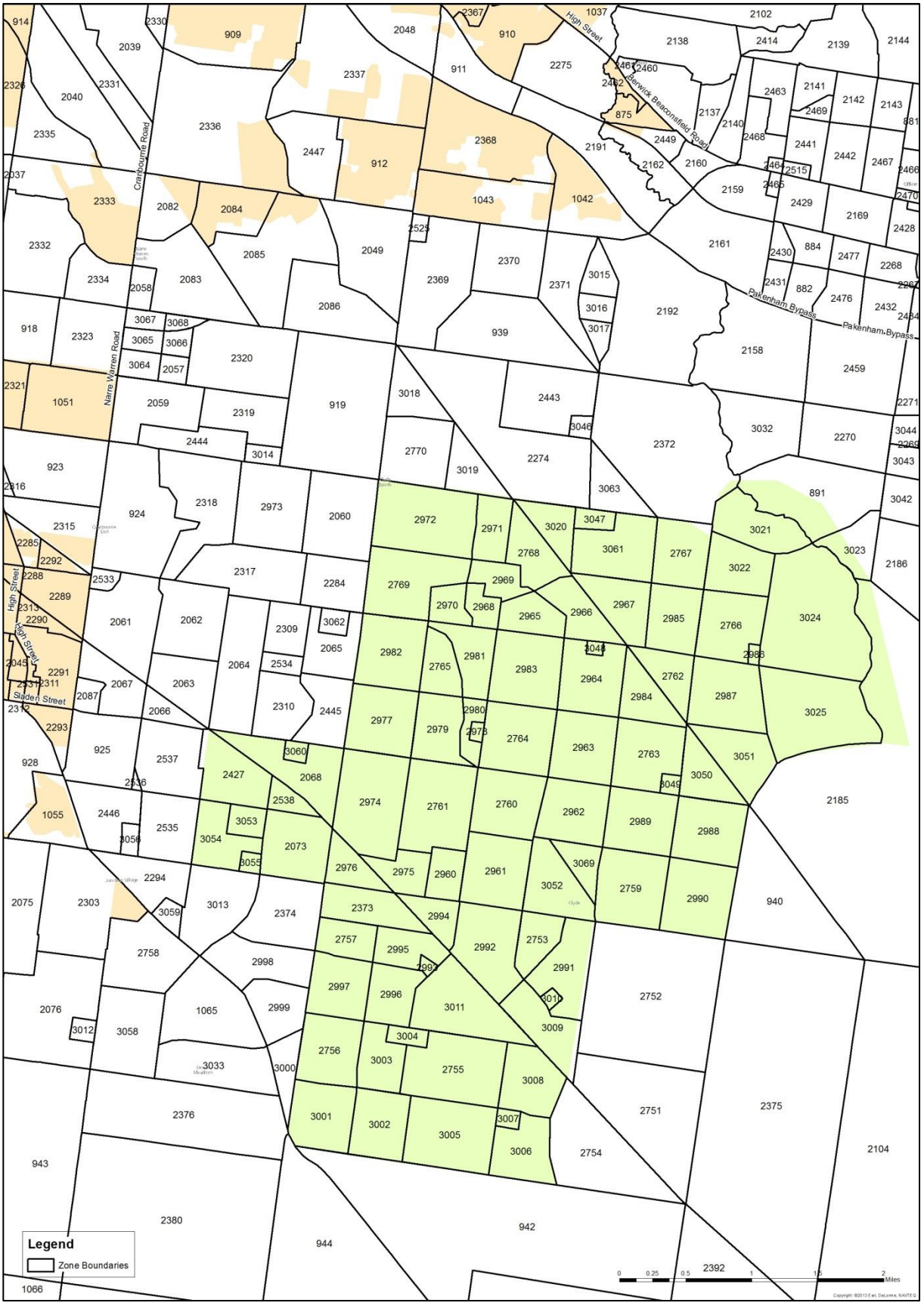


Figure 3 Ultimate model zone boundaries (green shading indicates extent of wider study area)



3.2 Development of Road Network

The first task of development of road network was to code zone centroid connectors for new split zones. Attention was given to coding centroid connectors so that they best represent the likely access conditions, as well as to distribute the traffic within a zone to the surrounding road network. Care was taken to avoid linking centroid connectors directly into intersections, particularly as the outputs from the strategic model will be used for subsequent SIDRA analysis. In addition, they were also preferably to be connected to local or collector roads rather than directly to arterials.

MPA provided AECOM with Ultimate scenario network plans for the Precincts and adjacent areas. Summary plots of zone boundaries, network configuration (e.g. number of lanes, speed, etc.) were prepared and sent to MPA for review before starting the next task. Figure 4 shows the Ultimate road network proposed for the Precincts. Figure 5 and Figure 6 show the specified speeds and number of lanes for the proposed road network. This Ultimate network was coded into the Thompsons Road model, using the 2046 network as a starting point.

The existing and proposed bus services for the wider study area were also reviewed and sometimes rerouted to align with the new road network.

Figure 4 Road network hierarchy for the Ultimate scenario

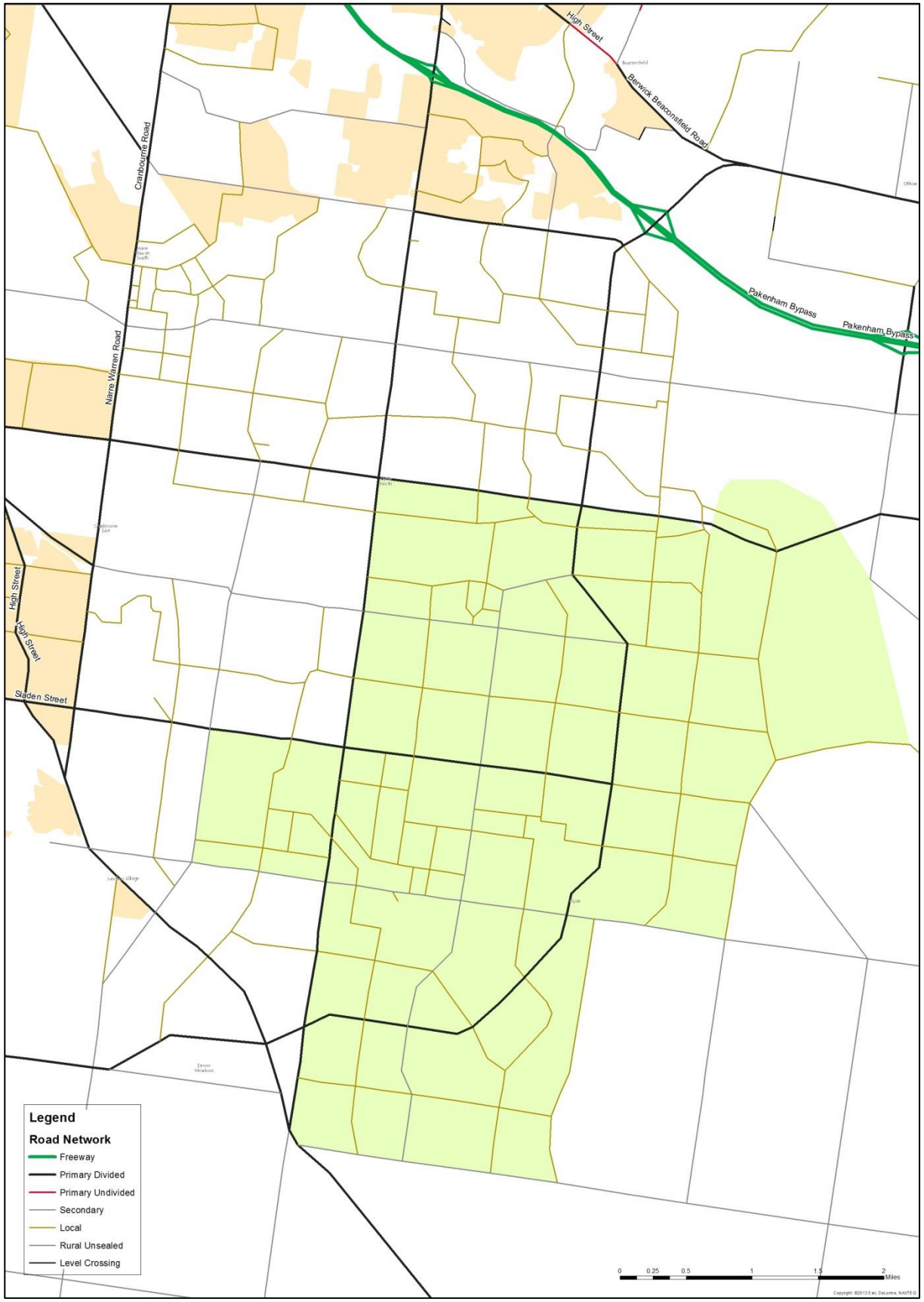


Figure 5 Road network speed limits for the Ultimate scenario

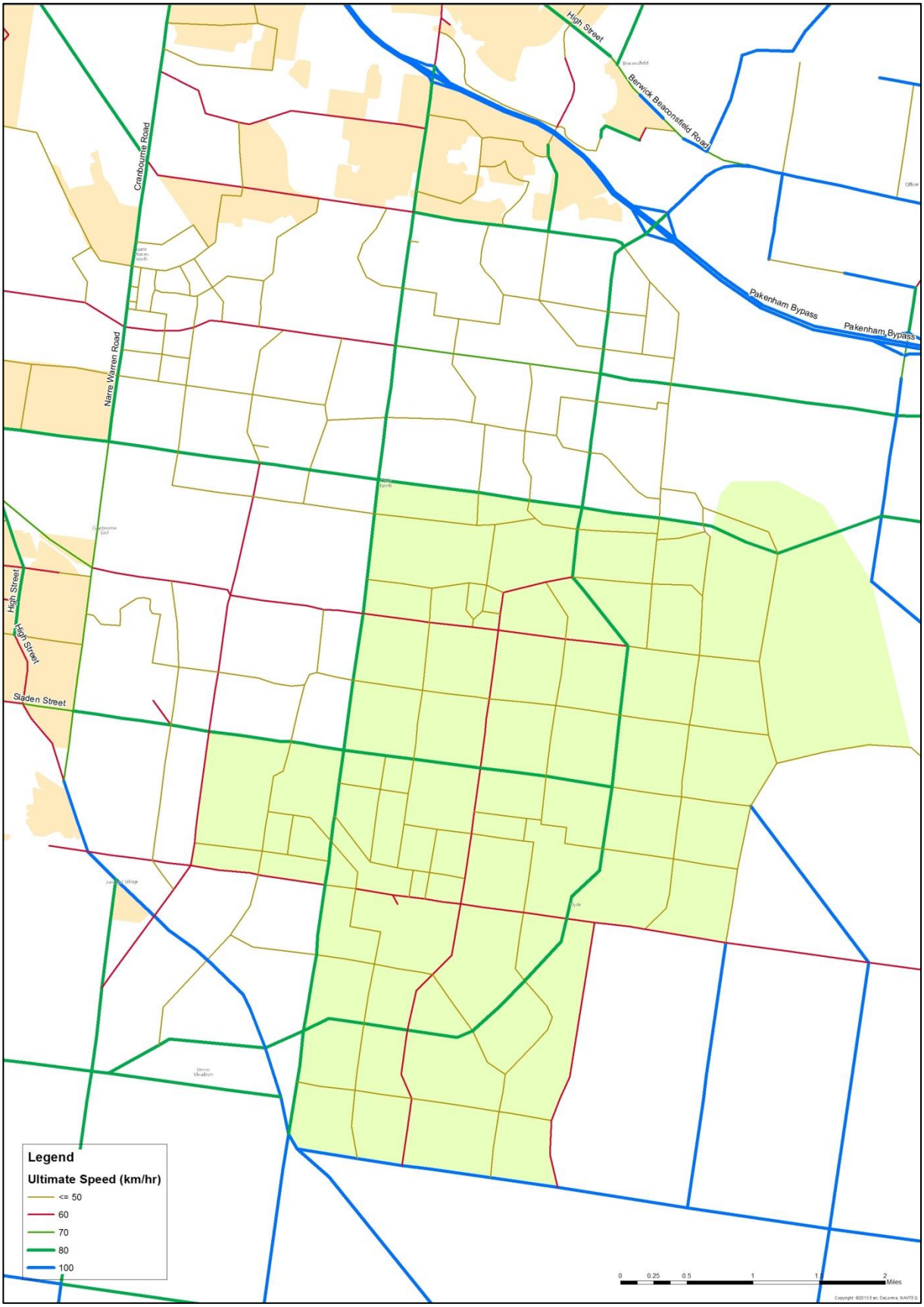
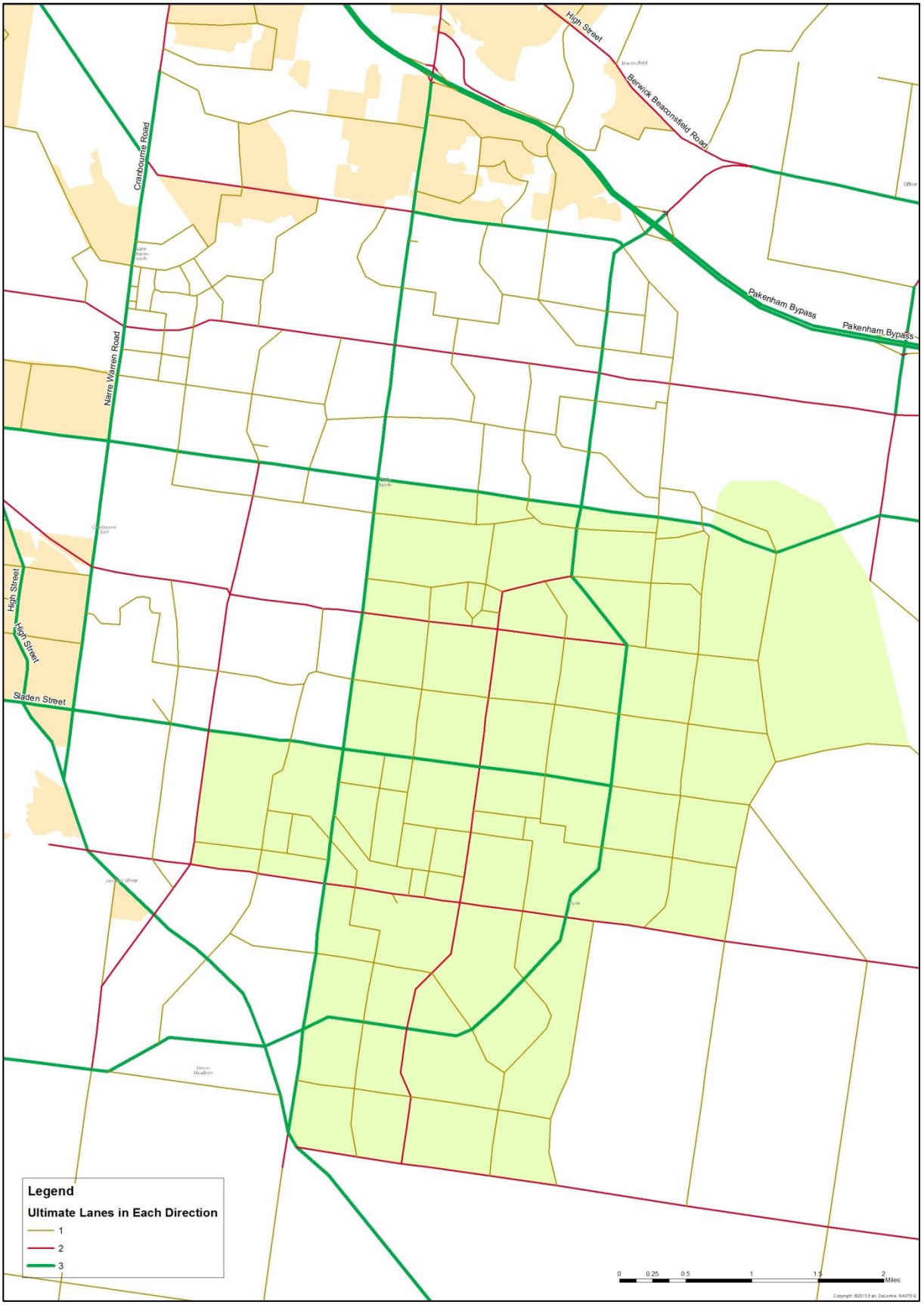


Figure 6 Number of lanes in each direction for the Ultimate scenario



3.3 Demographic Data

MPA provided AECOM with projected demographic information for all zones within the wider study area (including PSP areas to the south and east of PSPs 1053, 1054 and 1057.1), and also for partially developed approved PSP areas to the north and west). The key demographic data provided by MPA included dwellings, a proxy for household, population, retail employment, all employments and enrolments by primary, secondary and tertiary education. For zones outside the Precincts, demographic data from the 2046 SEGA model were used.

Table 1 shows a summary of key demographic data inputs for the study area (Precincts 1053, 1054 and 1057.1), and the whole Melbourne metropolitan for the Ultimate scenario. The demographic data assumed under the Ultimate scenario is shown geographically for the study area in Appendix C. Plots showing a representation of the demographics for the entire Casey-Cardinia corridor are also included in Appendix C.

The Ultimate scenario corresponds to 100% development and was checked zone by zone by MPA for areas within the Precincts and uses 2046 demographics from the standard VITM model for zones outside the Precincts. The demographics forecasts have a direct impact on the model results and outputs.

Table 1 Ultimate scenario demographic data for the Precincts

Area	Household	Population	Retail Jobs	Total Jobs	Enrolments
PSP 53	7,055	19,430	1,616	8,580	900
PSP 54	15,289	42,107	2,333	7,566	5,350
PSP 57.1	1,466	4,000	50	125	0
Total Precincts	**23,810**	**65,537**	**3,999**	**16,271**	**6,250**
Total Melbourne	**2,537,174**	**6,363,555**	**349,979**	**3,599,699**	**1,610,815**

3.4 Modelling Outputs

The travel demand in terms of car vehicle trips from the Ultimate scenario from VITM is summarised in Table 2. Weekday car travel demand related to the Precincts (referring to PSPs 53, 54 and 57.1) contributes about 1.0% of total Metropolitan travel, which is comparable to the corresponding proportion of population of only 0.9%..

Table 2 Weekday car trips

Origin – Destination	Car Trips
Precincts to Outside Precincts	83,285
Outside Precincts to Precincts	81,227
Precincts to Precincts	45,603
Total Precincts (production)	**128,888**
Total Melbourne	**12,425,144**

Figure 7 shows a plot of weekday traffic volumes for the study area and also the Casey Central Town Centre. Figure 8 and Figure 9 show a plot of AM (7am to 9am) and PM (3pm to 6pm) peak period traffic volumes for the study area.

It can be seen that within the study area:

- Thompsons Road would carry a daily traffic volumes of around 32,000 vehicles per day (vpd) per direction
- Hardys Road would carry 2,200-6,300 vpd per direction
- Pattersons Road would carry 7,500-16,300 vpd per direction

- Bells Road would carry 10,600-26,400 vpd
- Cranbourne Berwick Road would carry 6,300-27,500 vpd per direction

Figure 10 and Figure 11 show the volume to capacity ratios (VCR) for the AM and PM peak periods. These indicate that the road network within the Precincts generally operates within capacity. There are some sections of road within the study area approaching congestion (i.e. with VCR between 0.8 and 1) such as Thompsons Road.

