onemilegrid
TRAFFIC ENGINEERING

Craigieburn West PSP

Traffic and Transport
Expert Evidence Statement to Panel

190690PAN001C-F.docx

15 April 2021

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DOCUMENT INFORMATION

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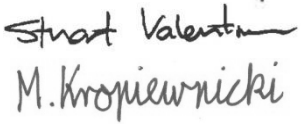
Signature		**Signature**	

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1 PLANNING PANELS VICTORIA GUIDE TO EXPERT EVIDENCE

In accordance with the Planning Panels Victoria, Guide to Expert Evidence, my qualifications, experience and expertise to provide my opinions on this matter are summarised below:

Name:	Ross Brendan Hill
Address:	56 Down Street Collingwood Victoria 3066
Professional Qualifications:	Bachelor of Engineering (Civil), RMIT University 1996
Professional Registration:	VicRoads Accredited Senior Road Safety Auditor
Professional Experience:	Director, **one**mile**grid**, 2014 – present Associate, Cardno, 2007 – 2014 Associate, Grogan Richards, 2005 – 2007 Senior Traffic Engineer, Grogan Richards, 1997 – 2005 Traffic Engineer, City of Monash, 1996 - 1997
Areas of Expertise:	Car parking and traffic engineering design and compliance. Traffic advice and assessment of land use and development proposals to local and state planning authorities, government agencies, corporations and developers for a variety of projects including low, medium & high density residential, commercial, retail, industrial, institutional, service orientated and mixed-use projects. Preparation of static traffic models, intersection design and analysis for residential subdivisions. Preparation and presentation of expert evidence before VCAT and Planning Panels.
Expertise to Prepare this Report:	My professional qualifications, training and experience over a number of years on all forms of development qualifies me to comment on the car parking and traffic implications of the proposal.
Relationship to the Applicant:	I do not have any private or business relationship with the applicant.

Instructions:	I have been requested by Harwood Andrews, representing Victorian Planning Authority to provide my expert opinions in relation to the traffic engineering matters relevant to the Craigieburn West Precinct Structure Plan.
Facts, Matters, and Assumptions Relied Upon:	Relevant Exhibition Documentation for the Craigieburn West PSP Traffic related submissions received by 21 parties Transport Impact Assessment prepared by onemilegrid (9 November 2020) Transport Impact Assessment – Addendum 1 prepared by onemilegrid (1 April 2021) Case study data held by onemilegrid Department of Transport (VicRoads) historical traffic volume data
Identity of Persons Undertaking the Work:	Ross Hill, Director **one**mile**grid** (BE Civil) Assisted by: Stuart Valentine, Associate **one**mile**grid** (BE Civil) Martin Kropiewnicki, Project Engineer **one**mile**grid** (BE Civil)

I have made all the inquiries that I believe are desirable and appropriate and that no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

_____

Ross Hill
Director – Senior Traffic Engineer
onemile**grid**

2 INTRODUCTION

My name is Ross Hill and I am a Director at **one**mile**grid** where I practise as a traffic engineer.

I have been requested by Harwood Andrews on behalf of the Victorian Planning Authority to undertake an assessment of the traffic engineering submissions that have been raised as part of the Craigieburn West PSP, and present expert evidence on these matters to Planning Panels Victoria.

My firm has previously undertaken traffic modelling work for the Craigieburn West PSP, and I was responsible for overseeing this work. The original traffic engineering assessment report prepared by my firm is included in Appendix A, while a supplementary addendum report is included as Appendix B, and I adopt these reports as part of this evidence statement.

In the course of preparing this statement, I have reviewed the submissions, reviewed the traffic modelling previously undertaken by my firm, and assessed the traffic implications of the proposed Craigieburn West PSP.