Figure 7 Ultimate scenario weekday volumes

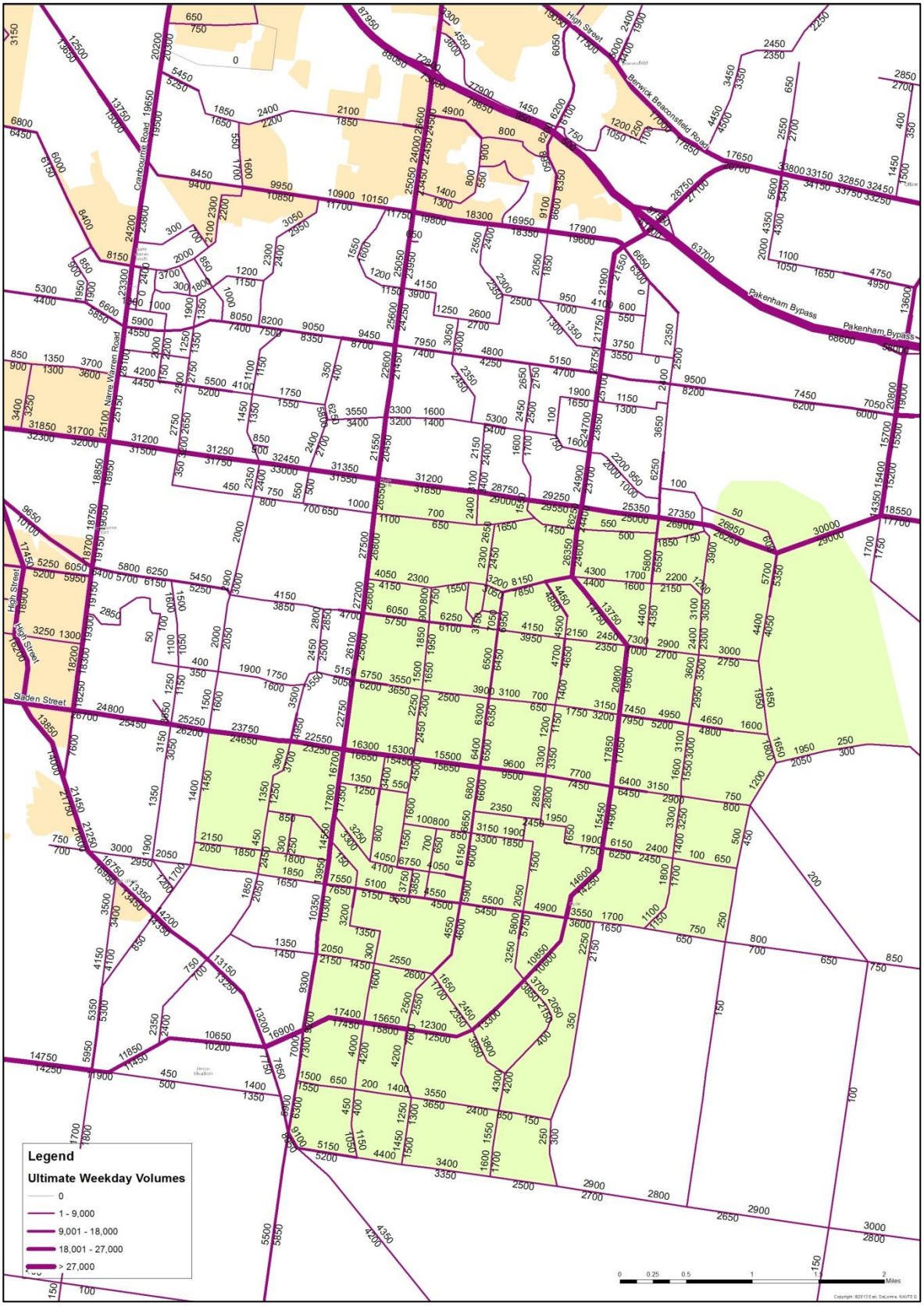


Figure 8 Ultimate scenario AM volumes

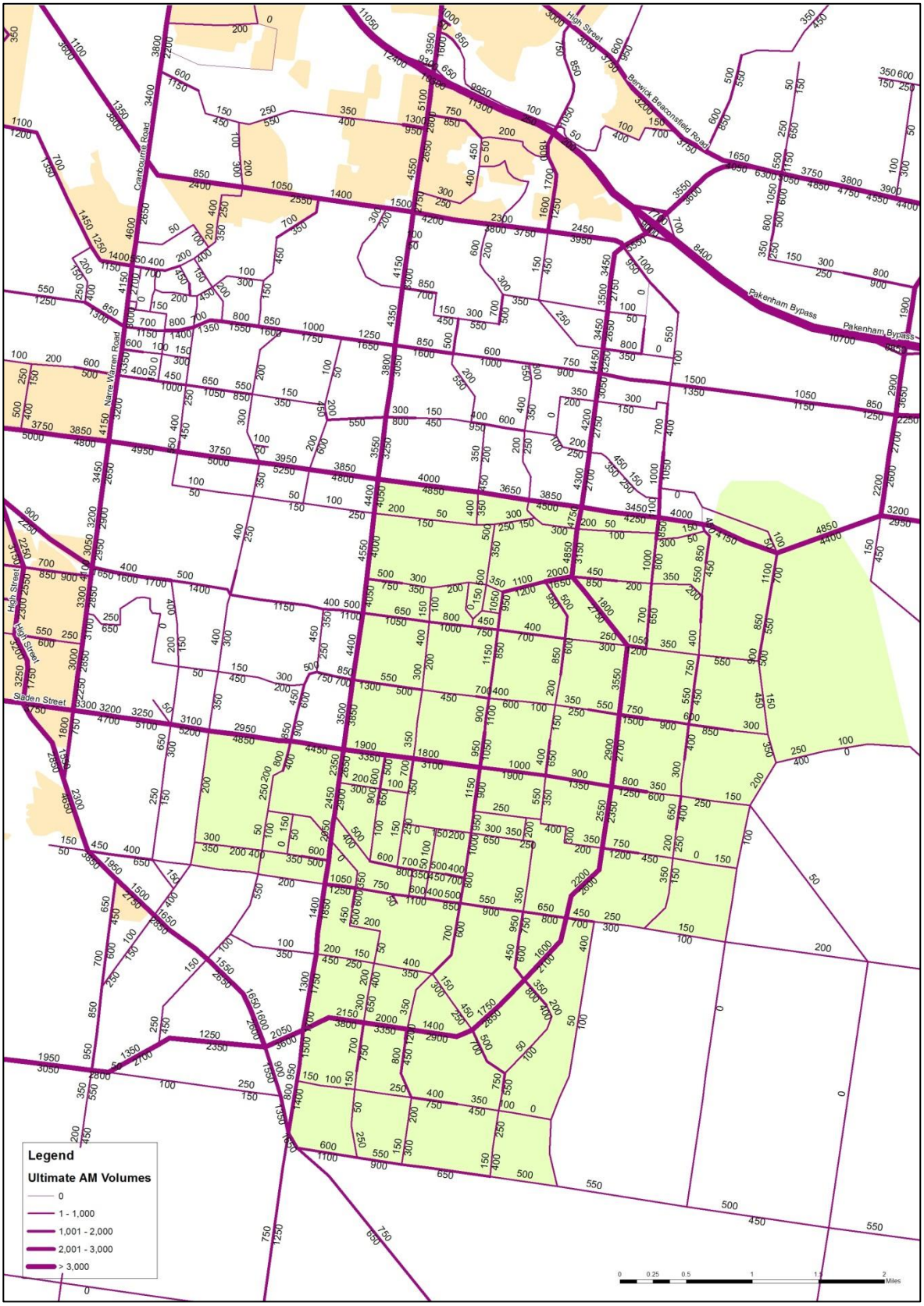


Figure 9 Ultimate scenario PM volumes

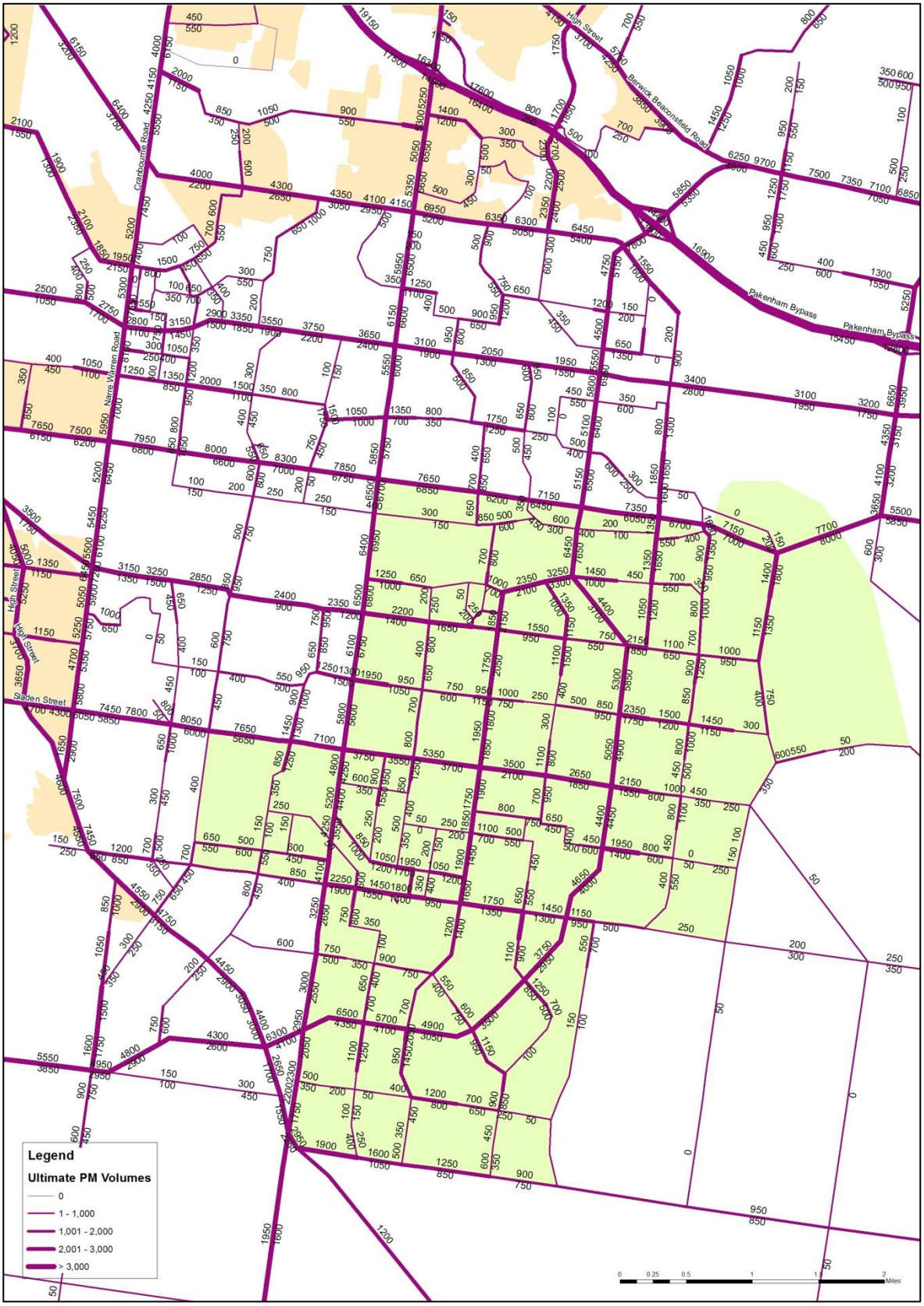


Figure 10 Ultimate scenario AM volume capacity ratios

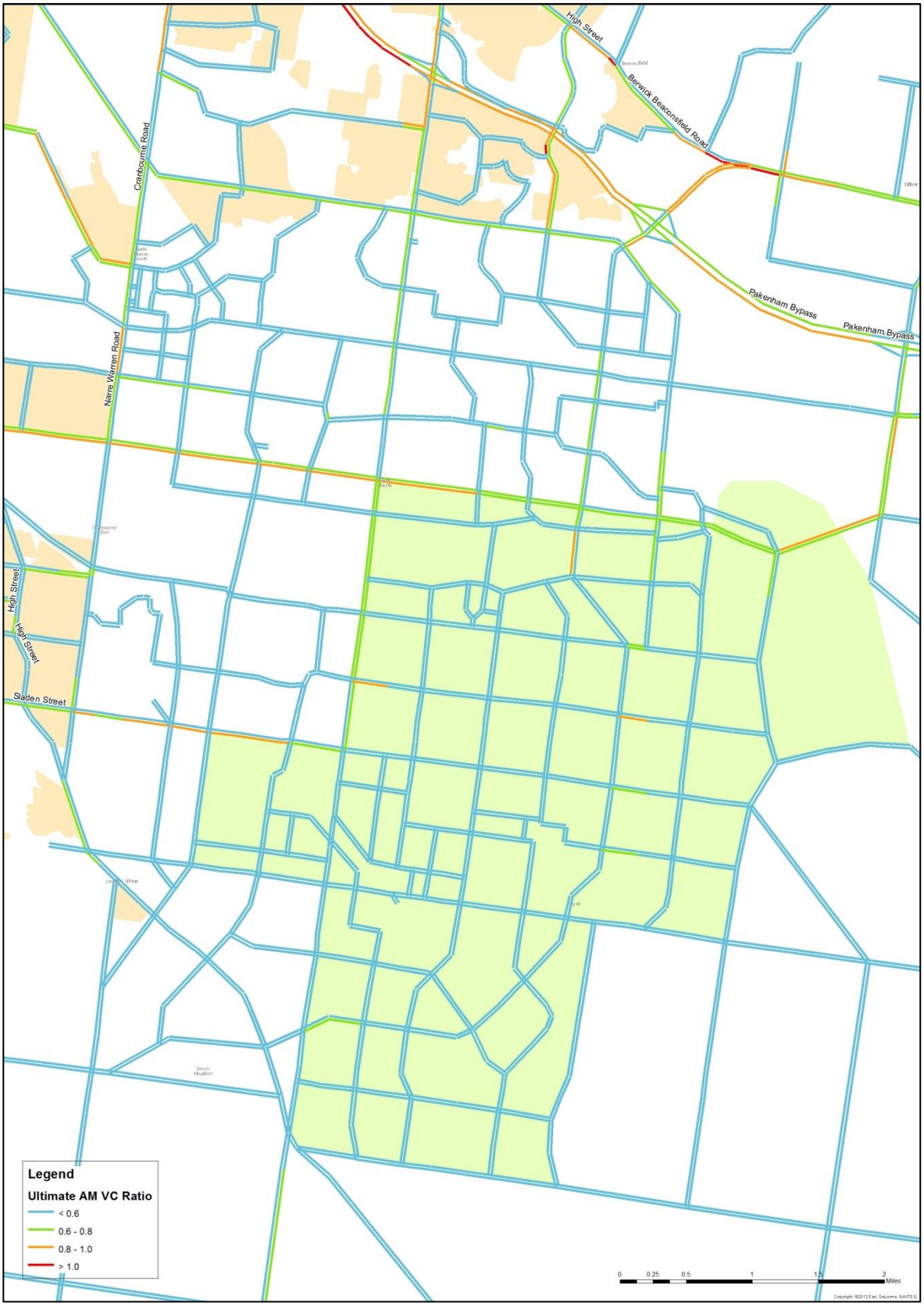
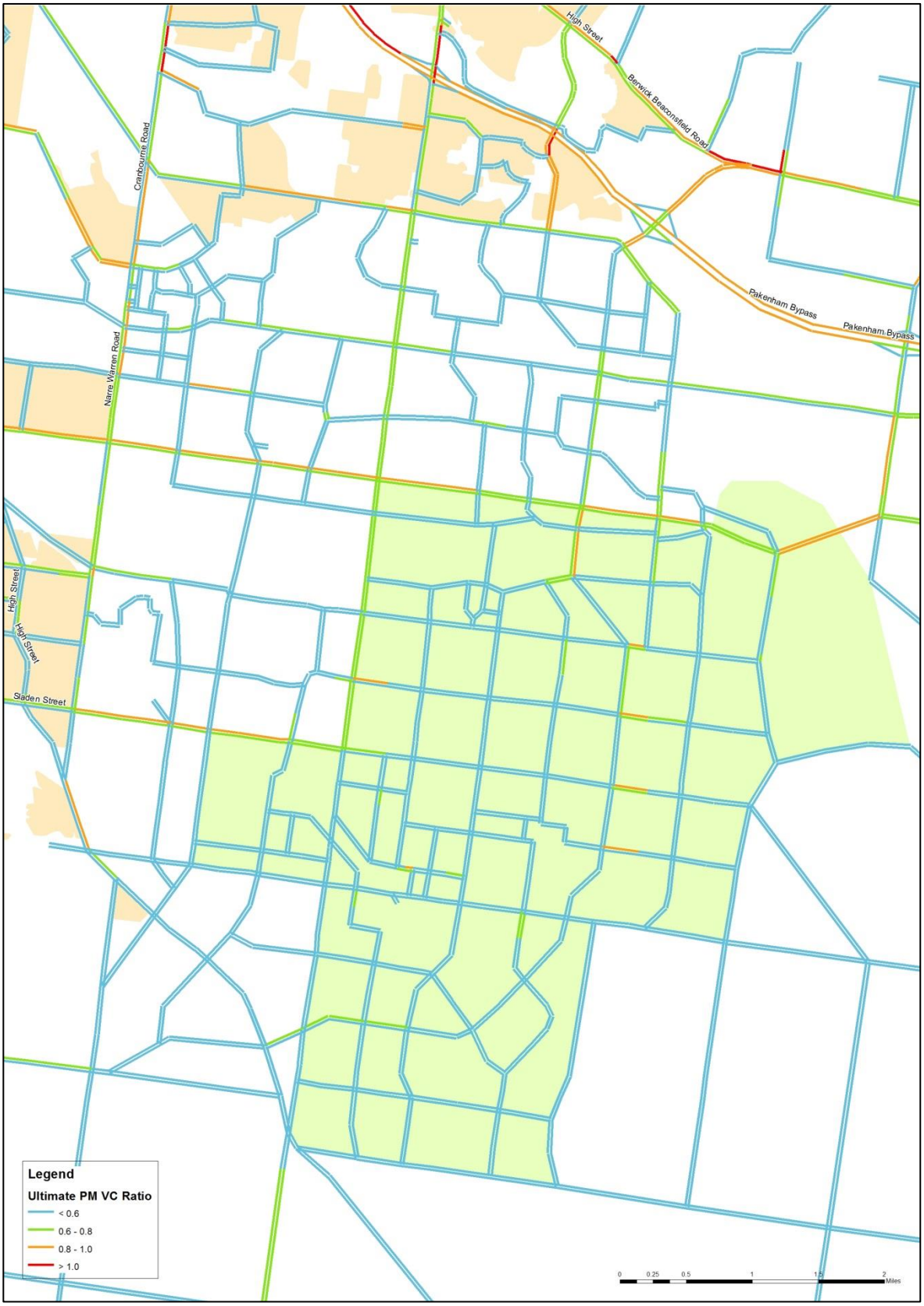


Figure 11 Ultimate scenario PM volume capacity ratios



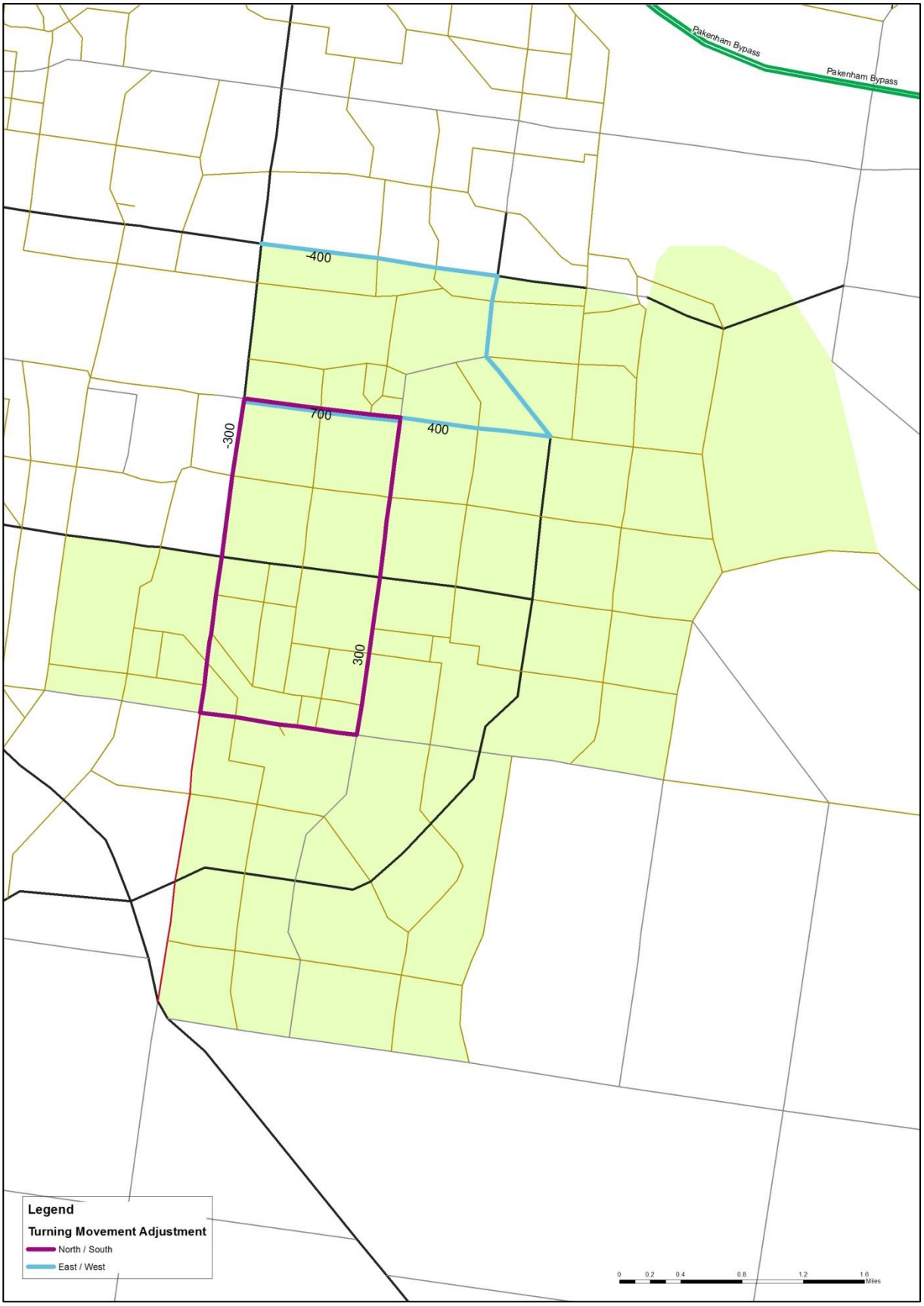
Due to the model link class coding associated with Thompsons Road (i.e. primary divided) and Grices Road (local collector) and the nature and detail of the surrounding network, the model allocates a large number of trips to Thompsons Road compared to Grices Road. In reality some of these trip drivers may use Grices Road.

Because the model allows trips to enter and exit the network via collector roads, some connector streets (e.g. north and south of Hardys Road) have higher volumes compared to parallel arterials where in reality trips are likely to travel along the arterials as long as possible.

Outputs from the strategic transport modelling were then used to produce turning movement volumes for subsequent SIDRA assessment. It should be noted that using strategic transport modelling results to produce turning movement forecasts and detailed link flows is highly variable, and that the strategic modelling has not be validated at a turning movement or individual link level. Due to this and the anomalies discussed above, these turning volume estimates are therefore indicative only, and need to be utilised with a high degree of caution and engineering judgement. Minor manual adjustments were made to the strategic modelling turning volumes for a selected number of intersections, where deemed appropriate to show a logical movement of traffic through the corridor.

This redistribution adjustment applied for the AM peak period is shown in Figure 12. The same adjustment was applied in the alternate direction for the PM peak period. These adjustments are not included in the volume plots were applied to the subsequent turning movement volumes extracted for the SIDRA analysis. These turning movements are shown in Appendix D.

Figure 12 AM peak turning movement adjustment



4.0 Development of Interim Scenario

This section documents the development of the model within and outside of the Precincts for the Interim scenario. The zone system developed for the Ultimate scenario was also applicable for Interim scenarios. The following sections will describe the network development, demographic data and model outputs for Interim scenario. The model inputs are based on 75% development of PSPs 1053, 1054 and 1057.1, notionally at 2026.

The interim strategic transport modelling for 2026 will be used to inform the scope of infrastructure required to be constructed to support the development, such as the size of the intersections and number of lanes of an arterial road to be built. This in turn will be utilised in the Clyde Development Contributions Plan (DCP).

4.1 Network Development

The road network for the Interim scenario adopts the same configuration as assumed for the Ultimate scenario except that all roads within the Precincts and the wider study area are assumed to be one lane each way, with the exception of Berwick-Cranbourne Road, which is assumed to be two lanes each way.

This is based on the advice provided by VicRoads that duplication of Berwick-Cranbourne Rd between Thompsons Road and Pattersons Rd is likely to be undertaken in the next five years.

Figure 13 shows the Interim scenario road network proposed for the Precincts and the wider study area. Figure 14 and Figure 15 show the specified speeds and number of lanes for the proposed road network. This Interim network was coded into the Thompsons Road model, using the 2031 network as a starting point.

The rest of the network was then coded the same as the Ultimate scenario but with all roads within the Precincts codes as one lane in each direction with the exception of Berwick-Cranbourne Road being 2 lanes each way. All roads outside the study area are as per the 2031 VITM network.

Figure 13 Interim scenario road network hierarchy

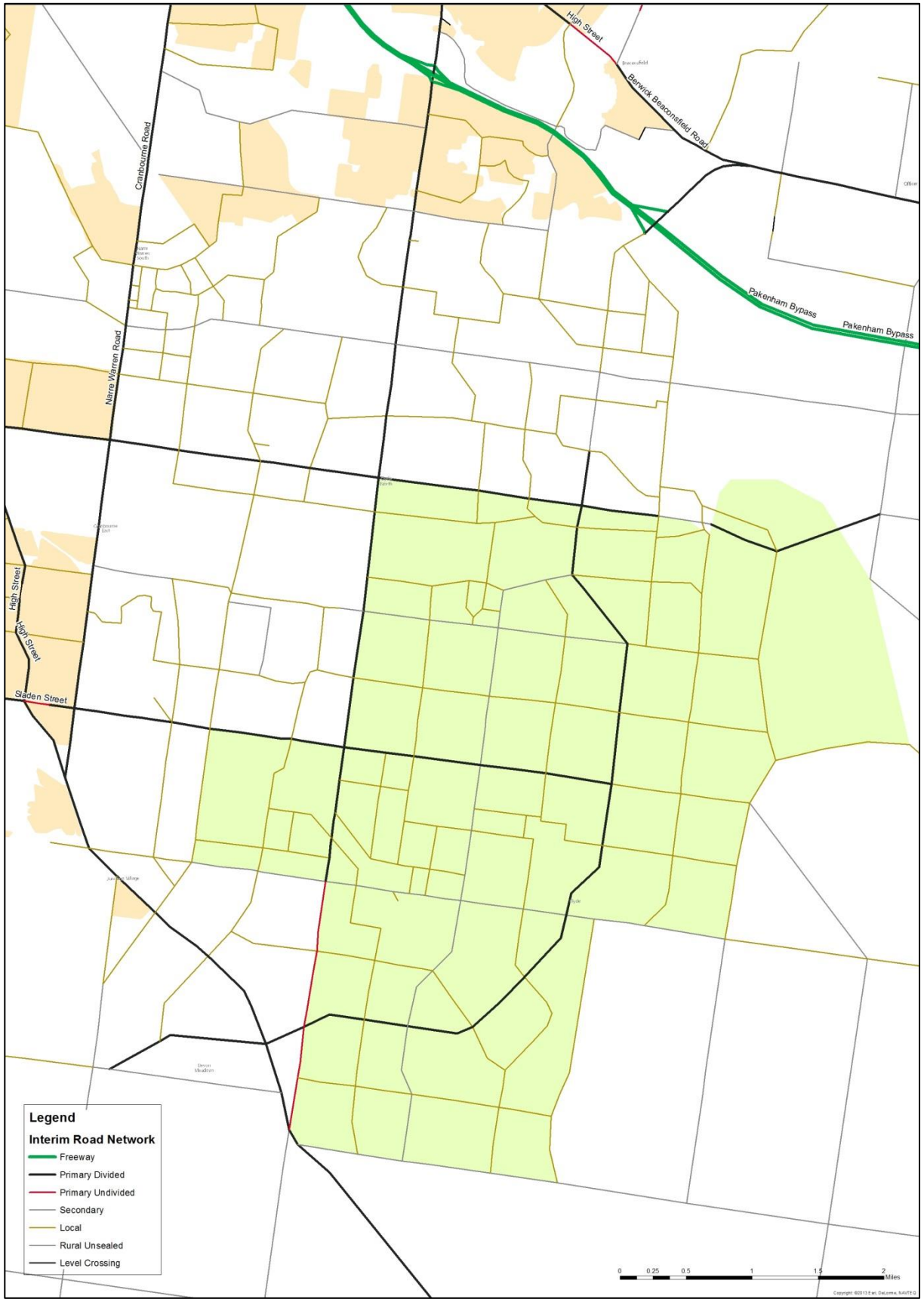


Figure 14 Interim scenario road network speeds

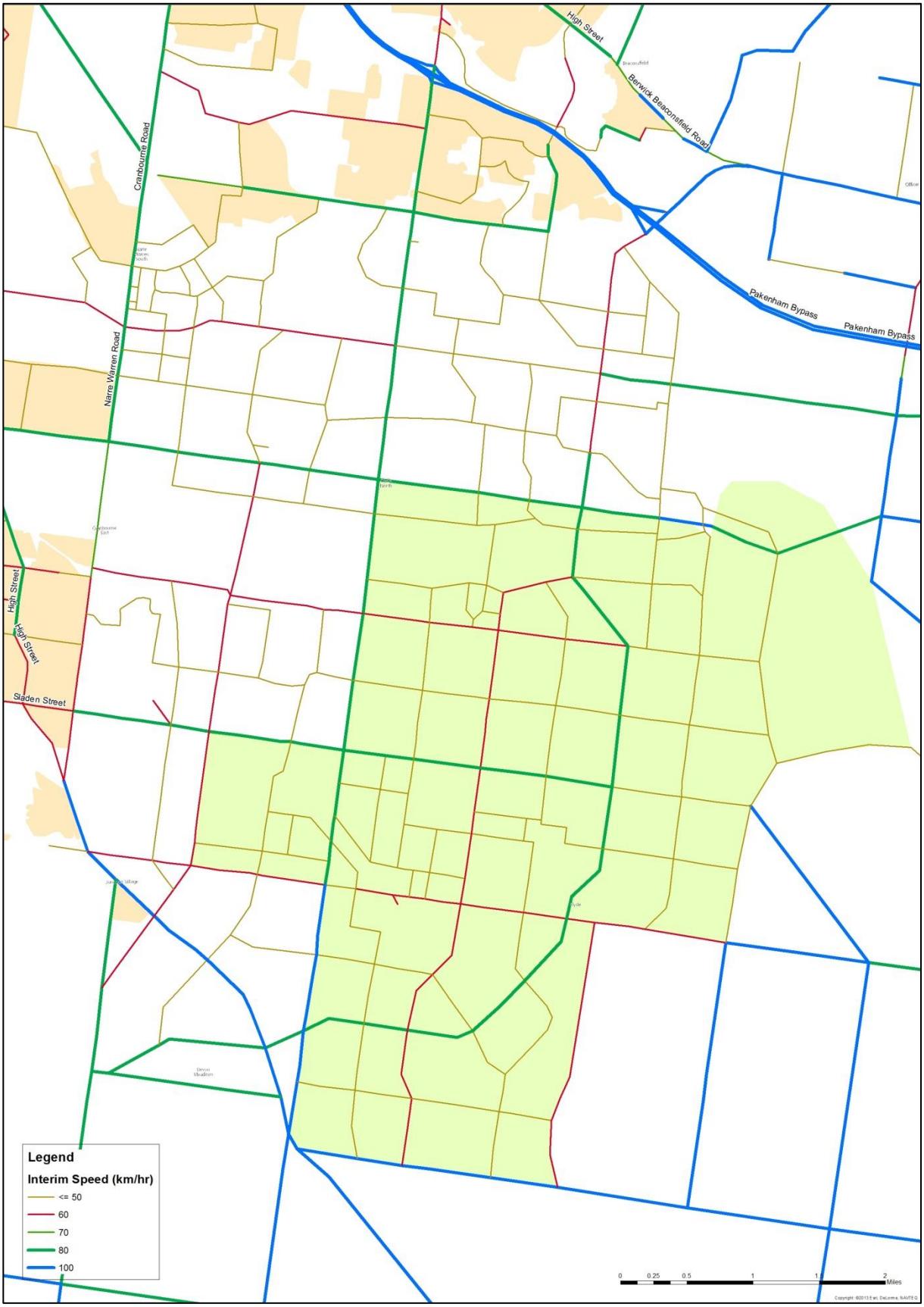
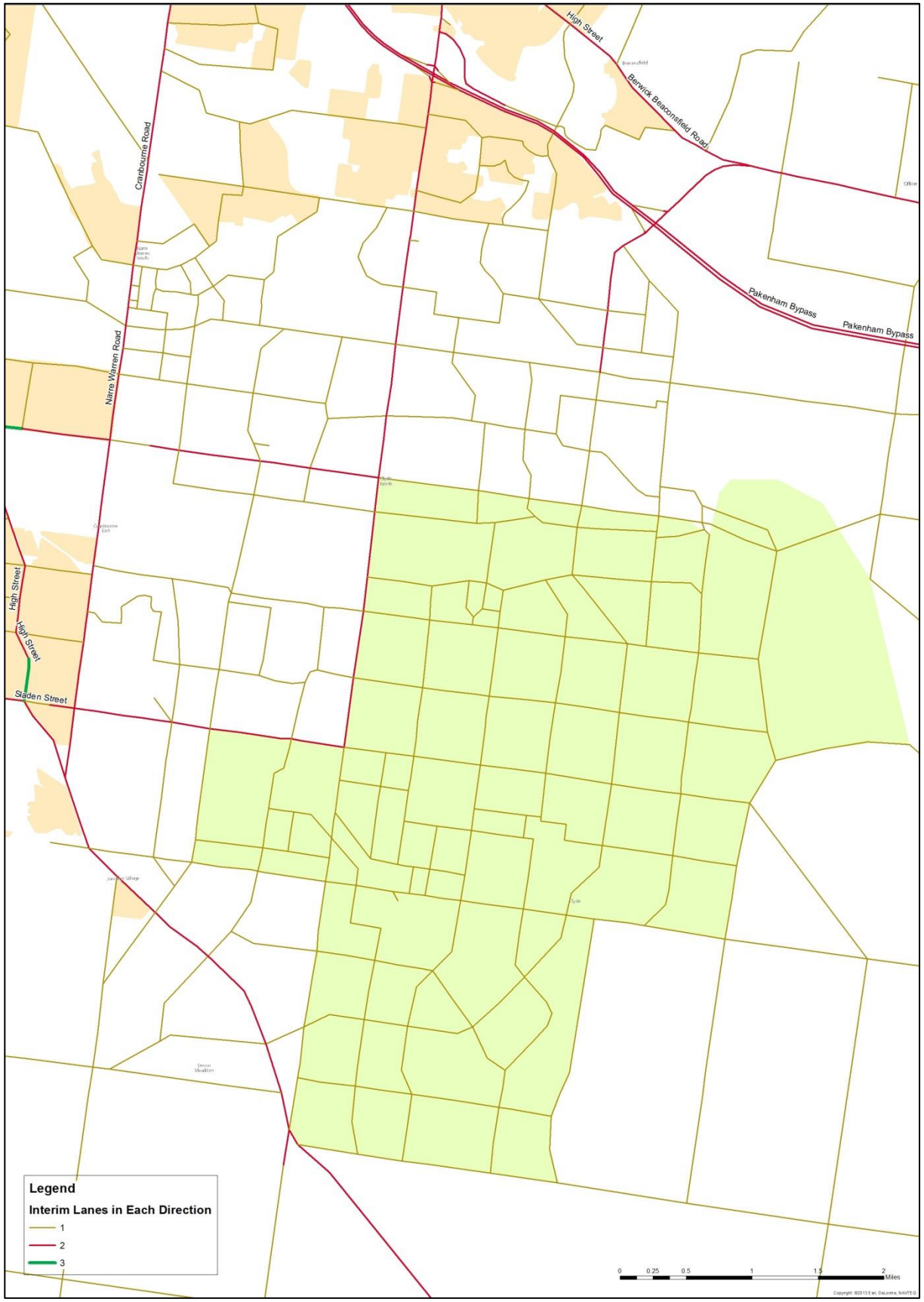


Figure 15 Interim scenario road network lanes in each direction



4.2 Demographic Data

MPA provided AECOM with proposed demographics information for within the Precinct PSPs. For zones outside the Precincts, demographics from the 2046 SEGA model were used. Table 3 shows a summary of demographic data within the Precincts for the Interim scenario. The detailed data is shown geographically in Appendix C.

The Interim scenario assumed 75% development from jobs and population for all zones within Thompsons Road, Clyde Creek and Casey Fields South (Residential) PSPs, zero jobs in the Cardinia employment areas and Minta Farm. All zones outside the Precincts were assumed to have current day demographics based on the standard VITM model for the year 2011. This scenario was tested to indicate the impact of the development of the area prior to major road upgrades being undertaken, and when interim intersections will be in place.

Table 3 Interim scenario demographic data for the Precincts

Area	Dwellings	Population	Retail Jobs	Total Jobs	Enrolments
PSP 53	5,313	14,575	1,226	6,480	900
PSP 54	11,598	31,818	1,791	5,754	4,900
PSP 57.1	1,094	3,000	38	91	0
Total Precincts	**18,005**	**49,393**	**3,055**	**12,325**	**5,800**
Total Melbourne	**1,576,554**	**4,216,301**	**237,717**	**2,188,801**	**1,210,567**

4.3 Modelling Outputs

The travel demand in terms of car vehicle trips from the Interim and Ultimate scenarios are summarised in Table 4 for comparison. It can be seen that there is a significant growth in travel demand between the Interim and Ultimate scenarios consistent with the growth in employment and population. The Precincts refer to PSPs 53, 43 and 57.1.

Table 4 Weekday car trips form Interim and Ultimate scenario

Car Trips	Interim	Ultimate
Precincts to Outside Precincts	48,198	83,285
Outside Precincts to Precincts	46,995	81,227
Precincts to Precincts	49,780	45,603
Total Precincts (production)	**97,978**	**128,888**
Total Melbourne	**8,658,228**	**12,425,144**

Figure 16 shows a plot of weekday traffic volumes for the study area and also the Casey Central Town Centre. Figure 17 and Figure 18 show a plot of AM (7am to 9am) and PM (3pm to 6pm) peak period traffic volumes for the study area.

Figure 19 and Figure 20 show the volume to capacity ratios for the AM and PM peak periods for the Interim scenario. This indicates that the road network within the Precincts generally operates within capacity.

As in the Ultimate scenario, the model allocates a large number of trips to Thompsons Road compared to Grices Road. In reality some of these trip drivers may use Grices Road.

Turning movement data for the Interim scenario were extracted and sent to MPA for more detailed intersection analysis. It should be noted that the turning volume estimates from strategic model are indicative only, and need to be utilised with a high degree of caution and engineering judgement. This data is included in Appendix D.

Select link analysis can inform as to the demand origin and destination for traffic travelling on a given link. Some select link analysis was conducted for the Interim scenario for sections of Berwick-Cranbourne Road (i.e. north

and south of Thompsons Road and Pattersons Road in each direction). This information is included in Appendix E and shows that a large proportion of trips (the order of 70%) travelling this road are originating and destined from and to areas outside the study area.