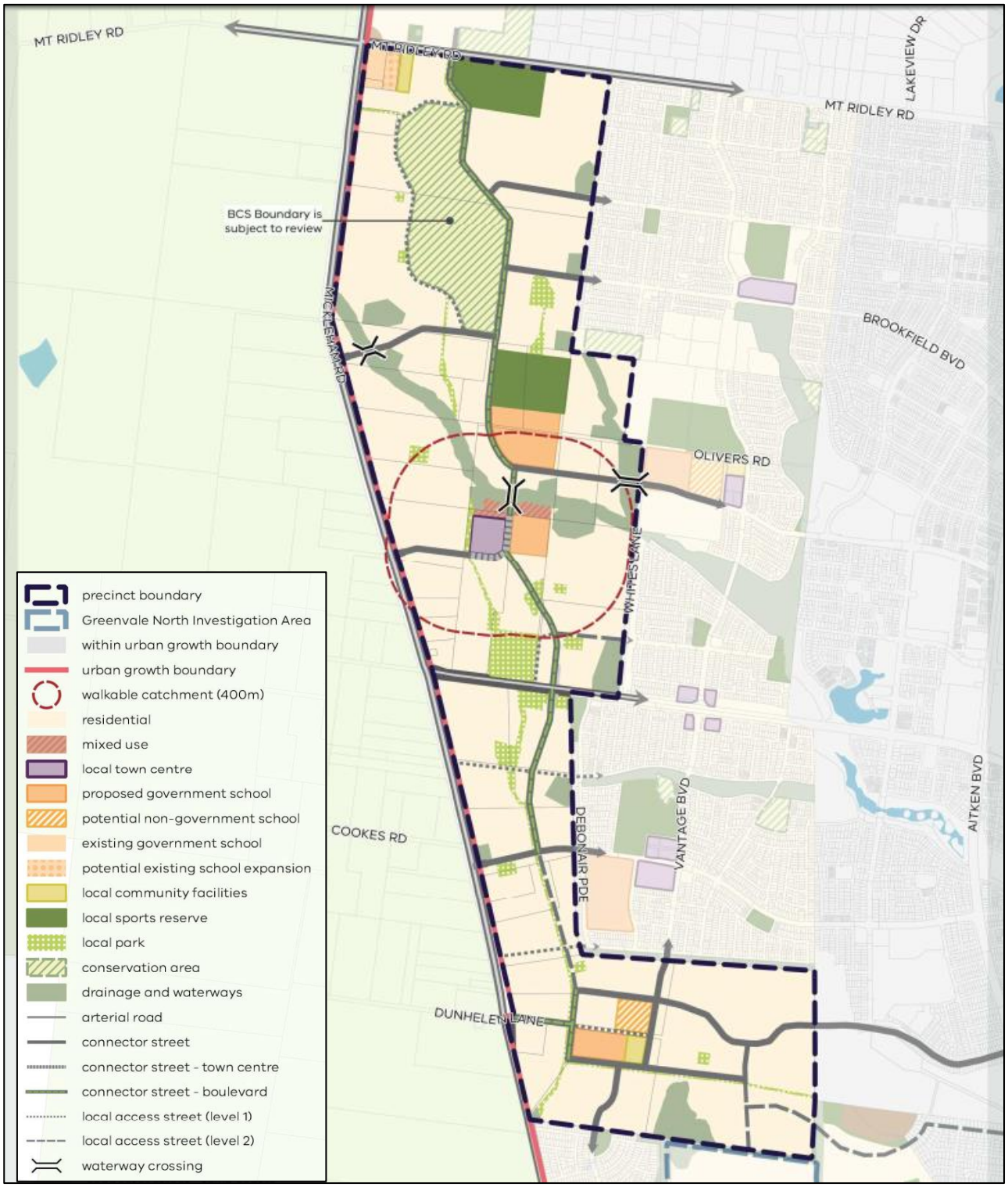
3 CRAIGIEBURN WEST PRECINCT STRUCTURE PLAN

The Craigieburn West Precinct Structure Plan (PSP) has been prepared by the Victorian Planning Authority (VPA) in consultation with Hume City Council and other authorities, to guide the development of the land within the Craigieburn West area.

The PSP has been prepared to identify (amongst other things) the future transport network including roads, public transport, and active transport, with due consideration of broader planning outcomes.

A view of the proposed Craigieburn West PSP area, reproduced from the draft PSP documentation, is provided in Figure 1.

Figure 1 Craigieburn West PSP



4 EXISTING CONDITIONS

4.1 Area Context

The Craigieburn West PSP area is currently utilised for predominantly farming uses, with a number of large non-farming single dwelling residential properties also located within the PSP area.