Figure 16 Interim scenario Weekday volumes

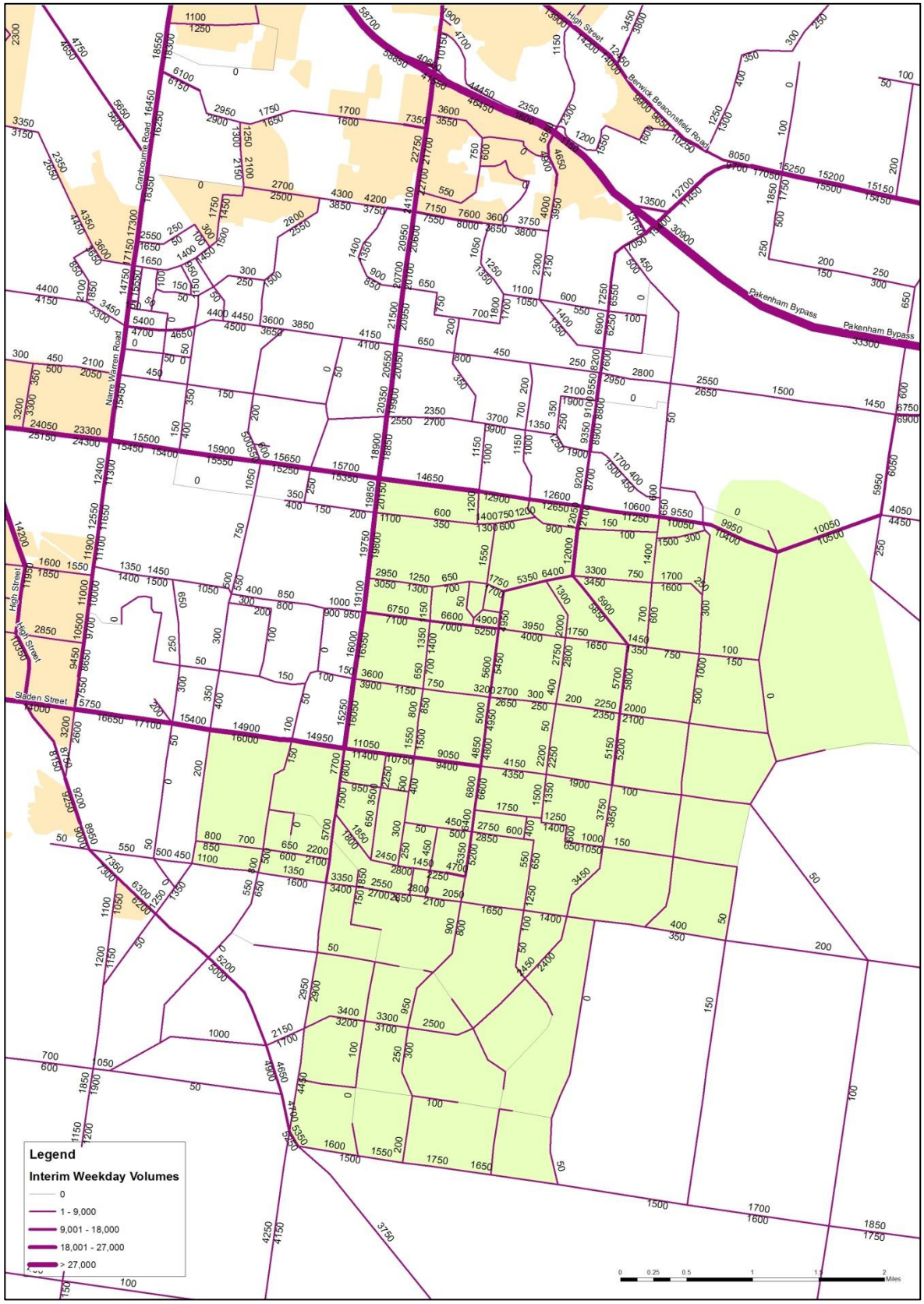


Figure 17 Interim scenario AM volumes

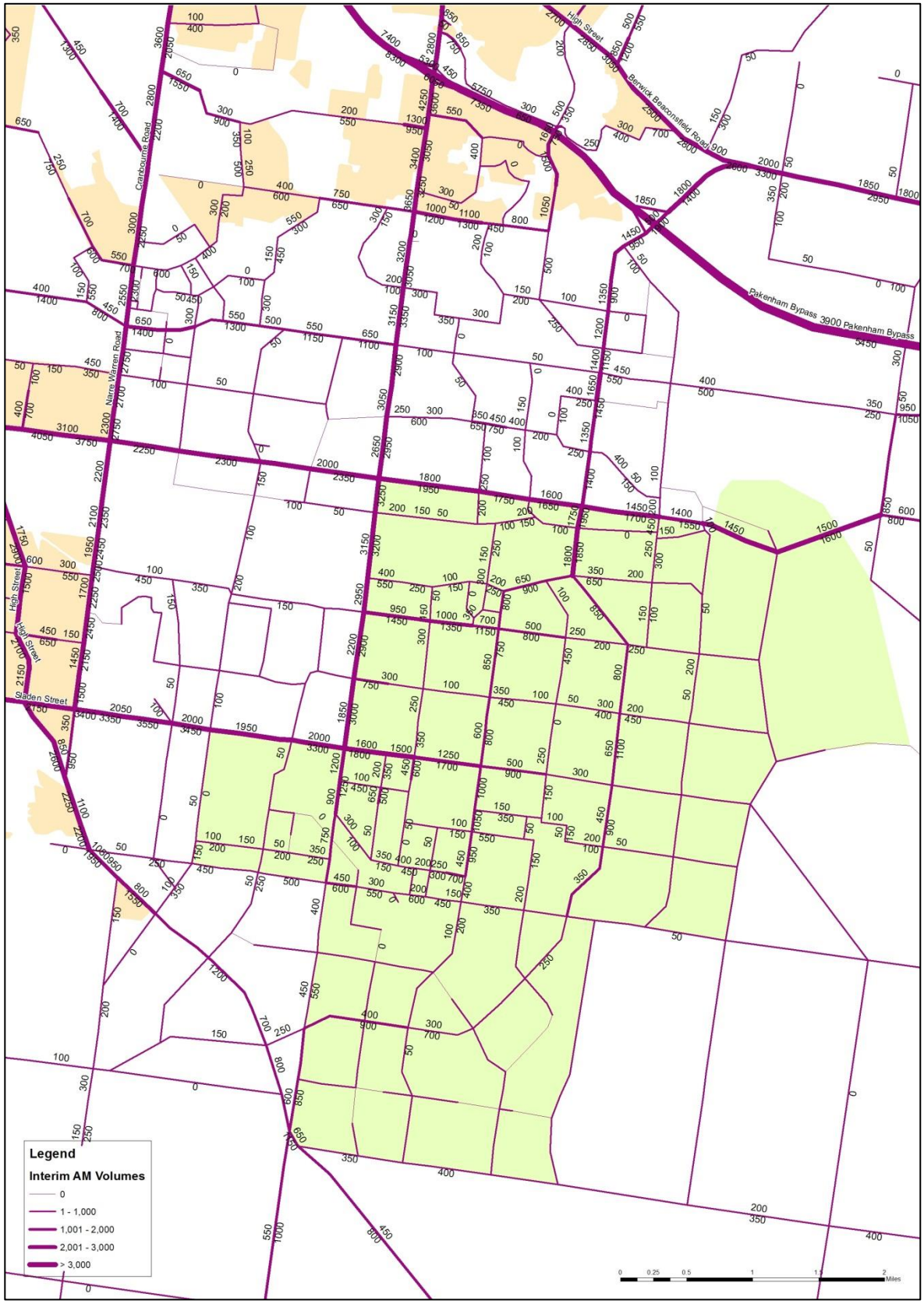


Figure 18 Interim scenario PM volumes

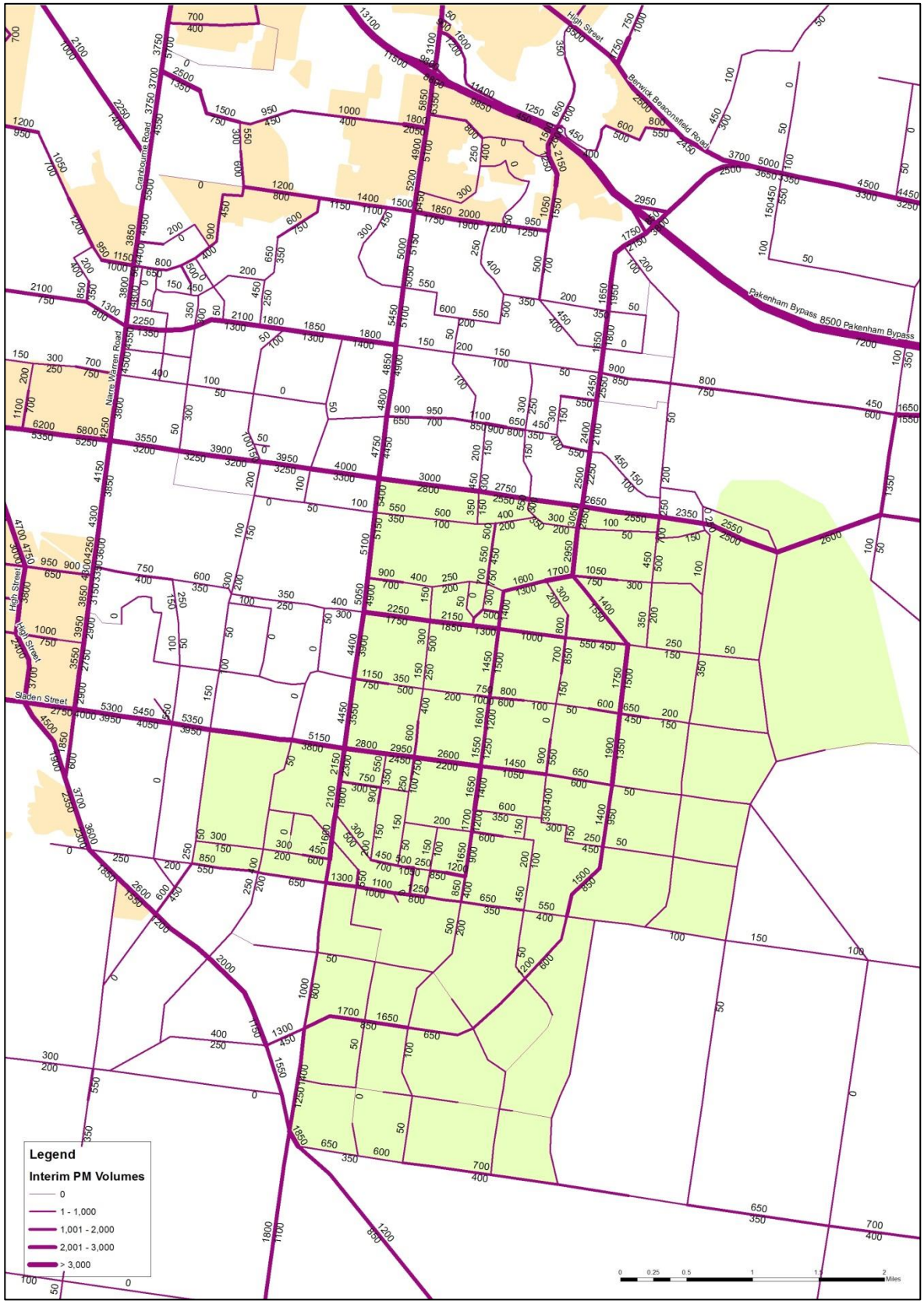


Figure 19 AM volume capacity ratios for Interim scenario

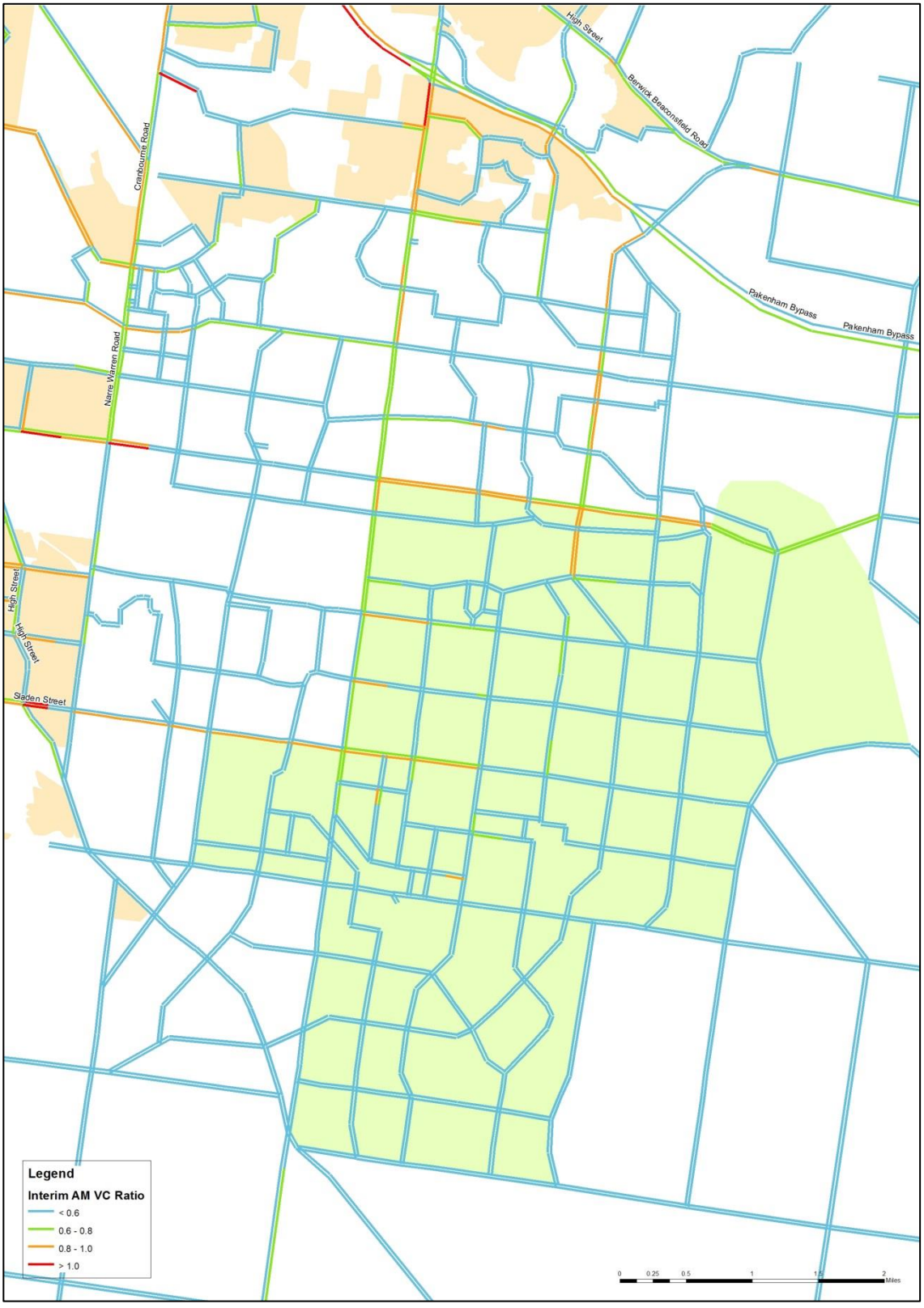
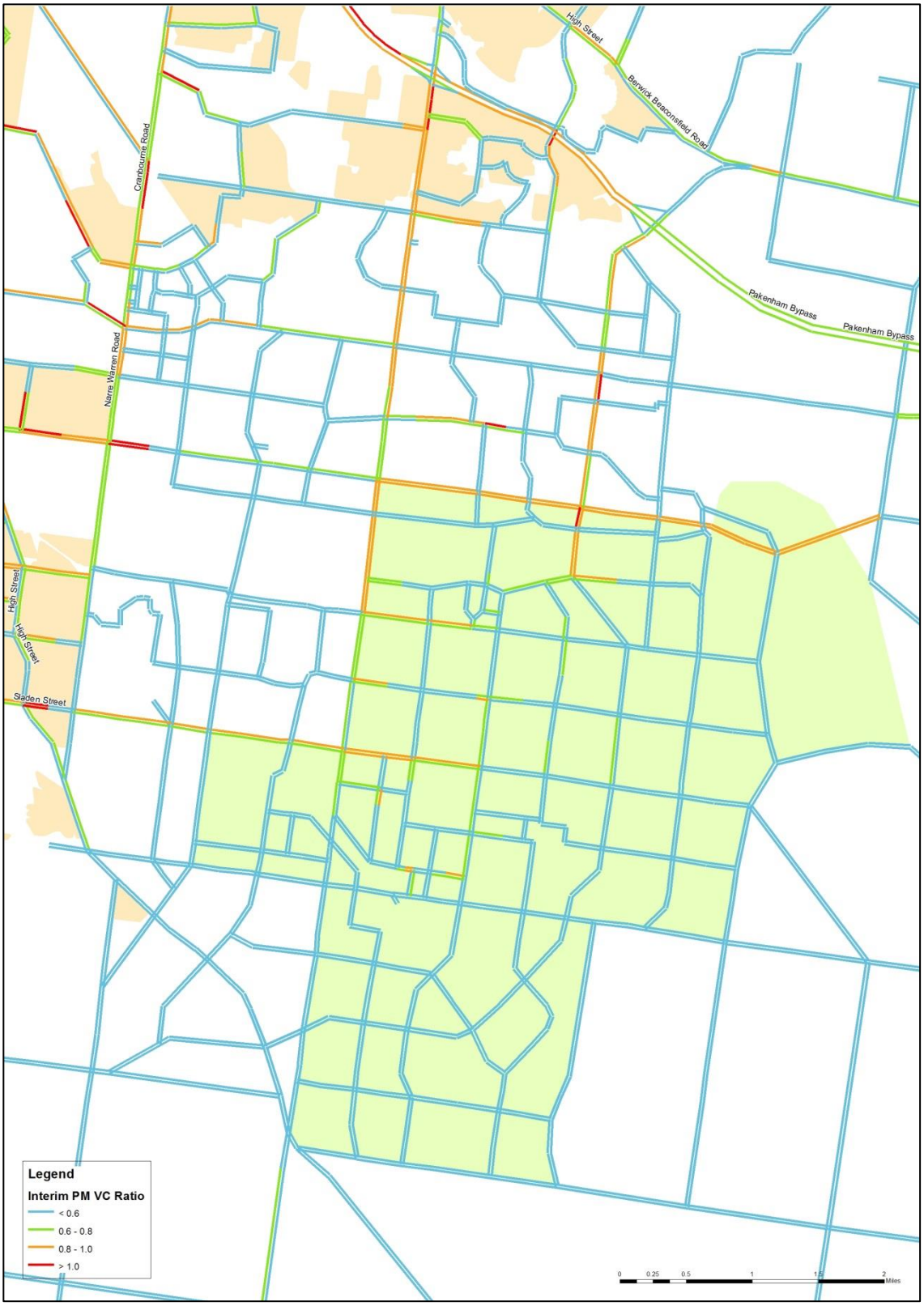


Figure 20 Interim scenario PM volume capacity ratios



5.0 Conclusions

This report has presented the development of Thompsons Road model from VITM to represent in detail the Thompsons Road, Clyde Creek and Casey Fields South (Residential) PSPs. The development involves disaggregation of 40 original VITM zones into 150 zones resulted in additional 110 zones for the study area.

The road network and demographic data were also formulated for two specific scenarios: Ultimate scenario and Interim scenario. The process of model development t was carried out in close consultation with MPA.

The model outputs for each scenario in terms of daily traffic volumes and traffic volume over capacity ratios (AM peak period) indicate that the traffic forecasts are generally proportionate with the proposed road network and the level of population and employment developments for the area. The volume over capacity plots indicate that the traffic demand would generally be within the capacity of the network.

For the Ultimate scenario, it can be seen that within the study area:

- Thompsons Road would carry a daily traffic volumes of around 32,000 vehicles per day (vpd) per direction
- Hardys Road would carry 2,200-6,300 vpd per direction
- Pattersons Road would carry 7,500-16,300 vpd per direction
- Bells Road would carry 10,600-26,400 vpd
- Cranbourne Berwick Road would carry 6,300-27,500 vpd per direction

Travel demand in terms of car vehicle trips for both the Interim and Ultimate scenario are summarised in Table 5.

Table 5 Weekday car trips form Interim and Ultimate scenario

Car Trips	Interim	Ultimate
Precincts to Outside Precincts	48,198	83,285
Outside Precincts to Precincts	46,995	81,227
Precincts to Precincts	49,780	45,603
Total Precincts (production)	**97,978**	**128,888**
Total Melbourne	**8,658,228**	**12,425,144**

As discussed in the sections above, it is possible the model is underestimating the east-west distribution of traffic on Grices Road and overestimating the volume on Thompsons Road. There also may be some overestimating of traffic on sections of local collector roads (e.g. north and South of Hardys Road) parallel to arterials where the model's estimated traffic demand enters the road network via local roads and does not distribute to arterials straight away.

With some adjustment for redistribution due to some of the anomalies described above, outputs from the strategic transport modelling were used to produce turning movement volumes provided in Appendix D for subsequent SIDRA assessment.

Appendix A

Extract from Study Brief

Appendix A Extract from Study Brief

PART A – PROJECT BRIEF

Services
Scope
The Growth Areas Authority (GAA) is seeking detailed strategic transport modelling for PSP 1053 (Thompsons Road), PSP 1054 (Clyde Creek), and PSP 1057A (Casey Fields South) (the Precincts). The modelling outputs of this consultancy, together with subsequent Sidra Analysis and Functional Layout Plans (FLP's) (the subject of future Requests for Quotation) will be major inputs into Infrastructure and Development Contributions Plans (DCP's) for the Precincts. Strategic Transport Modelling for the Precincts will be required to be undertaken for both interim and ultimate scenarios. The interim strategic transport modelling for 2026 will be used to inform the scope of infrastructure required to be constructed to support the development, such as the size of the intersections and number of lanes of an arterial road to be built. The ultimate strategic transport modelling for 2046 plus will inform the land requirements to enable the construction of ultimate infrastructure requirements - eg land required for future duplication of an arterial road, or if an additional turning lane will be needed at an intersection. The successful Consultant will be required to liaise closely with the GAA and relevant Council officers (and VicRoads officers as appropriate) to ensure the modelling has been undertaken utilising a satisfactory process as agreed with the GAA, in consultation with the Department of Transport (DoT). Subsequent to this strategic modelling project, GAA intends to seek consultants to run a Sidra analysis of a number of intersections in the Precincts. A separate RFQ will be issued for the Sidra analysis. An extract of turning volumes at all arterial/arterial and all connector/arterial intersections will be required as an output from this modelling work, for both interim and ultimate modelling years. This is to be made available to the GAA for use in subsequent consultancies. Further information may be required of the Consultant during the conduct of the Sidra analysis project. This is expected to be fairly limited in scope. The Consultant shall provide hourly rates in their quotation to undertake this additional work that is beyond the scope of this brief.
Background and Information to be provided by the GAA

Location

The GAA is managing the preparation of structure plans for the Precincts in partnership with Casey City Council. These precincts have been created as a result of the extension of the Urban Growth Boundary through Amendment V68 passed by the Victorian Government in July 2010. An extract from the South East Growth Corridor Plan is at Attachment 1 and the location of the Precincts within the South East Growth Corridor is shown in the plan at Attachment 2.

Clyde Creek PSP 1054 covers an area of approximately 1153 ha and is traversed by the natural water course Clyde Creek. This precinct is expected to support a residential community of approximately 15,000-17,000 dwellings and a Major Town Centre in association with a new Clyde Railway Station.

Casey Fields South PSP 1057A adjoins PSP 1054 to the west, and comprises that part of Precinct 1057 north of Ballarto Road. Precinct 1057A has an area of approximately 110 ha and is expected to support a residential community of approximately 1600 dwellings.

Thompsons Road PSP 1053 has been identified in the Melbourne South East Growth Corridor Plan (June 2012), as a mixed use residential and employment precinct. It covers an area of approximately 700 ha and is expected to support a residential community of approximately 5,000-7,000 dwellings in association with 180 ha of employment land and a Major Town Centre. Detailed planning in the PSP process will investigate the type of employment and industrial uses that are appropriate.

As identified in the Melbourne South East Growth Corridor Plan (June 2012), Thompsons Road will be planned to carry freight as a key function. The Thompsons Road Business Corridor will consequently have excellent freight access to the metropolitan area and the Port of Hastings.

Current Land Use

Most of the Precincts' areas are currently used for farming, as well as encompassing the existing Clyde township with a limited residential area.

Sub-regional Scale Transport Modelling

Sub-regional scale transport modelling at 2046, to a finer grain than the standard VITM modelling has already been undertaken (ie a study to disaggregate large zones and update road network and land use in South East Growth Corridor for Precincts 05, 11, 1053 and 1054) and will be provided to the Consultant.

The sub-regional transport modelling was undertaken based on the road network included in the Growth Corridor Plans.

More detailed planning for the Precincts has identified the need to modify the road network and update land uses. As a consequence the transport modelling for the Precincts needs to be updated and this is the primary purpose of this piece of work.

Land Use Planning

The Growth Areas Authority (GAA) is currently master planning for urban development of the Precincts and, whilst still subject to final planning processes and approvals, the proposed

development will be a mixture of residential land, employment land and town centres (including two major town centres).

To inform this project, the GAA has prepared a plan for the preliminary urban structure of the overall Clyde Creek area **(Attachment 3);** and a more detailed preliminary urban structure plan for Precincts 1053 and 1054 **(Attachment 4).** The plans interpret the outcomes of the previous pre-planning reports and address current growth area planning and objectives for these Precincts. They will be used as a basis for preparation of work under this contract, and may be subject to change depending on the outcomes of this project and other factors.

The GAA will brief the Consultant on the interpretation of the future urban structure plan for the Precincts and parameters for changing the distribution of land uses and altering the road network within the Precincts.

Purpose

3.1 Review of VITM

The VITM (Victorian Integrated Transport Model) for the South East Growth Corridor will be provided to the Consultant, and will be used as the basis for this consultancy.

The Consultant will:

- Review the model, particularly focussing on the area within the PSPs and surrounding the PSP for at least 1.6km.
- Consider the proposed road network in the model, including the proposed bus network.
- Consider and review the VITM transport zones and zone centroid links.
- Review the proposed land use form and proposed road network contained in the Precincts.
- Recommend adjustments/refinements to the South East Growth Corridor model to better reflect the current proposed PSP structure and ensure the surrounding road network reflects actual and proposed conditions as far as possible. Recommendations to improve the modelled bus network to service the precinct should also be made as part of this process.
- Agree the refinements with GAA, Council, VicRoads and DOT.
- Submit to GAA a written summary (2-3 pages) including discussion of the above work, outlining assumptions, assessment of previous modelling, etc. This will form the basis of the project report to be built upon in later stages.
- Revise the written summary following receipt of incorporated comments from GAA.

3.2 Transport Modelling

The Consultant must undertake interim and ultimate strategic transport modelling for the Precincts.

Ultimate Scenario Model (2046 plus)

One ultimate model scenario run will be undertaken.

Interim Scenario Model (2026)

The Consultant will provide for up to two interim model scenario runs (in addition to a base case) in their proposal. These should be costed as separate items as only one additional interim model scenario may be required.

The GAA will develop scenarios with the stakeholder group which will include network changes and land use adjustments. Scenarios may include combinations of e.g.

- reduced capacity on some arterials.
- bridges/overpasses not included.
- land use development in the PSP and surrounding areas, partially developed.

Methodology

The Consultant will use the full VITM South East Growth Corridor model (most current version) as the basis for the strategic transport modelling and will, for both interim and ultimate scenario model runs:

- Disaggregate and refine the model zones, update the land use demographics and the road network in accordance with the refinements agreed at Hold point 1 to better reflect the PSP structure. After the updated model zones have been agreed, land use demographic numbers will be provided to the consultant.
- Run VITM using the revised structure as agreed with the GAA in consultation with DoT.
- Produce appropriate speed plots, volume plots, zone and zone connection plots and network plots as required to enable a review by stakeholders.
- Prepare outputs for am peak, pm peak, inter-peak and off-peak and amalgamate to 24 hour, including midblock volumes for connectors and arterials and intersection turning volumes for intersections outlined in **Attachment 5** (Precincts 1053 and 1054) and for intersections in Precinct 1057A.
- Review the model traffic distribution and turning movements of intersections and adjust where necessary using sound engineering judgement to develop appropriate Sidra inputs (to be used in a separate RFQ). This review is to be done in collaboration with VicRoads, Council and GAA and the final movements agreed.
- Submit to GAA a report that discusses the assumptions made, the analysis undertaken and

assessments of the outputs, summarising the volumes and providing conclusions and recommendations regarding the transport network, including interim and ultimate scenarios.

- Revise the report following receipt of comments from GAA.
- Agree model outputs, conclusions and recommendations with GAA, Council, VicRoads and DOT.
- Allow for up to four iterations/revisions to model outputs in response to feedback from GAA and stakeholders.
- All outputs/plots to be provided in MapInfo and pdf formats (refer to Section 8 reporting requirements).

Modelling Outputs

The GAA requires modelling outputs that include:

- PSP – trips generated by mode, trips attracted by mode, through trips.
- Municipality – trips to/from PSP area by mode.
- Corridor – trips to/from PSP by mode.
- Regional – trips to/from PSP by mode.
- Select link analysis at 8 locations (to be nominated by the GAA).
- VKT measures – Municipality, Corridor.
- PT total mode share (to the extent this can be extracted from a sub-regional model).

3.3 Draft and Final Consolidated Report

The Consultant will prepare a draft consolidated report containing all of the outputs of the previous stages which will form the basis of a report for a potential Planning Panel.

The Consultant will be provided with feedback on the draft consolidated report from the GAA in the form of one consolidated list of comments incorporating the views of VicRoads, Council and DoT. The Consultant will be required to make all changes, or provide a written explanation of why changes were unable to be made.

Appendix B

Zone Disaggregation

Appendix B Zone Disaggregation

VITM Zones	SEGA Zones	SLA No.	SLA
877	877	12	Cardinia (S) - Pakenham
877	3034	12	Cardinia (S) - Pakenham
891	891	12	Cardinia (S) - Pakenham
891	3023	12	Cardinia (S) - Pakenham
1065	1065	17	Casey (C) - South
1065	3033	17	Casey (C) - South
2057	2057	15	Casey (C) - Cranbourne
2057	3064	15	Casey (C) - Cranbourne
2057	3065	15	Casey (C) - Cranbourne
2057	3066	15	Casey (C) - Cranbourne
2057	3067	15	Casey (C) - Cranbourne
2057	3068	15	Casey (C) - Cranbourne
2060	2060	15	Casey (C) - Cranbourne
2060	2973	15	Casey (C) - Cranbourne
2065	2065	15	Casey (C) - Cranbourne
2065	3062	15	Casey (C) - Cranbourne
2068	2068	15	Casey (C) - Cranbourne
2068	3060	15	Casey (C) - Cranbourne
2073	2073	15	Casey (C) - Cranbourne
2073	3054	15	Casey (C) - Cranbourne
2076	2076	15	Casey (C) - Cranbourne
2076	3012	15	Casey (C) - Cranbourne
2076	3057	15	Casey (C) - Cranbourne
2146	2146	12	Cardinia (S) - Pakenham
2146	3035	12	Cardinia (S) - Pakenham
2146	3036	12	Cardinia (S) - Pakenham
2146	3037	12	Cardinia (S) - Pakenham
2146	3038	12	Cardinia (S) - Pakenham
2178	2178	12	Cardinia (S) - Pakenham
2178	3026	12	Cardinia (S) - Pakenham
2178	3027	12	Cardinia (S) - Pakenham
2178	3028	12	Cardinia (S) - Pakenham
2178	3029	12	Cardinia (S) - Pakenham
2178	3030	12	Cardinia (S) - Pakenham
2178	3031	12	Cardinia (S) - Pakenham
2178	3039	12	Cardinia (S) - Pakenham
2178	3040	12	Cardinia (S) - Pakenham
2269	2269	12	Cardinia (S) - Pakenham
2269	3043	12	Cardinia (S) - Pakenham
2269	3044	12	Cardinia (S) - Pakenham

VITM Zones	SEGA Zones	SLA No.	SLA
2269	3045	12	Cardinia (S) - Pakenham
2270	2270	12	Cardinia (S) - Pakenham
2270	3032	12	Cardinia (S) - Pakenham
2274	2274	17	Casey (C) - South
2274	3063	17	Casey (C) - South
2319	2319	15	Casey (C) - Cranbourne
2319	3014	15	Casey (C) - Cranbourne
2371	2371	17	Casey (C) - South
2371	3015	17	Casey (C) - South
2371	3016	17	Casey (C) - South
2371	3017	17	Casey (C) - South
2373	2373	17	Casey (C) - South
2373	2976	17	Casey (C) - South
2374	2374	17	Casey (C) - South
2374	2998	17	Casey (C) - South
2374	2999	17	Casey (C) - South
2374	3000	17	Casey (C) - South
2374	3013	17	Casey (C) - South
2374	3055	17	Casey (C) - South
2374	3059	17	Casey (C) - South
2427	2427	15	Casey (C) - Cranbourne
2427	3053	15	Casey (C) - Cranbourne
2443	2443	17	Casey (C) - South
2443	3046	17	Casey (C) - South
2446	2446	15	Casey (C) - Cranbourne
2446	3056	15	Casey (C) - Cranbourne
2457	2457	12	Cardinia (S) - Pakenham
2457	3041	12	Cardinia (S) - Pakenham
2457	3042	12	Cardinia (S) - Pakenham
2753	2753	17	Casey (C) - South
2753	2991	17	Casey (C) - South
2753	2992	17	Casey (C) - South
2753	2993	17	Casey (C) - South
2753	2994	17	Casey (C) - South
2753	3009	17	Casey (C) - South
2753	3010	17	Casey (C) - South
2754	2754	17	Casey (C) - South
2754	3006	17	Casey (C) - South
2754	3007	17	Casey (C) - South
2754	3008	17	Casey (C) - South
2755	2755	17	Casey (C) - South
2755	3004	17	Casey (C) - South
2755	3005	17	Casey (C) - South