In addition to residential uses, the PSP area also includes:

- Mickleham Primary School (Corner of Mickleham Road/Mount Ridley Road);
- Aitken Hill Conference Centre (Located at the end of Dunhelen Lane);
- A Buddhist Temple – Daham Niketanaya (Located on Mickleham Road); and
- Mor Yacoub Syrian Orthodox Church (Located on Whites Lane).

Land to the west of Mickleham Road is outside of the urban growth boundary.

An aerial view of the Craigieburn West PSP area is provided in Figure 2.

Figure 2 Aerial Imagery Site Context- Aerial Dated 13 October 2019

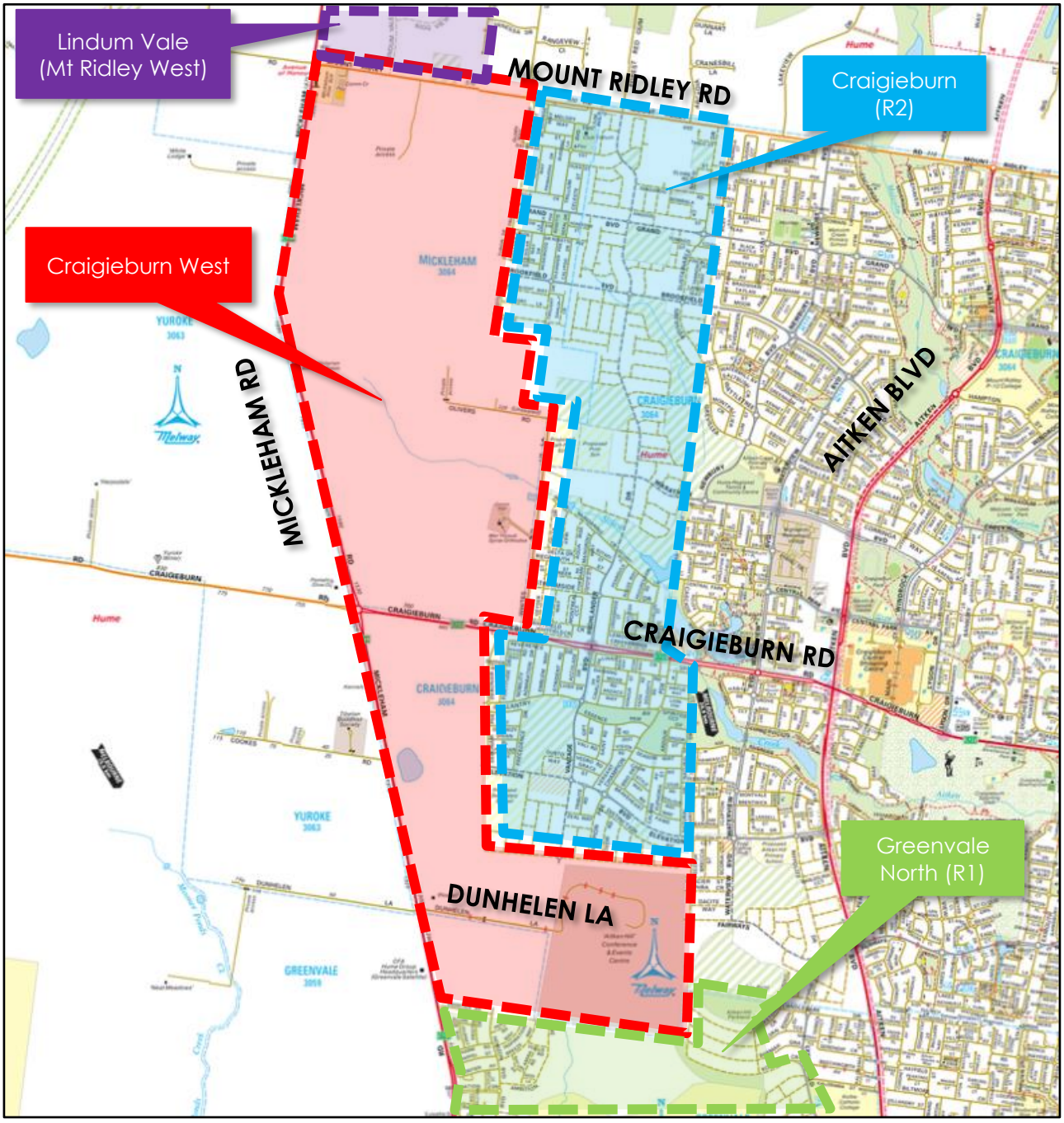
Copyright Nearmap

4.2 Adjacent PSP Areas

The Craigieburn West PSP area is bordered by Mount Ridley Road to the north and Mickleham Road to the west. To the east and south the PSP area is bounded by private properties, with no clearly defined road network boundaries. The PSP area is bisected by Craigieburn Road, which runs east – west through the PSP area.

In addition, several other PSP areas abut the Craigieburn West PSP, including Lindum Vale (Mt Ridley West) to the north, Craigieburn (R2) to the east and Greenvale North (R1) to the south, as shown in Figure 3 and discussed in subsequent sections of this report.

Figure 3 Site Context



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5 TRAFFIC MODELLING

5.1 Background

In 2020, my firm prepared a Transport Impact Assessment for the Craigieburn West Precinct Structure Plan (Ref: 190690TIA002D-F) at the request of the Victorian Planning Authority.

As part of the Transport Impact Assessment, a traffic model was prepared for the PSP area to assess the capability of the internal road network to accommodate traffic volumes anticipated to be generated by the future development of the PSP. The Transport Impact Assessment identified the expected future daily volumes on the internal road network, though did not make any recommendations in this regard.

Subsequent to the submission of the abovementioned report, the draft Craigieburn West PSP document was released for public consultation. Upon review, it was identified that the residential lot yield assessed did not in accord with the residential yield that was ultimately considered within the PSP document. Subsequently, my firm updated the traffic model and prepared an addendum (Ref: 190690LET001D-F) which was to be read in conjunction with the Transport Impact Assessment. As part of this additional work, my firm was requested to review the resulting daily traffic volumes, and make recommendations with regard to road cross-sections based on the modelled volumes. These recommendations are included within the addendum report, and have been generally adopted by the VPA.