VITM Zones	SEGA Zones	SLA No.	SLA
2756	2756	17	Casey (C) - South
2756	3001	17	Casey (C) - South
2756	3002	17	Casey (C) - South
2756	3003	17	Casey (C) - South
2757	2757	17	Casey (C) - South
2757	2995	17	Casey (C) - South
2757	2996	17	Casey (C) - South
2757	2997	17	Casey (C) - South
2757	3011	17	Casey (C) - South
2758	2758	17	Casey (C) - South
2758	3058	17	Casey (C) - South
2759	2759	17	Casey (C) - South
2759	2988	17	Casey (C) - South
2759	2989	17	Casey (C) - South
2759	2990	17	Casey (C) - South
2759	3049	17	Casey (C) - South
2760	2760	17	Casey (C) - South
2760	2961	17	Casey (C) - South
2760	2962	17	Casey (C) - South
2761	2761	17	Casey (C) - South
2761	2960	17	Casey (C) - South
2761	2974	17	Casey (C) - South
2761	2975	17	Casey (C) - South
2762	2762	17	Casey (C) - South
2762	2987	17	Casey (C) - South
2762	3025	17	Casey (C) - South
2762	3051	17	Casey (C) - South
2762	3052	17	Casey (C) - South
2762	3069	15	Casey (C) - Cranbourne
2763	2763	17	Casey (C) - South
2763	2984	17	Casey (C) - South
2763	3050	17	Casey (C) - South
2764	2764	17	Casey (C) - South
2764	2963	17	Casey (C) - South
2764	2964	17	Casey (C) - South
2764	2983	17	Casey (C) - South
2764	3048	17	Casey (C) - South
2765	2765	17	Casey (C) - South
2765	2977	17	Casey (C) - South
2765	2978	17	Casey (C) - South
2765	2979	17	Casey (C) – South
2765	2980	17	Casey (C) – South
2765	2981	17	Casey (C) – South

VITM Zones	SEGA Zones	SLA No.	SLA
2765	2982	17	Casey (C) – South
2766	2766	17	Casey (C) – South
2766	2986	17	Casey (C) – South
2766	3021	17	Casey (C) – South
2766	3022	17	Casey (C) – South
2766	3024	17	Casey (C) – South
2767	2767	17	Casey (C) – South
2767	2967	17	Casey (C) – South
2767	2985	17	Casey (C) – South
2767	3020	17	Casey (C) – South
2767	3047	17	Casey (C) – South
2767	3061	17	Casey (C) – South
2768	2768	17	Casey (C) – South
2768	2965	17	Casey (C) – South
2768	2966	17	Casey (C) – South
2769	2769	17	Casey (C) – South
2769	2968	17	Casey (C) – South
2769	2969	17	Casey (C) – South
2769	2970	17	Casey (C) – South
2769	2971	17	Casey (C) – South
2769	2972	17	Casey (C) – South
2770	2770	17	Casey (C) – South
2770	3018	17	Casey (C) – South
2770	3019	17	Casey (C) – South

Appendix C

Demographics

Appendix C Demographics

Ultimate Scenario

Figure 21 Ultimate scenario households for study area

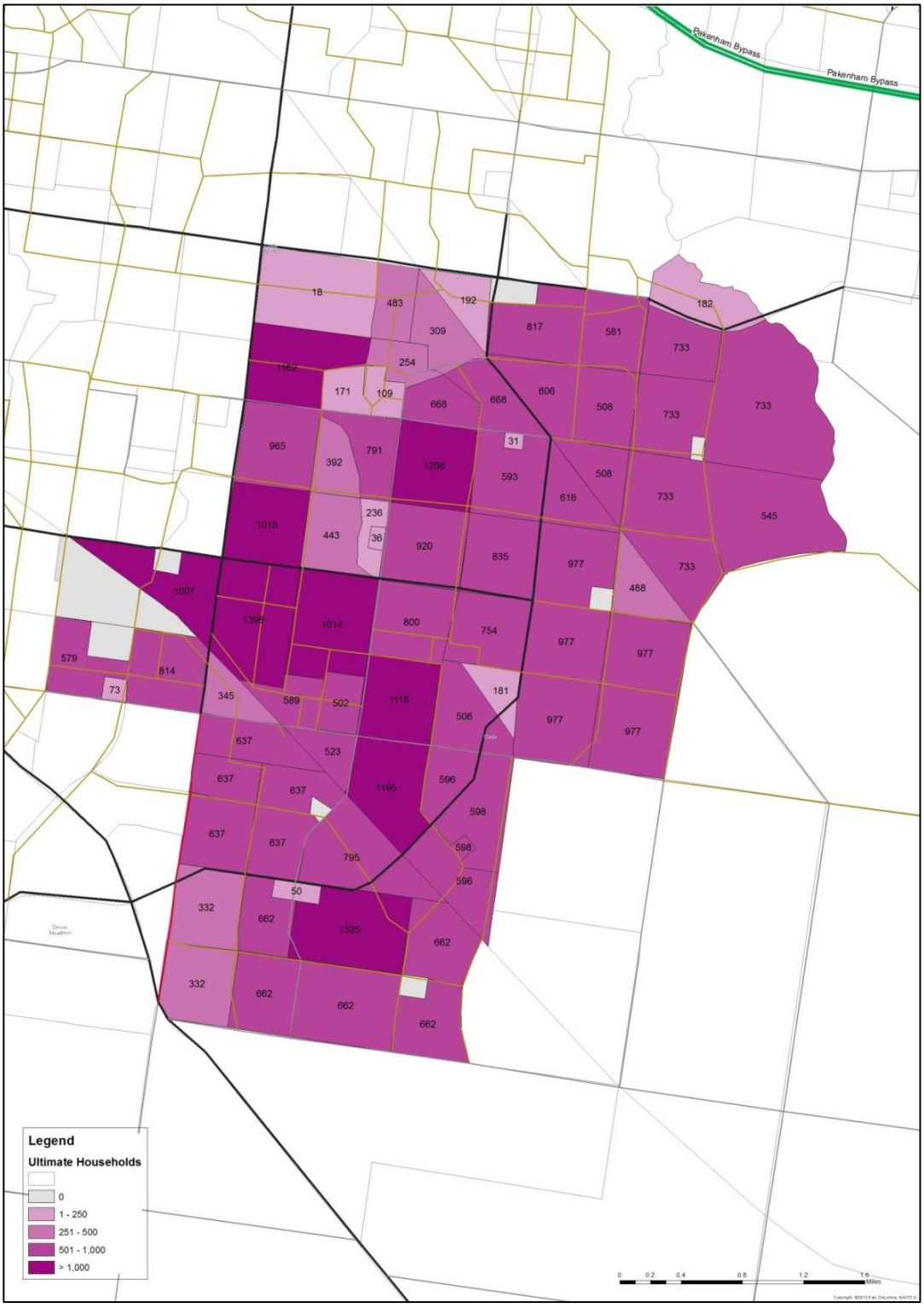


Figure 22 Ultimate scenario households for Casey-Cardinia corridor

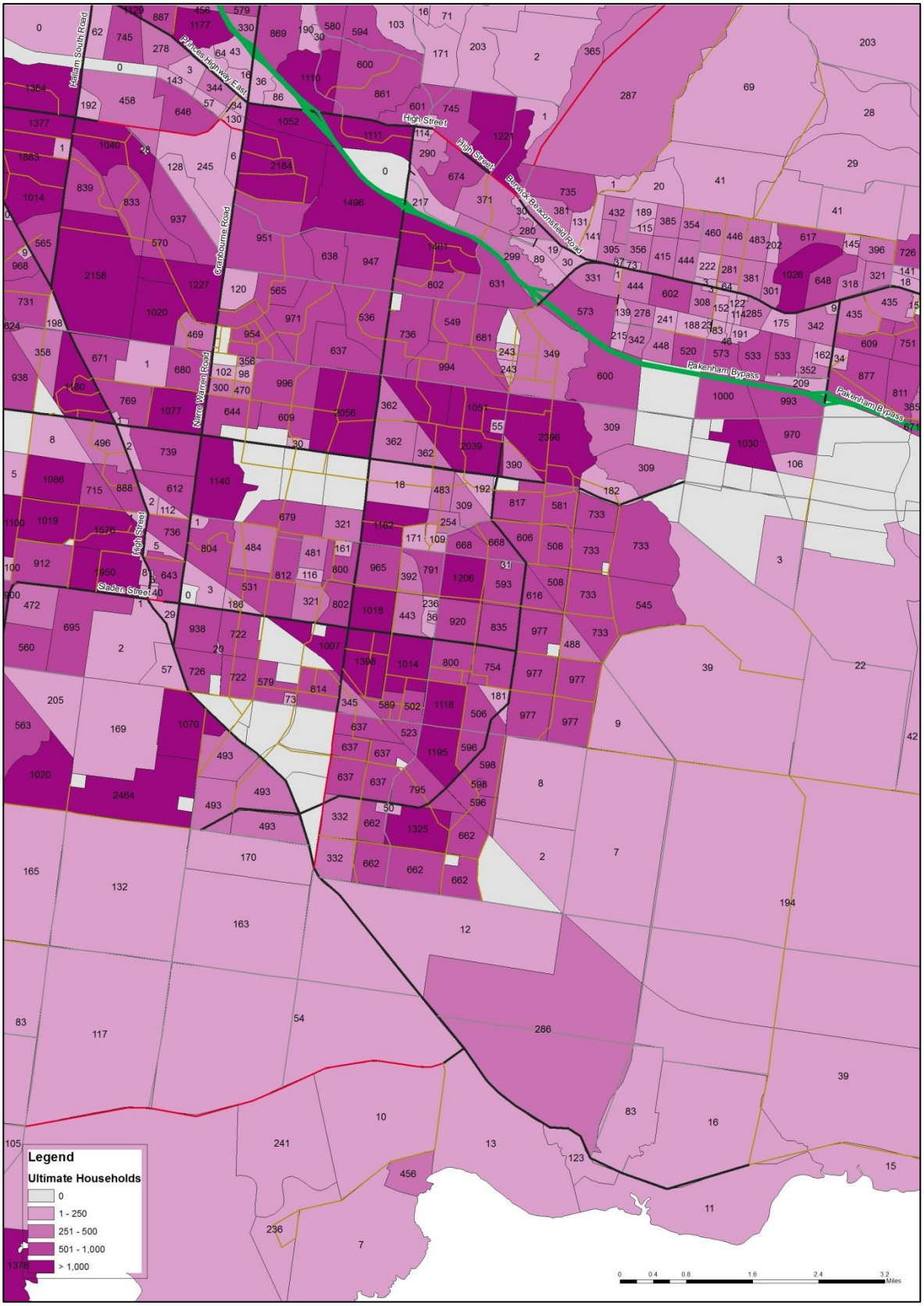


Figure 23 Ultimate scenario total employment for study area

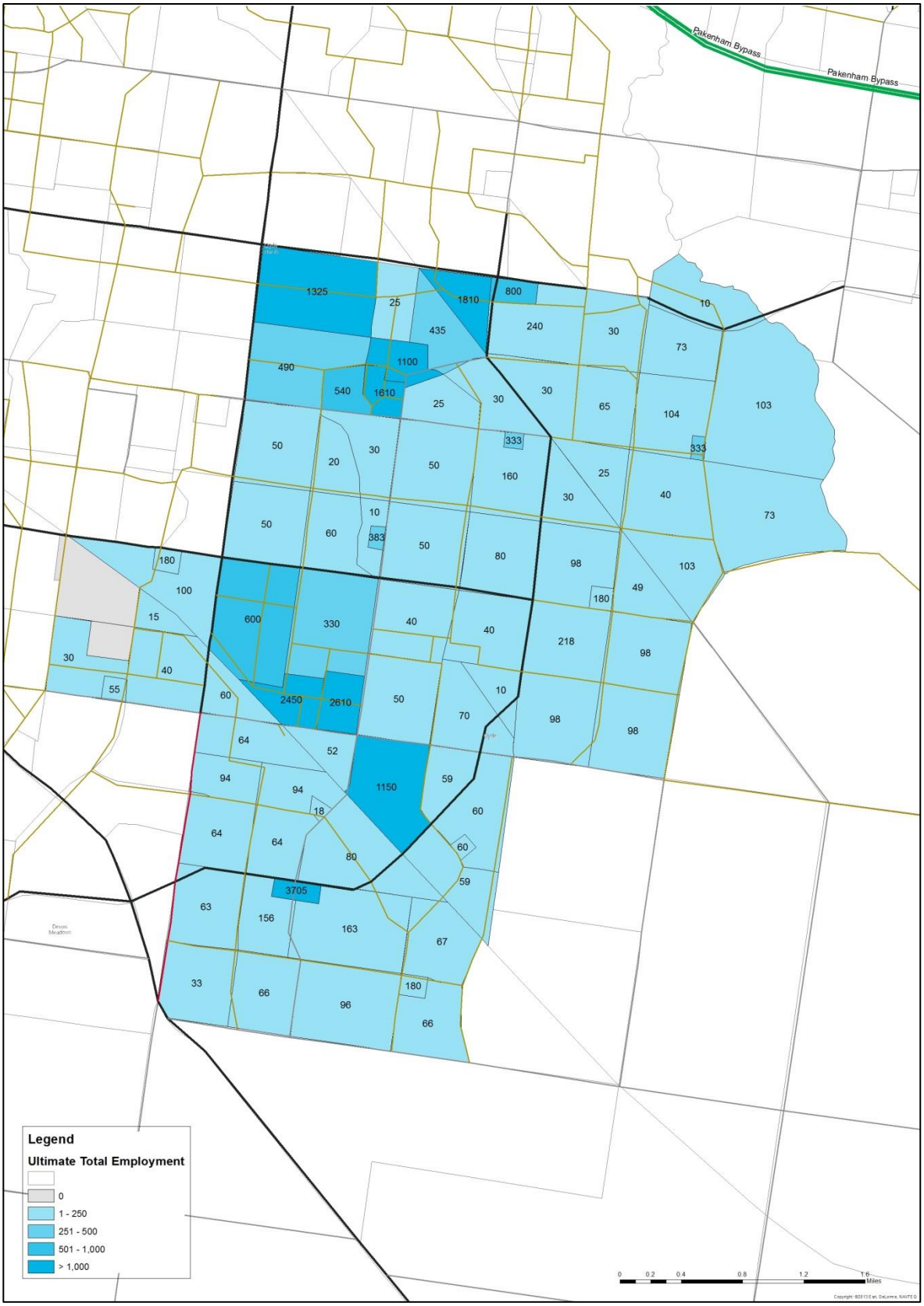


Figure 24 Ultimate scenario total employment for Casey-Cardinia corridor

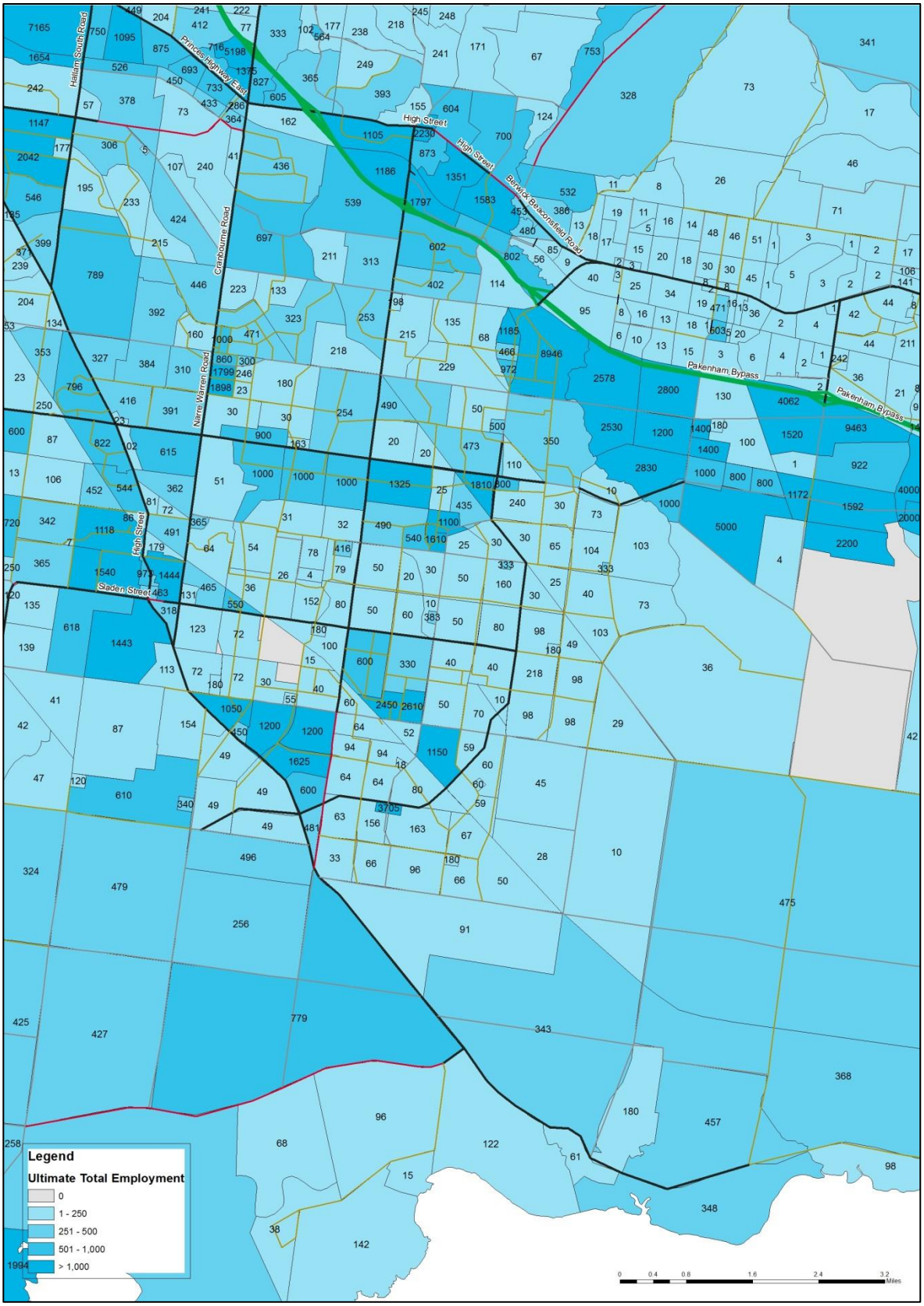


Figure 25 Ultimate scenario Total enrolments for study area

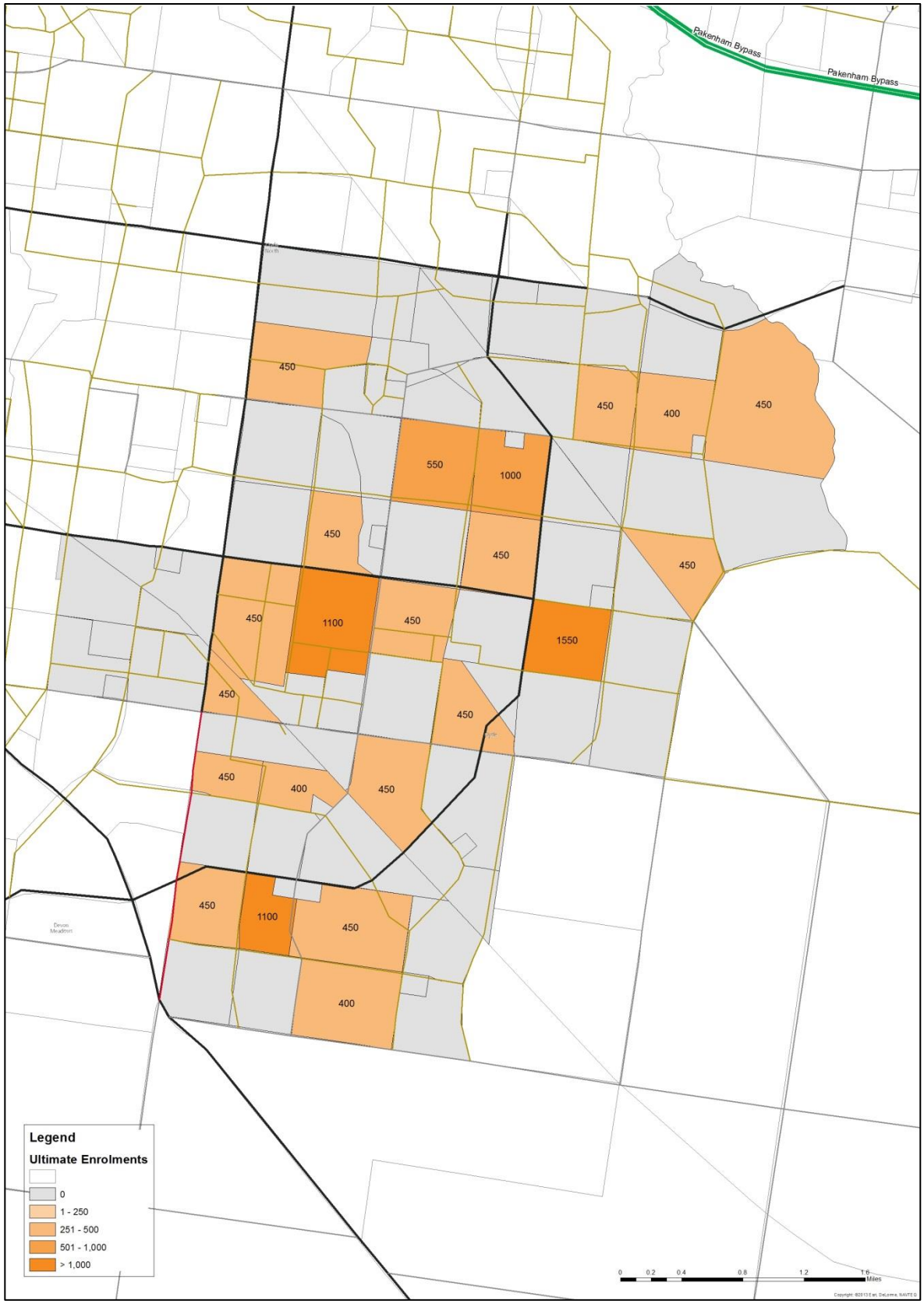
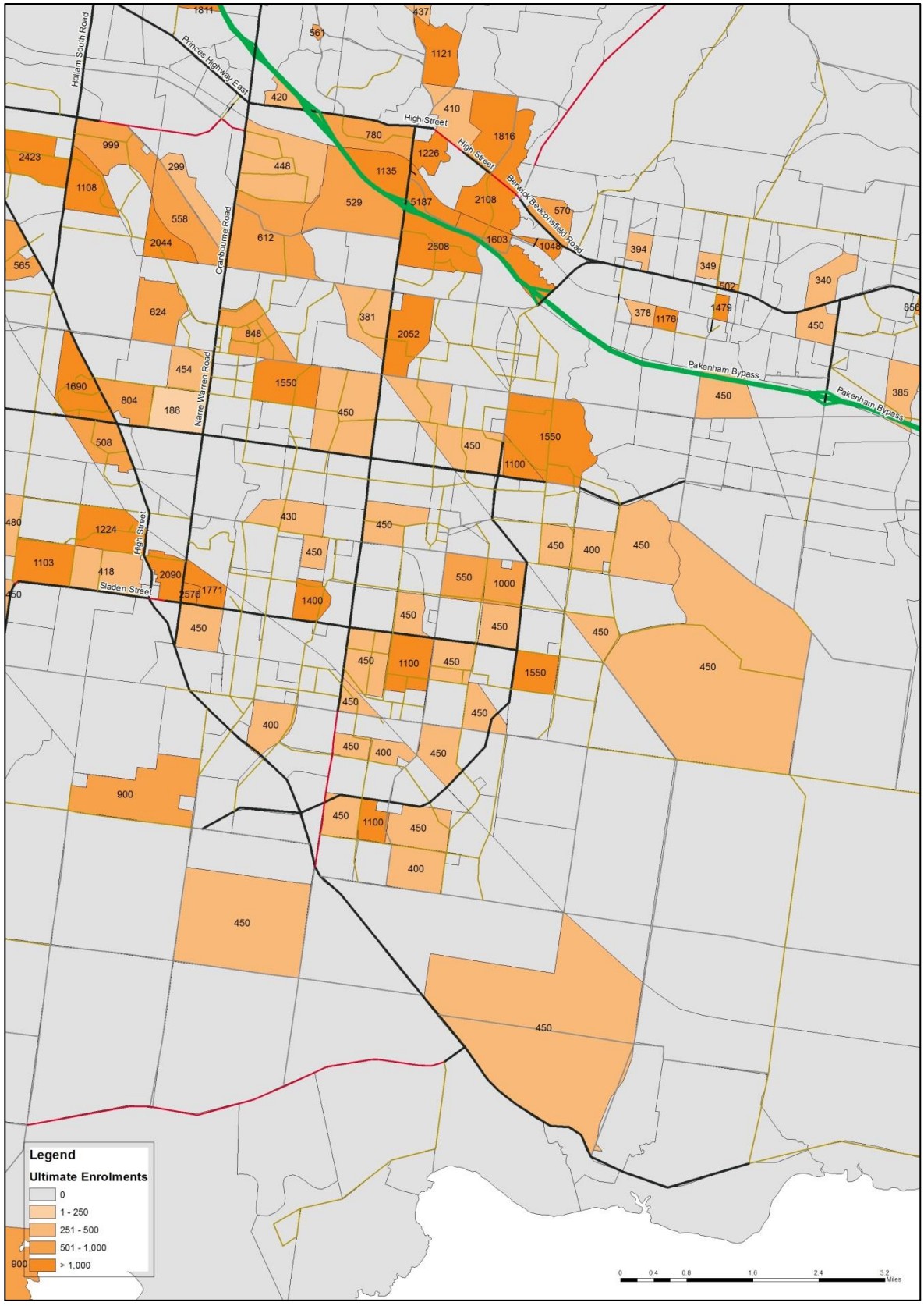


Figure 26 Ultimate scenario Total enrolments for Casey-Cardinia corridor



Interim Scenario

Figure 27 Interim scenario households for study area

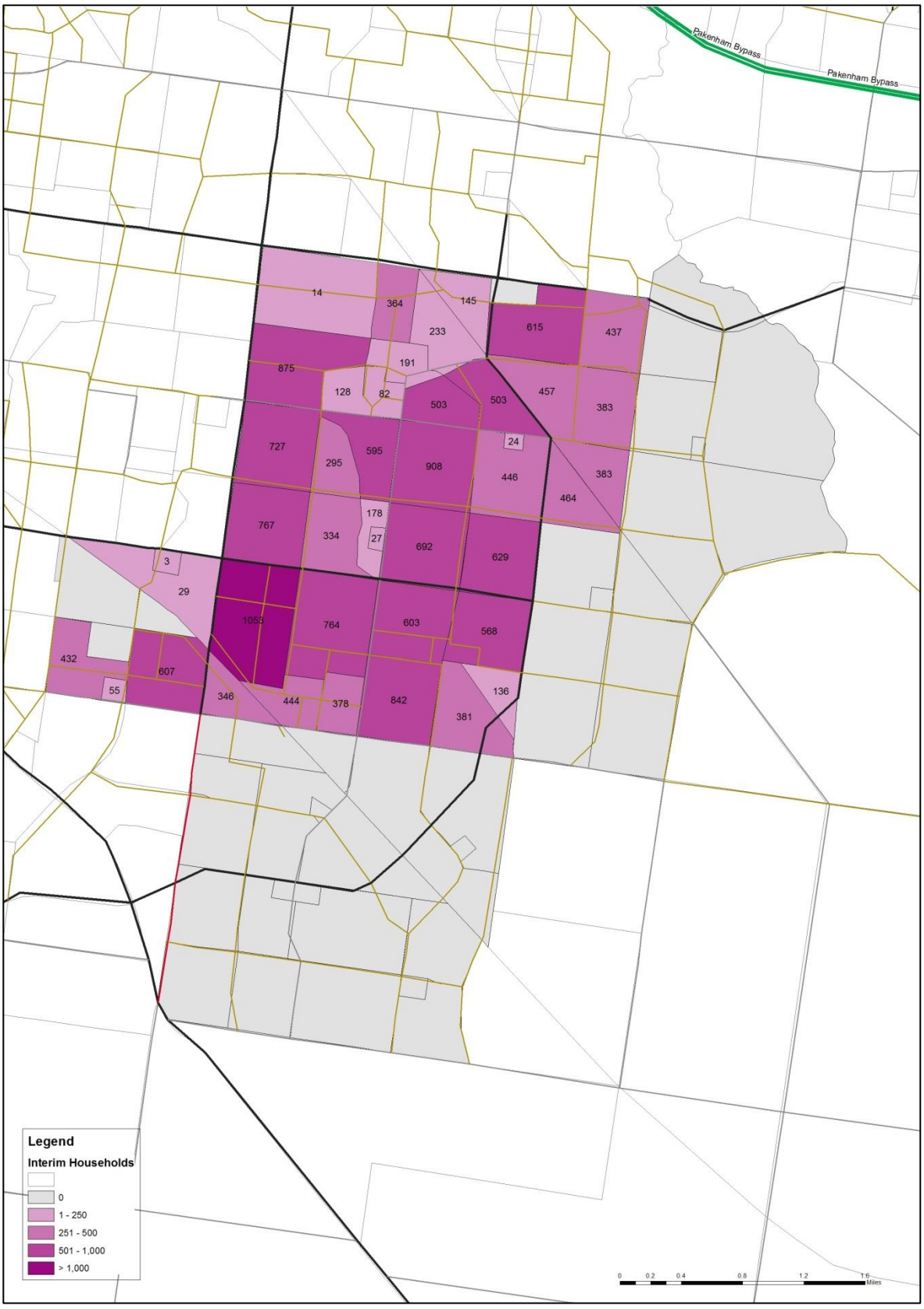


Figure 28 Interim scenario households for Casey-Cardinia corridor

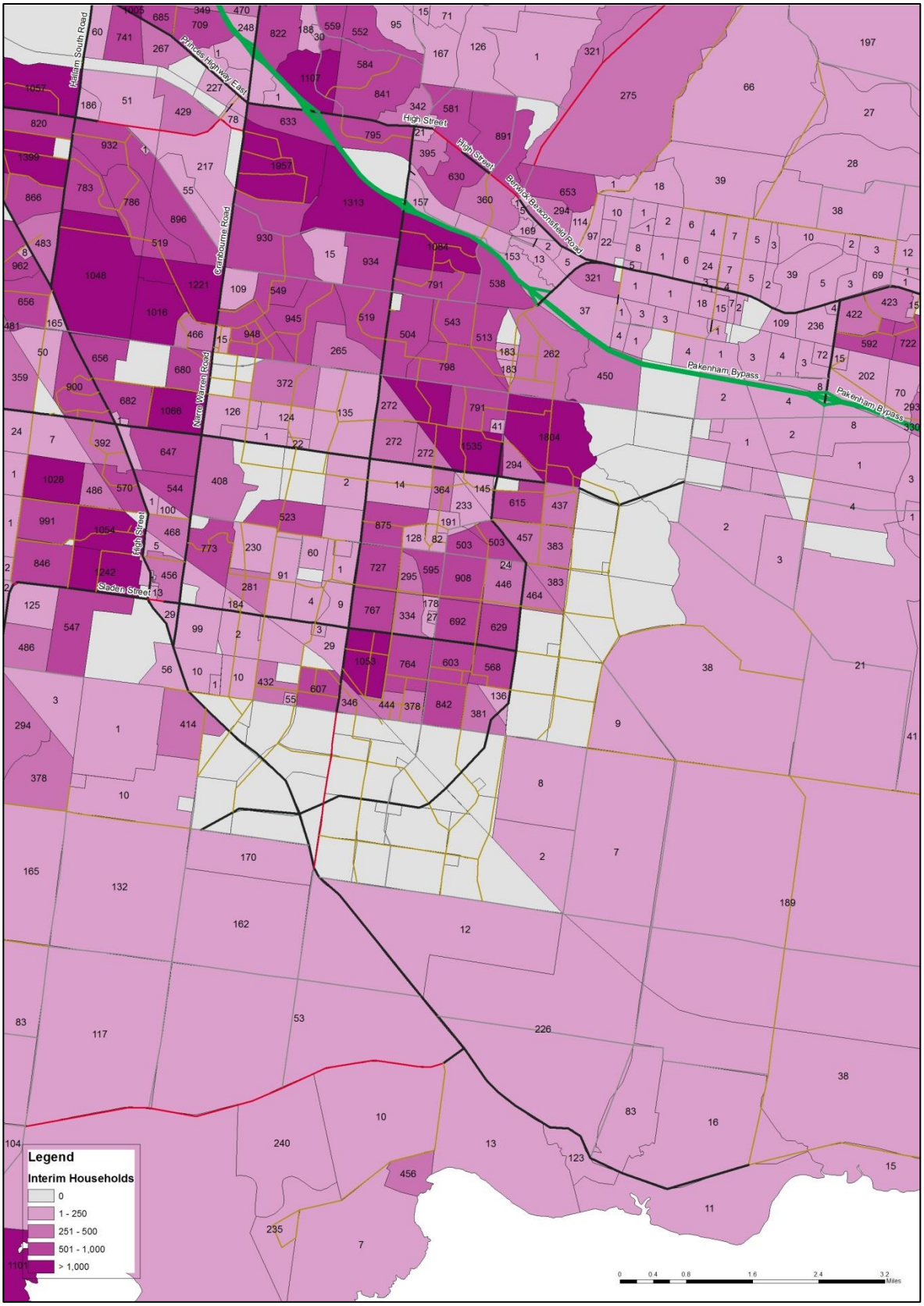


Figure 29 Interim scenario total employment for study area

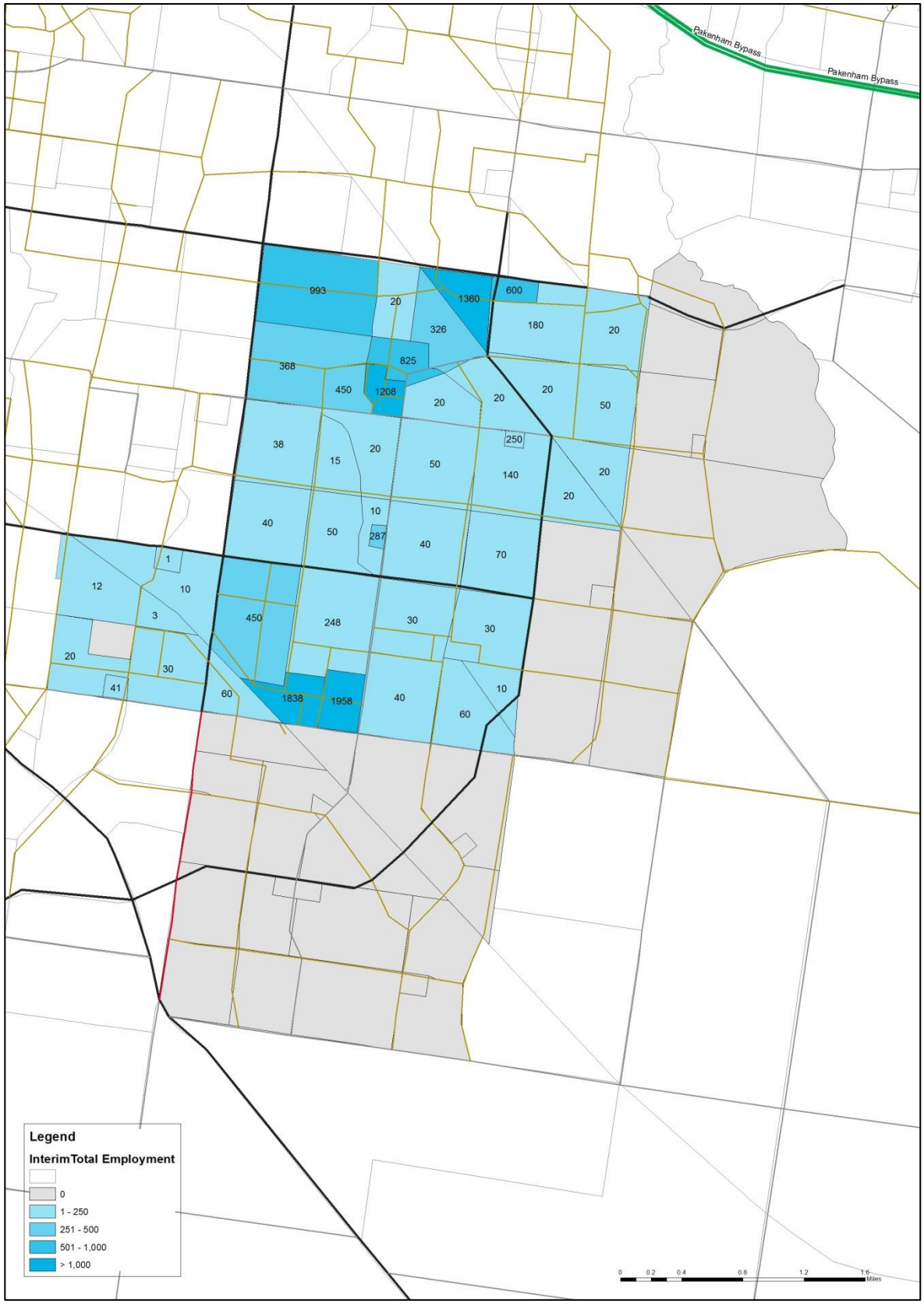


Figure 30 Interim scenario total employment for Casey-Cardinia corridor

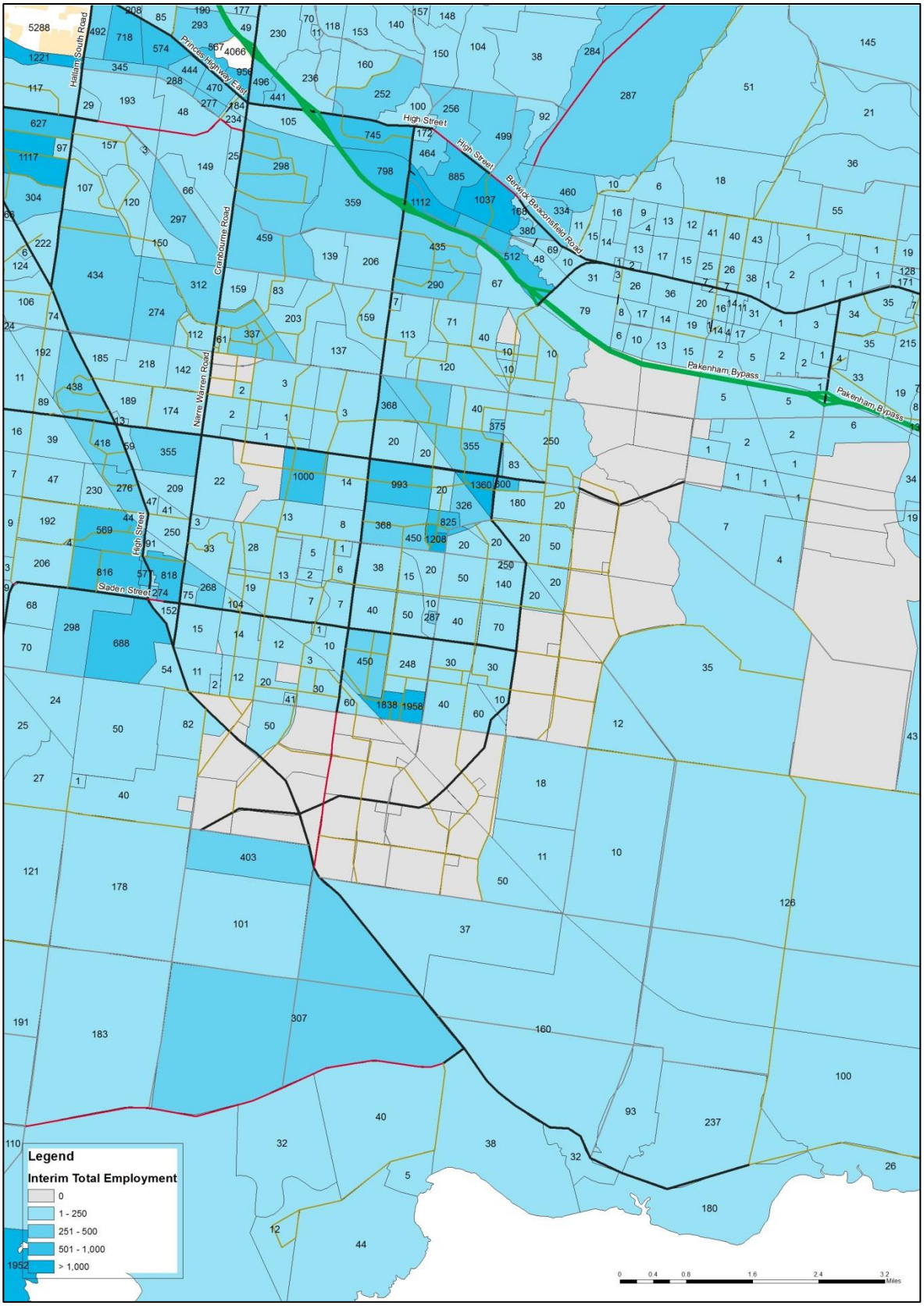


Figure 31 Interim scenario total enrolments for study area

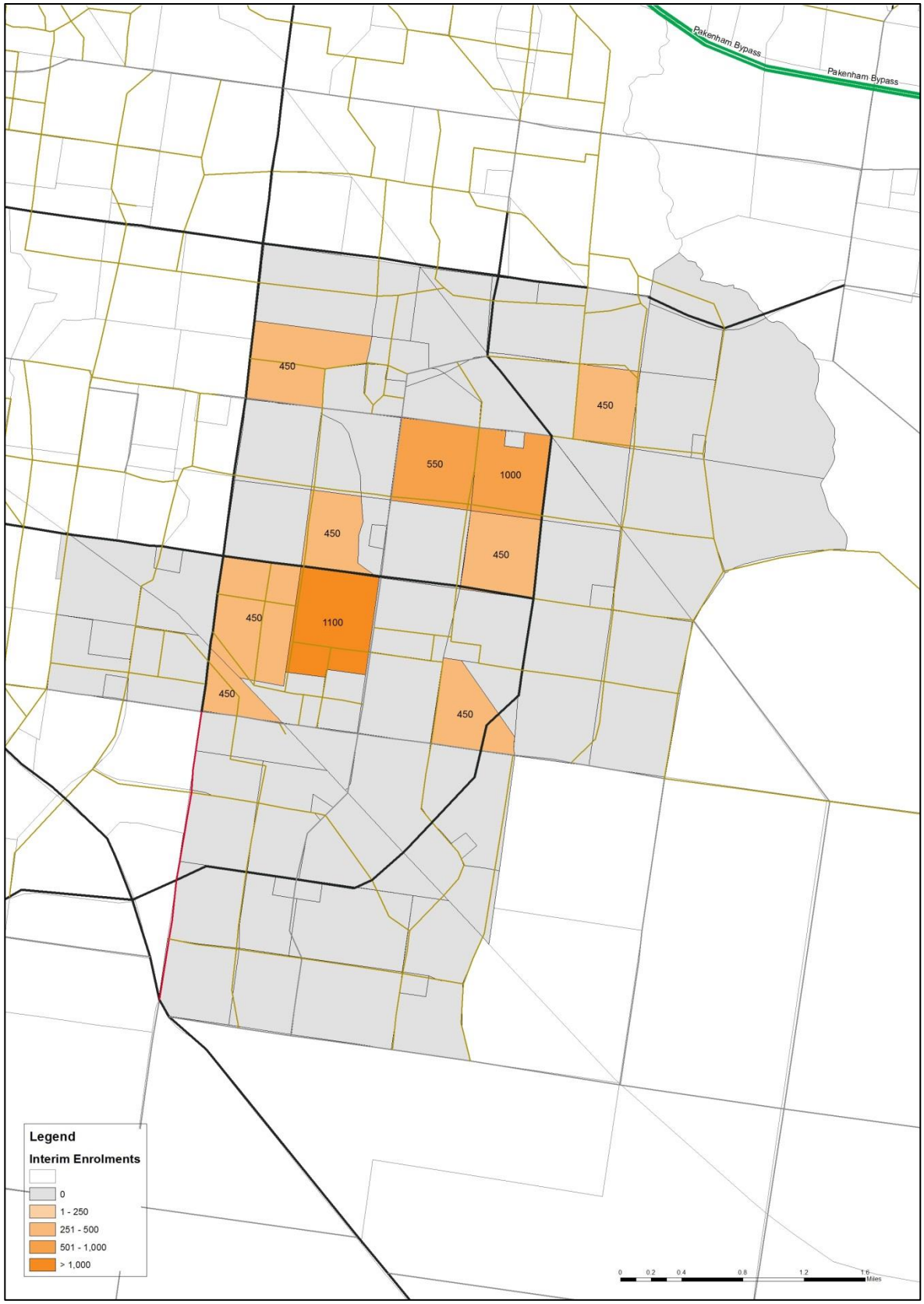
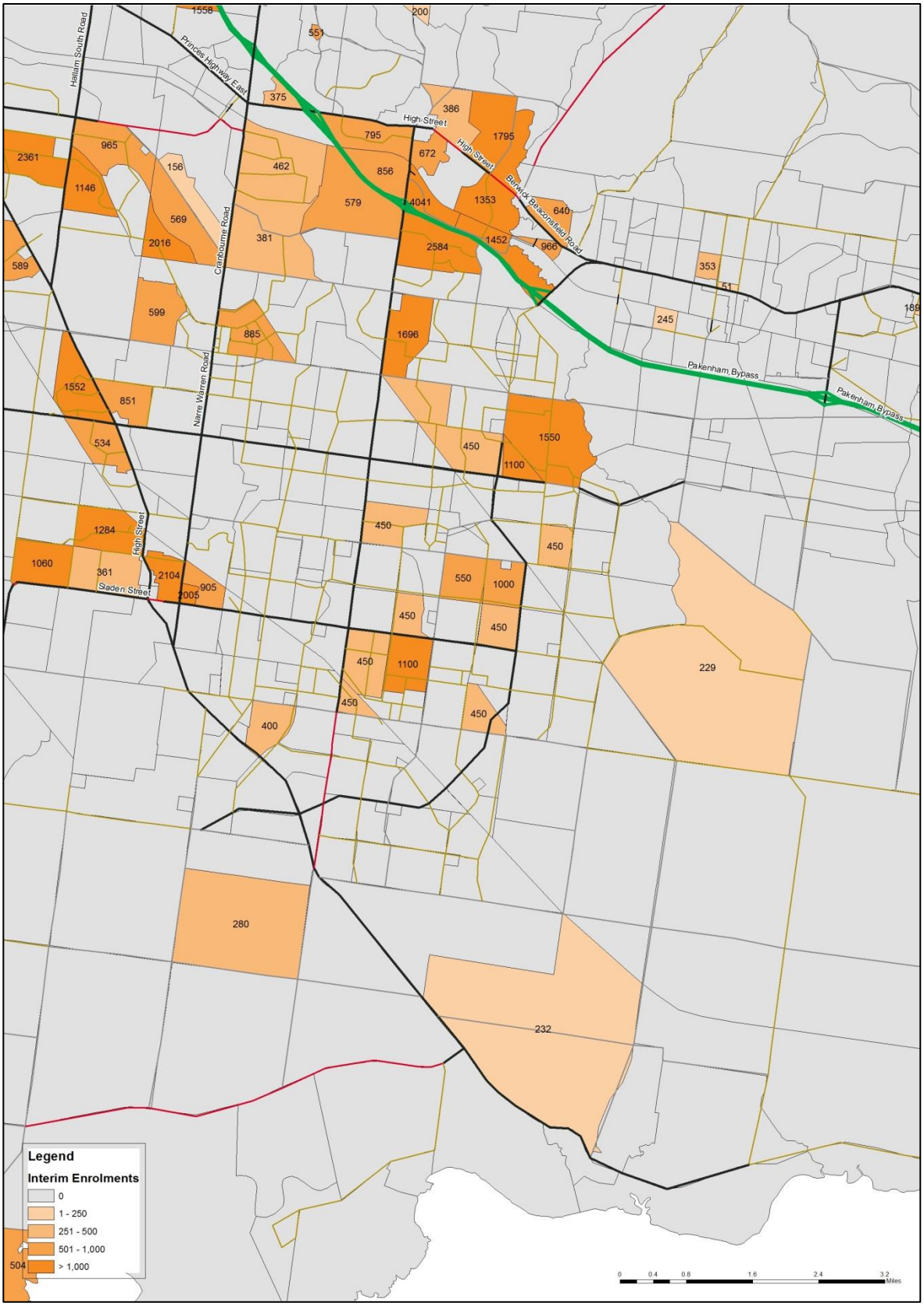


Figure 32 Interim scenario total enrolments for Casey-Cardinia corridor



Appendix D

Turning movements

Appendix D Turning movements

This section shows the adjusted turning movements provided for subsequent SIDRA analysis. Figure 33 shows the turning movement intersection zone numbers and the following figures show the average 2-hour AM and PM period adjusted turning movements associated with these intersections.