The original traffic engineering assessment report is included as Appendix A of this report, while the addendum is included as Appendix B.

It should be noted that the traffic model attempts to determine future road volumes over a long-term period, relying on a variety of assumptions related to traffic generation, future road network improvements, and the destinations of residential traffic. In reality we know that traffic conditions can alter considerably over time based on unforeseen circumstances, or large transport projects which had previously not been planned for. For example, the increased use of in-car navigational aids is expected to have resulted in broad changes to traffic distributions, whilst the recent and ongoing shift to working-from-home is expected to result in long-lasting changes to traffic patterns and traffic generation associated with employment trips. Similarly, the construction of the Suburban Rail Loop will likely cause considerable changes to on-road traffic conditions in the area surrounding the proposed loop, though would not have been contemplated in any modelling undertaken in the areas.

Noting the above, traffic modelling is simply a tool which can be utilised to assist in the design and assessment of a proposed road network, though should not be used without sound engineering judgement.

An overview of the traffic model is provided below.

5.2 Modelling Inputs

The traffic model was prepared in order to determine future traffic volumes along the internal and surrounding road network. The traffic model output the generated and resultant traffic volumes for both interim (2031) and ultimate (2046) conditions and considered the following as appropriate:

- Existing traffic volumes based on tube counts commissioned by my firm;
- Major road network improvements as identified by the Department of Transport;
- Traffic generation of surrounding PSPs based on existing traffic reports for the adjacent PSP areas;
- Base conditions traffic growth based on the Department of Transport (VicRoads) historical traffic volume data;
- Proposed land uses within Craigieburn West PSP (approximately 8,230 residential lots);

- Traffic generations rates for Craigieburn West PSP based on case study data held by my firm (7 vehicle movements per day for medium density residential lots and 9 vehicle movements per day for standard density lots); and
- External traffic distributions for Craigieburn West PSP based on Victorian Integrated Survey of Travel and Activity (VISTA) data.

Further details on the above inputs are provided within the Transport Impact Assessment and addendum provided in Appendix A and Appendix B respectively.