Figure 33 Turning movement intersection zone numbers

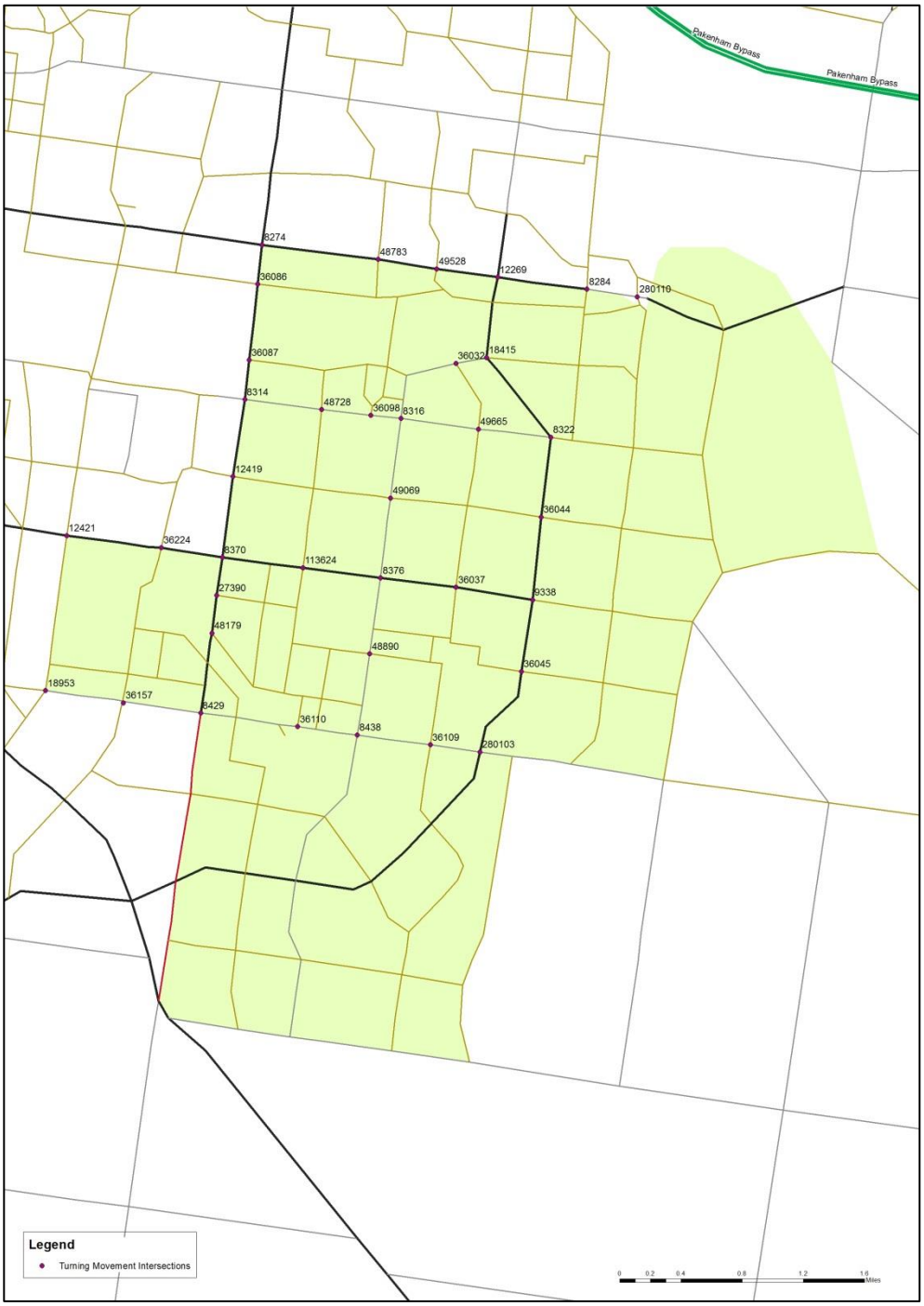


Table 6 Ultimate scenario turning movement for the peak periods

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
8274	North	Left	279	392
8274	North	Through	1,702	2,552
8274	North	Right	627	828
8274	South	Left	1,274	603
8274	South	Through	2,883	2,674
8274	South	Right	1,324	981
8274	East	Left	1,122	1,172
8274	East	Through	3,758	2,878
8274	East	Right	396	340
8274	West	Left	649	816
8274	West	Through	3,052	2,978
8274	West	Right	776	694
8284	North	Left	375	429
8284	North	Through	159	242
8284	North	Right	439	402
8284	South	Left	332	222
8284	South	Through	254	190
8284	South	Right	627	444
8284	East	Left	303	602
8284	East	Through	2,424	3,287
8284	East	Right	422	421
8284	West	Left	345	518
8284	West	Through	2,757	3,755
8284	West	Right	159	341
8314	North	Left	306	1,109
8314	North	Through	2,969	3,450
8314	North	Right	255	321
8314	South	Left	111	153
8314	South	Through	4,369	3,527
8314	South	Right	289	291
8314	East	Left	323	299
8314	East	Through	146	327
8314	East	Right	1,187	308
8314	West	Left	331	396
8314	West	Through	121	767
8314	West	Right	104	408

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
8316	North	Left	86	249
8316	North	Through	567	1,011
8316	North	Right	94	175
8316	South	Left	494	128
8316	South	Through	710	892
8316	South	Right	51	134
8316	East	Left	61	124
8316	East	Through	788	300
8316	East	Right	157	193
8316	West	Left	77	140
8316	West	Through	228	1,062
8316	West	Right	99	541
8322	North	Left	64	266
8322	North	Through	1,407	2,217
8322	North	Right	48	33
8322	South	Left	569	215
8322	South	Through	2,381	2,258
8322	South	Right	868	950
8322	East	Left	595	1,009
8322	East	Through	91	131
8322	East	Right	128	96
8322	West	Left	33	60
8322	West	Through	96	163
8322	West	Right	130	661
8370	North	Left	500	616
8370	North	Through	1,800	1,544
8370	North	Right	915	1,223
8370	South	Left	715	769
8370	South	Through	1,866	2,001
8370	South	Right	164	394
8370	East	Left	255	277
8370	East	Through	2,257	1,707
8370	East	Right	837	504
8370	West	Left	833	1,224
8370	West	Through	1,149	2,734
8370	West	Right	536	707
8376	North	Left	42	86

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
8376	North	Through	335	753
8376	North	Right	589	705
8376	South	Left	746	524
8376	South	Through	634	456
8376	South	Right	51	139
8376	East	Left	87	99
8376	East	Through	1,669	1,231
8376	East	Right	49	64
8376	West	Left	455	770
8376	West	Through	871	2,072
8376	West	Right	399	731
8429	North	Left	622	424
8429	North	Through	1,489	1,317
8429	North	Right	235	249
8429	South	Left	12	32
8429	South	Through	1,536	1,686
8429	South	Right	171	377
8429	East	Left	207	348
8429	East	Through	173	231
8429	East	Right	639	641
8429	West	Left	113	434
8429	West	Through	131	395
8429	West	Right	9	24
8438	North	Left	206	725
8438	North	Through	434	551
8438	North	Right	89	117
8438	South	Left	116	160
8438	South	Through	488	535
8438	South	Right	98	104
8438	East	Left	79	139
8438	East	Through	47	413
8438	East	Right	636	339
8438	West	Left	95	126
8438	West	Through	266	233
8438	West	Right	95	193
9338	North	Left	369	403
9338	North	Through	1,272	2,349

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
9338	North	Right	474	480
9338	South	Left	342	246
9338	South	Through	2,078	2,332
9338	South	Right	98	197
9338	East	Left	139	165
9338	East	Through	583	488
9338	East	Right	486	367
9338	West	Left	391	533
9338	West	Through	384	815
9338	West	Right	156	429
12269	North	Left	230	444
12269	North	Through	1,933	2,892
12269	North	Right	1,727	928
12269	South	Left	596	674
12269	South	Through	3,397	2,406
12269	South	Right	606	1,299
12269	East	Left	461	1,004
12269	East	Through	2,300	2,558
12269	East	Right	433	348
12269	West	Left	1,510	602
12269	West	Through	2,424	2,871
12269	West	Right	512	617
12419	North	Left	344	755
12419	North	Through	2,671	2,875
12419	North	Right	380	527
12419	South	Left	187	276
12419	South	Through	3,190	3,096
12419	South	Right	159	359
12419	East	Left	347	252
12419	East	Through	170	156
12419	East	Right	935	451
12419	West	Left	645	424
12419	West	Through	98	189
12419	West	Right	198	256
12421	North	Left	4	52
12421	North	Through	44	94
12421	North	Right	156	163

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
12421	South	Left	173	97
12421	South	Through	40	92
12421	South	Right	138	33
12421	East	Left	142	43
12421	East	Through	4,010	3,636
12421	East	Right	8	49
12421	West	Left	92	188
12421	West	Through	2,338	4,779
12421	West	Right	88	74
18415	North	Left	196	494
18415	North	Through	1,360	2,311
18415	North	Right	1,251	1,863
18415	South	Left	77	79
18415	South	Through	2,390	2,206
18415	South	Right	75	129
18415	East	Left	110	101
18415	East	Through	229	262
18415	East	Right	485	288
18415	West	Left	1,836	1,739
18415	West	Through	151	330
18415	West	Right	49	103
18953	North	Left	23	15
18953	North	Through	197	135
18953	North	Right	67	82
18953	South	Left	0	0
18953	South	Through	136	191
18953	South	Right	84	264
18953	East	Left	92	159
18953	East	Through	137	360
18953	East	Right	9	29
18953	West	Left	80	123
18953	West	Through	260	549
18953	West	Right	0	0
25358	North	Left	112	70
25358	North	Through	2,685	4,356
25358	North	Right	108	88
25358	South	Left	142	91

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
25358	South	Through	4,481	4,037
25358	South	Right	87	105
25358	East	Left	47	148
25358	East	Through	6	16
25358	East	Right	49	111
25358	West	Left	68	231
25358	West	Through	7	15
25358	West	Right	74	165
27390	North	Left	0	115
27390	North	Through	2,591	2,413
27390	South	Through	2,744	3,164
27390	South	Right	175	274
27390	East	Left	200	220
27390	East	Right	0	0
36032	South	Left	36	35
36032	South	Right	1,046	648
36032	East	Left	513	847
36032	East	Through	1,044	1,357
36032	West	Through	990	1,524
36032	West	Right	16	52
36037	North	Left	57	49
36037	North	Through	123	141
36037	North	Right	379	344
36037	South	Left	200	138
36037	South	Through	121	142
36037	South	Right	222	175
36037	East	Left	139	241
36037	East	Through	1,226	912
36037	East	Right	34	62
36037	West	Left	232	496
36037	West	Through	651	1,553
36037	West	Right	80	248
36044	North	Left	417	905
36044	North	Through	1,546	2,709
36044	North	Right	169	273
36044	South	Left	213	192
36044	South	Through	2,512	2,577

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
36044	South	Right	230	462
36044	East	Left	411	335
36044	East	Through	205	175
36044	East	Right	1,005	644
36044	West	Left	301	203
36044	West	Through	117	186
36044	West	Right	157	188
36045	North	Left	301	659
36045	North	Through	1,181	2,123
36045	North	Right	85	162
36045	South	Left	51	126
36045	South	Through	1,628	2,251
36045	South	Right	351	539
36045	East	Left	424	424
36045	East	Through	78	97
36045	East	Right	692	413
36045	West	Left	198	110
36045	West	Through	95	90
36045	West	Right	96	88
36086	North	Left	107	63
36086	North	Through	3,419	4,323
36086	North	Right	73	32
36086	South	Left	130	57
36086	South	Through	5,408	4,045
36086	South	Right	105	109
36086	East	Left	51	129
36086	East	Through	6	11
36086	East	Right	46	122
36086	West	Left	27	92
36086	West	Through	4	19
36086	West	Right	40	152
36087	North	Left	257	441
36087	North	Through	3,252	4,163
36087	South	Through	5,218	3,863
36087	South	Right	268	368
36087	East	Left	278	317
36087	East	Right	425	348

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
36091	South	Left	117	160
36091	South	Right	730	1,128
36091	East	Left	751	1,075
36091	East	Through	328	316
36091	West	Through	276	448
36091	West	Right	105	206
36098	North	Left	32	85
36098	North	Right	286	565
36098	East	Through	1,322	541
36098	East	Right	53	62
36098	West	Left	391	444
36098	West	Through	372	1,658
36105	North	Left	0	0
36105	North	Right	82	263
36105	East	Through	352	633
36105	East	Right	0	0
36105	West	Left	108	211
36105	West	Through	370	603
36109	North	Left	98	116
36109	North	Through	158	189
36109	North	Right	54	78
36109	South	Left	417	430
36109	South	Through	181	208
36109	South	Right	420	342
36109	East	Left	320	360
36109	East	Through	292	382
36109	East	Right	110	136
36109	West	Left	57	89
36109	West	Through	233	427
36109	West	Right	280	545
36110	North	Left	155	426
36110	North	Right	163	355
36110	East	Through	169	579
36110	East	Right	265	316
36110	West	Left	221	280
36110	West	Through	324	387
36157	North	Left	14	28

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
36157	North	Through	113	66
36157	North	Right	65	63
36157	South	Left	68	217
36157	South	Through	34	101
36157	South	Right	129	290
36157	East	Left	303	164
36157	East	Through	104	268
36157	East	Right	14	80
36157	West	Left	43	183
36157	West	Through	111	535
36157	West	Right	212	110
36215	North	Through	2,130	1,799
36215	North	Right	167	280
36215	South	Left	113	195
36215	South	Through	2,176	2,566
36215	West	Left	304	219
36215	West	Right	216	190
36217	North	Left	59	83
36217	North	Through	215	127
36217	South	Through	187	171
36217	South	Right	37	172
36217	East	Left	72	105
36217	East	Right	164	51
36224	North	Left	275	331
36224	North	Through	76	120
36224	North	Right	458	405
36224	South	Left	376	292
36224	South	Through	112	120
36224	South	Right	273	295
36224	East	Left	201	324
36224	East	Through	3,326	3,032
36224	East	Right	360	344
36224	West	Left	333	462
36224	West	Through	1,970	4,039
36224	West	Right	177	362
48179	North	Left	494	554
48179	North	Through	2,297	2,079

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
48179	South	Through	2,479	2,784
48179	South	Right	0	0
48179	East	Left	0	0
48179	East	Right	440	654
48728	North	Left	25	51
48728	North	Through	30	77
48728	North	Right	41	71
48728	South	Left	110	72
48728	South	Through	49	60
48728	South	Right	125	144
48728	East	Left	75	282
48728	East	Through	1,504	791
48728	East	Right	28	33
48728	West	Left	49	79
48728	West	Through	613	1,908
48728	West	Right	54	180
48783	North	Left	81	105
48783	North	Through	79	133
48783	North	Right	461	324
48783	South	Left	317	240
48783	South	Through	62	135
48783	South	Right	17	56
48783	East	Left	49	28
48783	East	Through	4,499	3,826
48783	East	Right	41	128
48783	West	Left	239	161
48783	West	Through	4,229	3,900
48783	West	Right	187	289
48843	North	Through	499	863
48843	North	Right	374	417
48843	South	Left	387	385
48843	South	Through	831	615
48843	West	Left	218	579
48843	West	Right	231	530
48890	North	Left	182	442
48890	North	Through	623	1,021
48890	North	Right	28	20

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
48890	South	Left	115	81
48890	South	Through	848	876
48890	South	Right	86	237
48890	East	Left	186	163
48890	East	Through	51	38
48890	East	Right	422	264
48890	West	Left	19	24
48890	West	Through	30	46
48890	West	Right	64	97
49069	North	Left	83	256
49069	North	Through	514	1,099
49069	North	Right	130	321
49069	South	Left	118	273
49069	South	Through	825	771
49069	South	Right	150	259
49069	East	Left	226	191
49069	East	Through	127	180
49069	East	Right	189	120
49069	West	Left	242	263
49069	West	Through	167	165
49069	West	Right	251	192
49528	North	Left	171	188
49528	North	Through	28	57
49528	North	Right	90	57
49528	South	Left	148	15
49528	South	Through	23	45
49528	South	Right	102	172
49528	East	Left	82	223
49528	East	Through	4,398	3,752
49528	East	Right	142	186
49528	West	Left	44	84
49528	West	Through	4,128	3,888
49528	West	Right	156	90
49665	North	Left	105	98
49665	North	Through	415	494
49665	North	Right	200	166
49665	South	Left	265	255

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
49665	South	Through	573	428
49665	South	Right	42	49
49665	East	Left	33	58
49665	East	Through	541	196
49665	East	Right	61	120
49665	West	Left	96	342
49665	West	Through	106	662
49665	West	Right	163	441
113623	North	Left	147	266
113623	North	Through	674	1,316
113623	South	Through	1,187	936
113623	South	Right	103	229
113623	East	Left	159	167
113623	East	Right	244	183
113624	North	Left	134	159
113624	North	Through	87	108
113624	North	Right	184	168
113624	South	Left	352	274
113624	South	Through	73	116
113624	South	Right	266	431
113624	East	Left	380	358
113624	East	Through	2,496	1,927
113624	East	Right	128	175
113624	West	Left	135	227
113624	West	Through	1,325	2,983
113624	West	Right	266	356
280103	North	Left	117	204
280103	North	Through	1,051	1,776
280103	North	Right	532	654
280103	South	Left	0	0
280103	South	Through	1,160	2,070
280103	South	Right	81	300
280103	East	Left	163	187
280103	East	Through	191	224
280103	East	Right	240	209
280103	West	Left	630	638
280103	West	Through	121	247

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
280103	West	Right	0	0
280110	North	Left	0	30
280110	North	Through	0	11
280110	North	Right	0	0
280110	South	Left	568	363
280110	South	Through	0	3
280110	South	Right	345	392
280110	East	Left	194	512
280110	East	Through	2,581	3,946
280110	East	Right	0	11
280110	West	Left	0	0
280110	West	Through	3,486	4,080
280110	West	Right	272	548

Table 7 Interim scenario turning movements for the peak periods

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
8274	North	Left	371	238
8274	North	Through	2,267	2,151
8274	North	Right	248	553
8274	South	Left	915	504
8274	South	Through	1,820	2,385
8274	South	Right	388	485
8274	East	Left	417	401
8274	East	Through	949	1,095
8274	East	Right	306	356
8274	West	Left	508	400
8274	West	Through	1,029	979
8274	West	Right	426	1,022
8284	North	Left	64	50
8284	North	Through	60	110
8284	North	Right	3	0
8284	South	Left	283	224
8284	South	Through	120	90
8284	South	Right	52	30
8284	East	Left	35	21
8284	East	Through	1,315	1,456
8284	East	Right	84	53
8284	West	Left	0	0
8284	West	Through	1,260	1,419
8284	West	Right	178	290
8314	North	Left	655	1,364
8314	North	Through	2,311	2,054
8314	North	Right	40	44
8314	South	Left	34	53
8314	South	Through	1,748	2,447
8314	South	Right	236	343
8314	East	Left	348	316
8314	East	Through	87	88
8314	East	Right	1,337	771
8314	West	Left	40	55
8314	West	Through	54	139
8314	West	Right	57	67

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
8316	North	Left	63	156
8316	North	Through	472	620
8316	North	Right	180	150
8316	South	Left	499	226
8316	South	Through	476	629
8316	South	Right	36	103
8316	East	Left	76	66
8316	East	Through	826	475
8316	East	Right	91	122
8316	West	Left	137	145
8316	West	Through	390	920
8316	West	Right	180	460
8322	North	Left	61	58
8322	North	Through	893	542
8322	North	Right	113	128
8322	South	Left	264	122
8322	South	Through	446	841
8322	South	Right	74	182
8322	East	Left	114	115
8322	East	Through	41	54
8322	East	Right	114	63
8322	West	Left	103	122
8322	West	Through	26	136
8322	West	Right	87	324
8370	North	Left	598	343
8370	North	Through	853	781
8370	North	Right	1,352	1,067
8370	South	Left	390	358
8370	South	Through	521	998
8370	South	Right	136	66
8370	East	Left	70	134
8370	East	Through	1,381	1,104
8370	East	Right	359	440
8370	West	Left	790	1,433
8370	West	Through	846	1,451
8370	West	Right	322	465
8376	North	Left	15	47

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
8376	North	Through	363	547
8376	North	Right	408	388
8376	South	Left	532	476
8376	South	Through	436	492
8376	South	Right	67	127
8376	East	Left	99	91
8376	East	Through	736	586
8376	East	Right	29	34
8376	West	Left	296	496
8376	West	Through	423	777
8376	West	Right	506	459
8429	North	Left	292	198
8429	North	Through	467	420
8429	North	Right	120	69
8429	South	Left	9	9
8429	South	Through	338	572
8429	South	Right	74	82
8429	East	Left	59	97
8429	East	Through	369	344
8429	East	Right	44	282
8429	West	Left	35	104
8429	West	Through	62	429
8429	West	Right	5	9
8438	North	Left	27	226
8438	North	Through	174	128
8438	North	Right	136	54
8438	South	Left	5	6
8438	South	Through	87	284
8438	South	Right	0	34
8438	East	Left	44	0
8438	East	Through	70	208
8438	East	Right	204	41
8438	West	Left	31	173
8438	West	Through	121	157
8438	West	Right	4	8
9338	North	Left	2	3
9338	North	Through	793	608

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
9338	North	Right	276	296
9338	South	Left	24	72
9338	South	Through	412	856
9338	South	Right	0	0
9338	East	Left	0	0
9338	East	Through	14	18
9338	East	Right	4	2
9338	West	Left	226	384
9338	West	Through	13	7
9338	West	Right	60	26
12269	North	Left	97	104
12269	North	Through	878	973
12269	North	Right	426	417
12269	South	Left	209	288
12269	South	Through	859	1,020
12269	South	Right	487	700
12269	East	Left	761	628
12269	East	Through	743	939
12269	East	Right	96	112
12269	West	Left	448	518
12269	West	Through	854	906
12269	West	Right	263	89
12419	North	Left	184	452
12419	North	Through	2,515	1,963
12419	North	Right	18	21
12419	South	Left	1	8
12419	South	Through	1,543	2,556
12419	South	Right	126	308
12419	East	Left	284	225
12419	East	Through	3	3
12419	East	Right	456	265
12419	West	Left	19	22
12419	West	Through	2	4
12419	West	Right	3	3
12421	North	Left	0	0
12421	North	Through	1	2
12421	North	Right	67	47

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
12421	South	Left	42	34
12421	South	Through	2	2
12421	South	Right	0	1
12421	East	Left	1	1
12421	East	Through	3,124	2,518
12421	East	Right	0	0
12421	West	Left	26	67
12421	West	Through	1,950	3,343
12421	West	Right	24	40
18415	North	Left	151	333
18415	North	Through	956	614
18415	North	Right	711	805
18415	South	Left	25	15
18415	South	Through	595	903
18415	South	Right	43	109
18415	East	Left	101	79
18415	East	Through	197	213
18415	East	Right	332	196
18415	West	Left	688	849
18415	West	Through	138	257
18415	West	Right	10	34
18953	North	Left	5	3
18953	North	Through	94	58
18953	North	Right	49	23
18953	South	Left	0	0
18953	South	Through	51	96
18953	South	Right	71	319
18953	East	Left	272	237
18953	East	Through	193	126
18953	East	Right	1	4
18953	West	Left	6	54
18953	West	Through	10	229
18953	West	Right	0	0
25358	North	Left	93	71
25358	North	Through	1,734	1,565
25358	North	Right	74	54
25358	South	Left	83	66

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
25358	South	Through	1,469	1,803
25358	South	Right	63	79
25358	East	Left	30	88
25358	East	Through	4	12
25358	East	Right	42	122
25358	West	Left	45	83
25358	West	Through	6	17
25358	West	Right	54	99
27390	North	Left	65	402
27390	North	Through	1,180	977
27390	South	Through	685	1,294
27390	South	Right	51	99
27390	East	Left	78	68
27390	East	Right	362	129
36032	South	Left	29	18
36032	South	Right	173	123
36032	East	Left	84	174
36032	East	Through	848	859
36032	West	Through	663	1,017
36032	West	Right	7	39
36037	North	Left	26	14
36037	North	Through	30	59
36037	North	Right	405	309
36037	South	Left	191	122
36037	South	Through	46	55
36037	South	Right	65	64
36037	East	Left	38	80
36037	East	Through	268	279
36037	East	Right	8	28
36037	West	Left	217	480
36037	West	Through	209	339
36037	West	Right	79	132
36044	North	Left	106	127
36044	North	Through	770	619
36044	North	Right	217	236
36044	South	Left	138	156
36044	South	Through	424	833

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
36044	South	Right	80	252
36044	East	Left	181	151
36044	East	Through	68	41
36044	East	Right	176	97
36044	West	Left	183	216
36044	West	Through	21	50
36044	West	Right	120	137
36045	North	Left	27	8
36045	North	Through	755	505
36045	North	Right	71	122
36045	South	Left	21	176
36045	South	Through	310	799
36045	South	Right	0	13
36045	East	Left	10	0
36045	East	Through	0	0
36045	East	Right	5	28
36045	West	Left	121	102
36045	West	Through	0	0
36045	West	Right	93	50
36086	North	Left	122	287
36086	North	Through	2,986	3,285
36086	North	Right	2	2
36086	South	Left	38	18
36086	South	Through	2,991	3,228
36086	South	Right	80	85
36086	East	Left	52	102
36086	East	Through	3	1
36086	East	Right	131	145
36086	West	Left	1	3
36086	West	Through	1	5
36086	West	Right	13	45
36087	North	Left	229	367
36087	North	Through	2,822	3,064
36087	South	Through	2,771	3,048
36087	South	Right	155	225
36087	East	Left	185	198
36087	East	Right	338	282

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
36091	South	Left	78	121
36091	South	Right	552	816
36091	East	Left	692	702
36091	East	Through	185	175
36091	West	Through	118	239
36091	West	Right	90	126
36098	North	Left	28	59
36098	North	Right	207	423
36098	East	Through	1,467	805
36098	East	Right	38	46
36098	West	Left	306	306
36098	West	Through	679	1,467
36105	North	Left	0	5
36105	North	Right	163	262
36105	East	Through	214	269
36105	East	Right	0	1
36105	West	Left	50	282
36105	West	Through	159	334
36109	North	Left	96	122
36109	North	Through	0	0
36109	North	Right	155	107
36109	South	Left	1	1
36109	South	Through	0	0
36109	South	Right	4	5
36109	East	Left	5	5
36109	East	Through	162	141
36109	East	Right	88	129
36109	West	Left	112	188
36109	West	Through	35	228
36109	West	Right	1	1
36110	North	Left	40	317
36110	North	Right	210	255
36110	East	Through	183	390
36110	East	Right	194	141
36110	West	Left	118	289
36110	West	Through	169	300
36157	North	Left	57	72

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
36157	North	Through	52	19
36157	North	Right	138	52
36157	South	Left	18	42
36157	South	Through	6	29
36157	South	Right	30	100
36157	East	Left	147	71
36157	East	Through	311	272
36157	East	Right	39	79
36157	West	Left	18	148
36157	West	Through	16	370
36157	West	Right	53	33
36215	North	Through	783	601
36215	North	Right	184	252
36215	South	Left	41	115
36215	South	Through	376	842
36215	West	Left	243	229
36215	West	Right	95	86
36217	North	Left	19	39
36217	North	Through	5	3
36217	South	Through	1	4
36217	South	Right	56	151
36217	East	Left	142	81
36217	East	Right	42	30
36224	North	Left	15	10
36224	North	Through	0	0
36224	North	Right	3	5
36224	South	Left	15	15
36224	South	Through	0	0
36224	South	Right	12	12
36224	East	Left	9	14
36224	East	Through	3,107	2,499
36224	East	Right	7	16
36224	West	Left	4	4
36224	West	Through	1,931	3,326
36224	West	Right	15	15
48179	North	Left	290	192
48179	North	Through	967	853

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
48179	South	Through	619	1,071
48179	South	Right	0	0
48179	East	Left	0	0
48179	East	Right	118	322
48728	North	Left	50	63
48728	North	Through	15	36
48728	North	Right	76	113
48728	South	Left	122	85
48728	South	Through	26	28
48728	South	Right	142	81
48728	East	Left	47	172
48728	East	Through	1,575	976
48728	East	Right	52	81
48728	West	Left	88	91
48728	West	Through	794	1,629
48728	West	Right	64	126
48783	North	Left	50	40
48783	North	Through	37	70
48783	North	Right	173	81
48783	South	Left	91	158
48783	South	Through	33	44
48783	South	Right	8	31
48783	East	Left	30	15
48783	East	Through	1,408	1,613
48783	East	Right	28	52
48783	West	Left	121	172
48783	West	Through	1,537	1,503
48783	West	Right	129	28
48843	North	Through	275	283
48843	North	Right	616	471
48843	South	Left	85	118
48843	South	Through	238	380
48843	West	Left	340	669
48843	West	Right	62	125
48890	North	Left	206	325
48890	North	Through	737	625
48890	North	Right	32	15

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
48890	South	Left	51	41
48890	South	Through	481	813
48890	South	Right	46	196
48890	East	Left	119	105
48890	East	Through	45	26
48890	East	Right	372	252
48890	West	Left	11	30
48890	West	Through	23	37
48890	West	Right	35	24
49069	North	Left	117	190
49069	North	Through	412	631
49069	North	Right	199	324
49069	South	Left	85	251
49069	South	Through	507	548
49069	South	Right	142	267
49069	East	Left	204	178
49069	East	Through	61	91
49069	East	Right	198	139
49069	West	Left	307	271
49069	West	Through	102	88
49069	West	Right	205	153
49528	North	Left	113	35
49528	North	Through	39	32
49528	North	Right	64	41
49528	South	Left	79	80
49528	South	Through	18	85
49528	South	Right	136	214
49528	East	Left	49	78
49528	East	Through	1,264	1,425
49528	East	Right	66	141
49528	West	Left	29	81
49528	West	Through	1,372	1,398
49528	West	Right	194	95
49665	North	Left	72	65
49665	North	Through	82	48
49665	North	Right	368	247
49665	South	Left	351	278

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
49665	South	Through	28	62
49665	South	Right	111	111
49665	East	Left	103	131
49665	East	Through	274	139
49665	East	Right	36	85
49665	West	Left	157	401
49665	West	Through	79	405
49665	West	Right	252	372
113623	North	Left	110	226
113623	North	Through	858	871
113623	South	Through	819	948
113623	South	Right	45	147
113623	East	Left	117	94
113623	East	Right	216	148
113624	North	Left	85	90
113624	North	Through	84	54
113624	North	Right	164	136
113624	South	Left	299	310
113624	South	Through	48	101
113624	South	Right	106	174
113624	East	Left	163	129
113624	East	Through	1,437	1,202
113624	East	Right	77	120
113624	West	Left	118	185
113624	West	Through	1,034	1,468
113624	West	Right	352	305
280103	North	Left	31	27
280103	North	Through	605	338
280103	North	Right	222	190
280103	South	Left	17	63
280103	South	Through	230	685
280103	South	Right	13	47
280103	East	Left	15	13
280103	East	Through	16	21
280103	East	Right	25	39
280103	West	Left	76	263
280103	West	Through	13	37

Intersection Node	Approach	Turn	2 Hour Am-peak	2 Hour Pm-peak
280103	West	Right	45	56
280110	North	Left	0	4
280110	North	Through	0	3
280110	North	Right	0	0
280110	South	Left	19	28
280110	South	Through	0	1
280110	South	Right	72	132
280110	East	Left	61	127
280110	East	Through	1,414	1,501
280110	East	Right	0	0
280110	West	Left	0	0
280110	West	Through	1,348	1,479
280110	West	Right	27	20

Appendix E

Select Link Analysis

Appendix E Select Link Analysis

Figure 34 Interim scenario select link analysis for Berwick Cranbourne Road north of Pattersons Road (southbound)

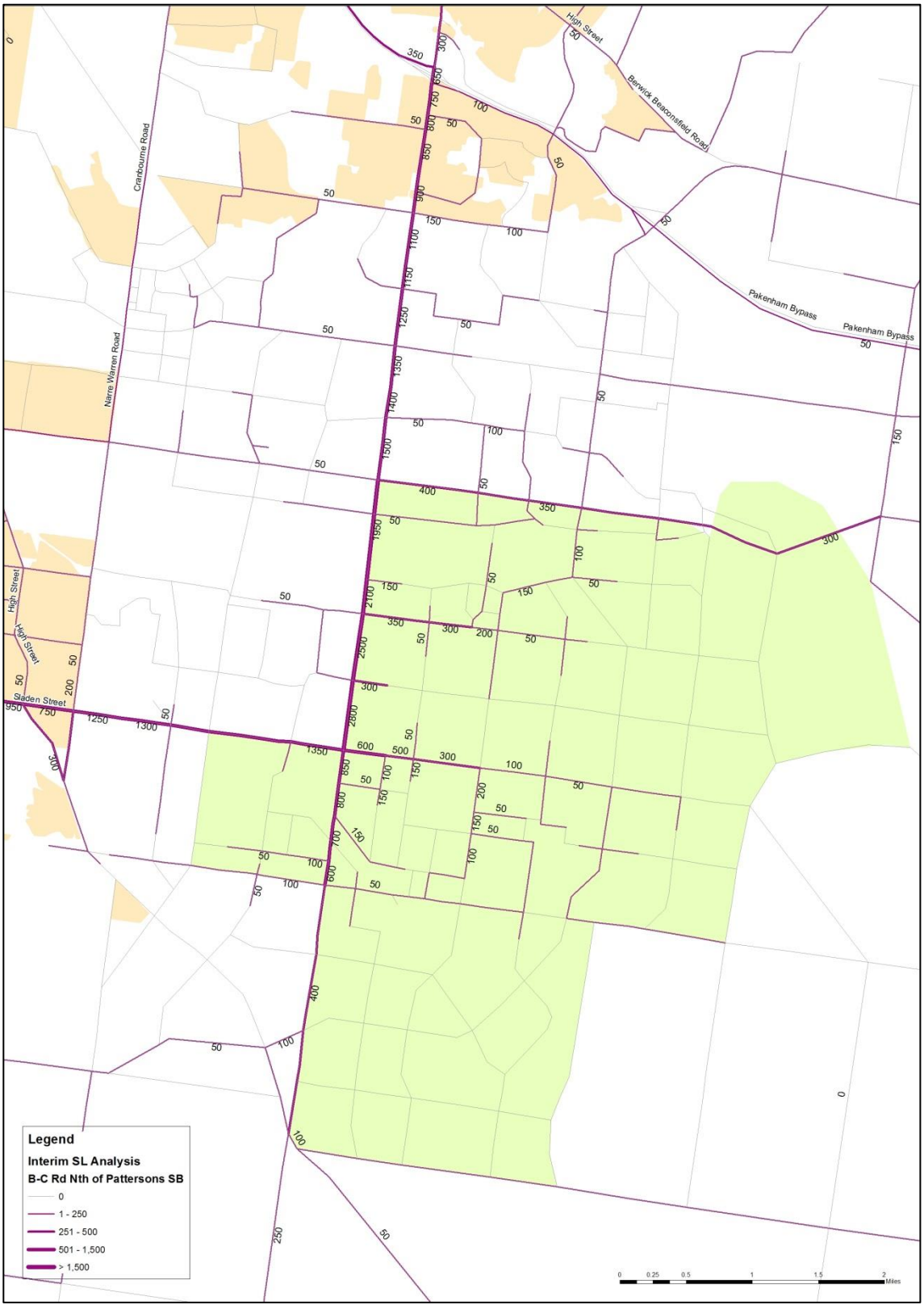


Figure 35 Interim scenario select link analysis for Berwick Cranbourne Road north of Pattersons Road (northbound)

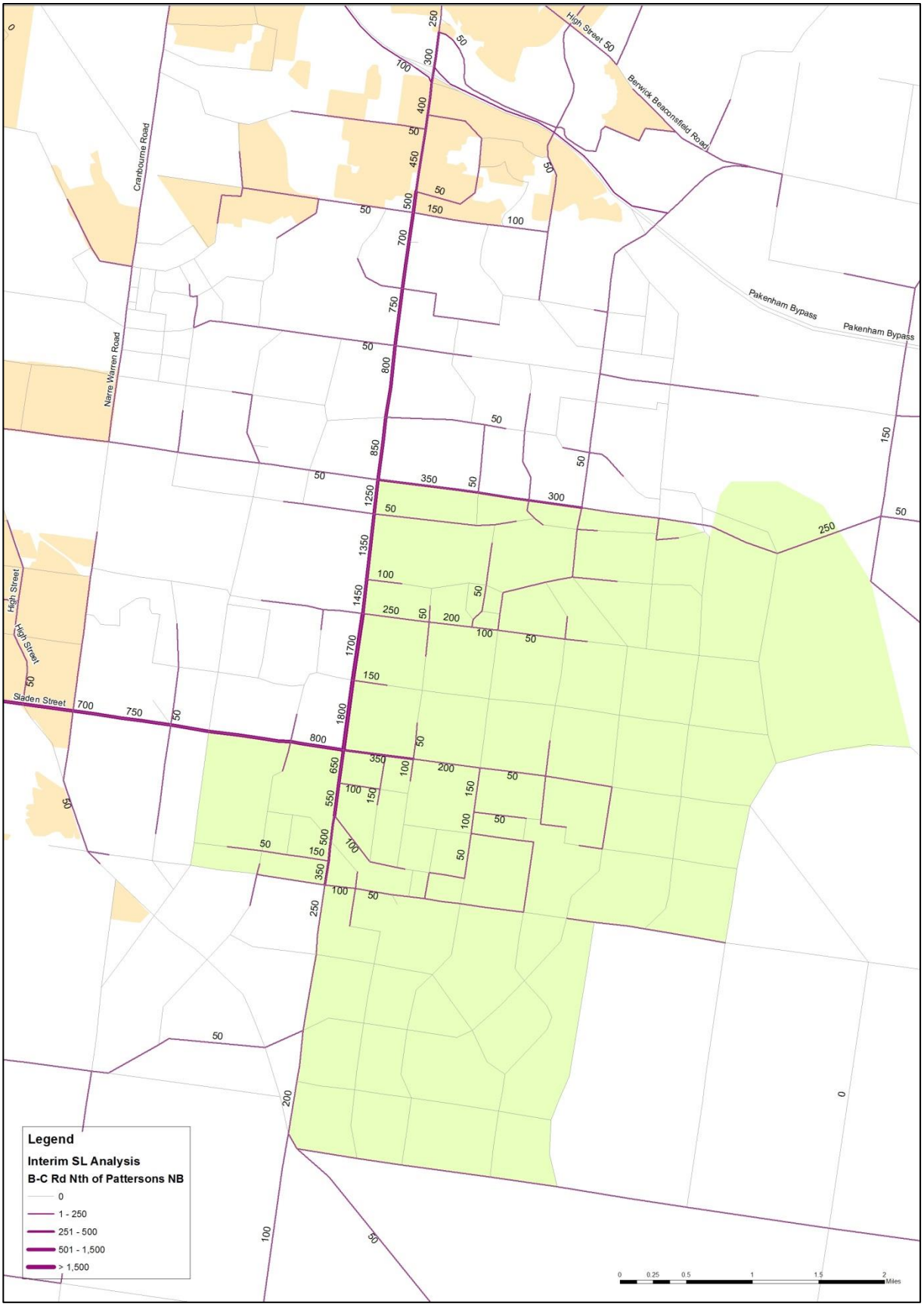


Figure 36 Interim scenario select link analysis for Berwick Cranbourne Road north of Thompsons Road (southbound)

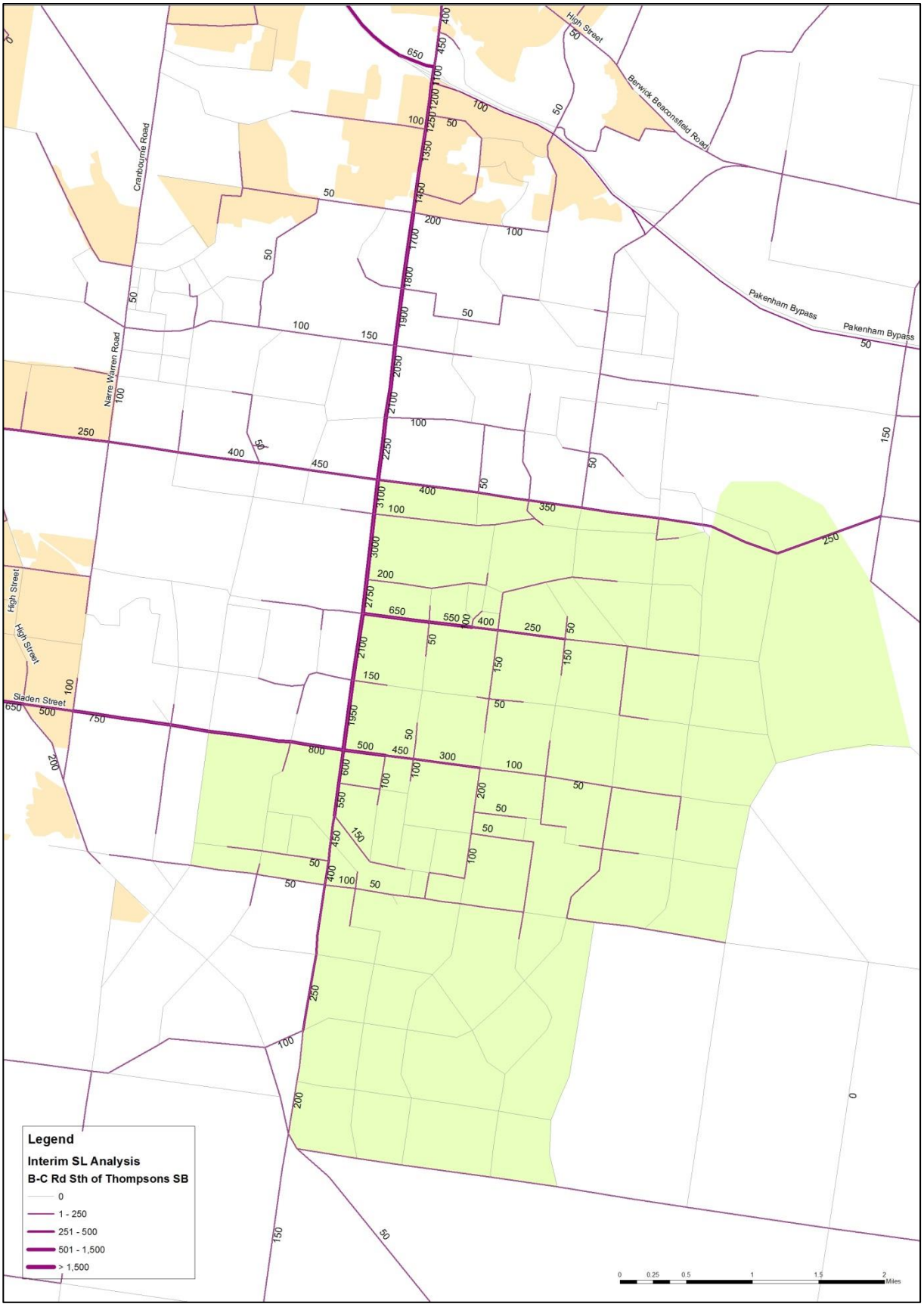


Figure 37 Interim scenario select link analysis for Berwick Cranbourne Road north of Thompsons Road (northbound)