I consider the methodology and assumptions of the assessments (outlined above) to be an appropriate approach to estimate the future traffic volumes along the internal road network. It is noted that this approach allows for a granular assessment of localised traffic generation, which is beneficial when determining appropriate local road connections and configurations.

5.3 Traffic Impact

The updated traffic model projects that the Craigieburn West PSP will result in a total traffic generation of 70,310 vehicle movements per day, with 10% (7,031 vehicle movements) expected to occur during both the AM and PM peak hours. This traffic would be distributed within the internal and external road network.

The generated and resultant traffic volumes for both the interim and ultimate scenarios are provided in the addendum in Appendix B.

Noting the updated residential yield and resulting increase in traffic generated, my firm also recommended an updated road hierarchy for the PSP which was included in the addendum. The updated road hierarchy was designed to better align the theoretical capacity of roads with the traffic volumes they would be expected to carry. These adjustments to the road hierarchy involved both upgrades and downgrades to road classifications as appropriate.

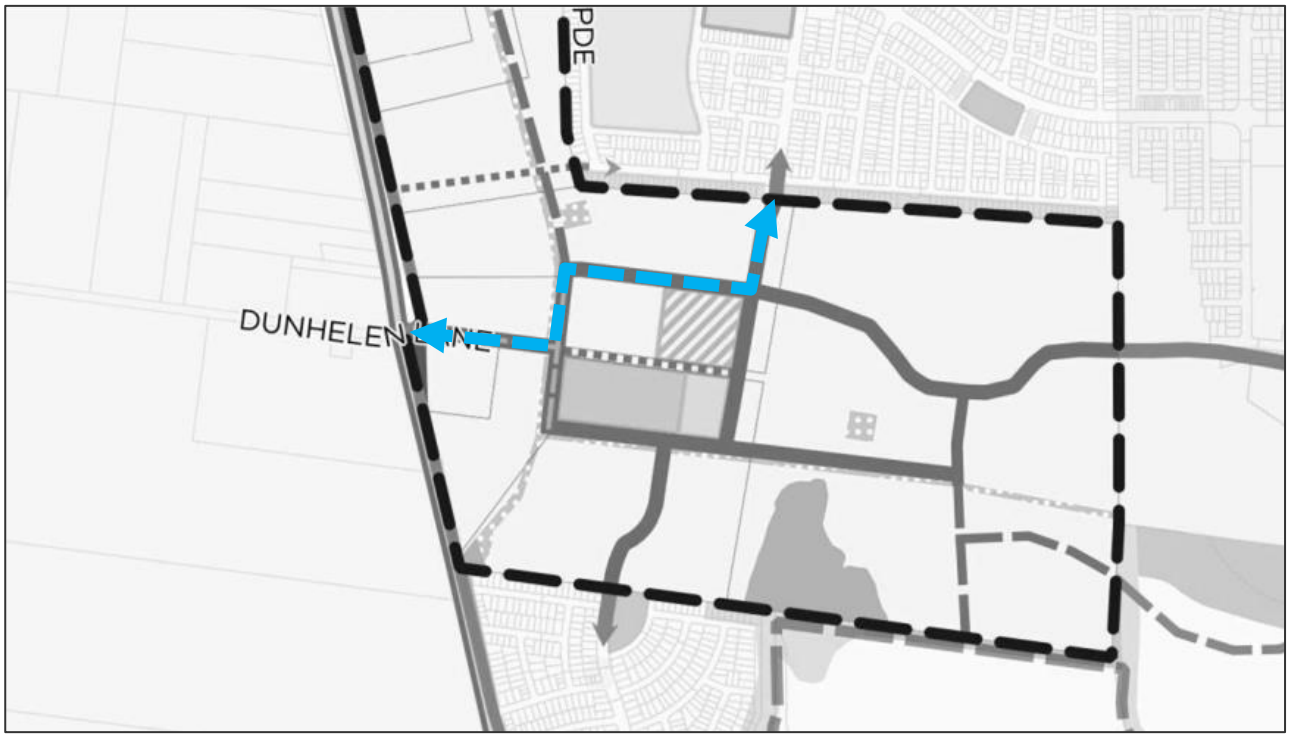
Of importance, the following roads had their road classifications upgraded/downgraded:

- Elevation Boulevard – West of North-South Connector Boulevard 1: Upgraded from Connector Street to Connector Boulevard;
- Vantage Boulevard – North of Fairways Boulevard: Upgraded from Connector Street to Connector Boulevard;
- Fairways Boulevard – West of Vantage Boulevard: Upgraded from Connector Street to Connector Boulevard;
- North-South Connector Boulevard 1 – South of Craigieburn Road: Downgraded from Connector Boulevard to Connector Street;
- North-South Connector Boulevard 2 – South of Dunhelen Lane: Downgraded from Connector Boulevard to Connector Street; and
- East-West Connector Road 1 - Upgraded from Connector Street to Connector Boulevard.

I consider that the above changes to the road hierarchy will better align the intended function of these roads with the traffic volumes projected.

Importantly, Vantage Boulevard (north of Fairways Boulevard) and Fairways Boulevard (west of Vantage Boulevard) are proposed to be upgraded to a Connector Boulevard to better facilitate traffic from the Craigieburn West PSP and through traffic from outside of the PSP. This upgrade will provide a continuous higher-order road connection from the Craigieburn West PSP boundary (Vantage Boulevard) and Mickleham Road, as shown in Figure 4.

Figure 4 Proposed Connector Boulevard Road



5.4 Findings

Based on the Transport Impact Assessment and the subsequent addendum, the following key findings were identified in the traffic model.

The mid-block capacity assessment showed that all roads will operate within or near their theoretical capacity, noting the following:

- Marathon Boulevard, Dunhelen Lane, Vantage Boulevard (south of Fairways Boulevard), North-South Connector Boulevard 1, Navigation Road and Horizon Boulevard are all anticipated to operate at a maximum of 11% over their theoretical capacity. I consider this to be within an acceptable range, given that the inclusion of lower order access streets within the network (which are not included in the model) are expected to reduce the actual traffic volumes on the modelled road network; and
- Elevation Boulevard (east of North-South Connector Boulevard 1) and East-West Connector Road 3 (Between Horizon Boulevard & Vantage Boulevard) are anticipated to operate at approximately 19% above their theoretical capacity. Similar to the above, these two sections of road are anticipated to carry a reduced level of traffic once the lower order access road network is delivered. Furthermore, both these sections of road are approximately 150 metres in length and with limited direct access, and given the influence of intersections adjacent, I do not consider it necessary to upgrade the cross-section for a short length of road that will not match the adjacent road cross-sections.

6 RESPONSE TO SUBMISSIONS

6.1 Overview

As part of the Craigieburn West PSP approval process, the draft PSP documents and background reports were issued for public and stakeholder consultation on 17th November 2020 for a one-month period. During this period, a total of 42 submissions were received by the VPA which included 21 submissions in regard to the traffic related aspects. The main traffic related issues could be categorised into the following:

- Timing for the duplication of Mickleham Road;
- Matters pertaining to the traffic model and methodology;
- Matters pertaining to the proposed road hierarchy; and
- Location of intersections along Mickleham Road.

A summary of the abovementioned issues and my opinions on these matters are provided below.

6.2 Timing for the Duplication of Mickleham Road

A total of 11 submissions were received which flagged the existing traffic issues with Mickleham Road and highlighted that these traffic issues will be exacerbated with the additional traffic from the Craigieburn West PSP. As a result, all of these 11 submissions requested that Mickleham Road be duplicated (or commitment made to the duplication) before development begins within the Craigieburn West PSP.

In response to the above, it is noted that Mickleham Road is located outside of the PSP boundary and is an arterial road under the management of the Department of Transport (DoT). Therefore, any upgrades are subject to the funding and approval by the Department of Transport. Nevertheless, as outlined within the Transport Impact Assessment prepared by my firm, Mickleham Road is slated to be duplicated to two traffic lanes in each direction and then ultimately will be widened again to provide three traffic lanes in each direction. The required road reserve has already been acquired by the Department of Transport for the majority of the PSP's frontage to Mickleham Road to facilitate the interim and ultimate duplication works.

Furthermore, and importantly, it should be noted that the development and approval of the PSP will not result in immediate increases in traffic in the area. More so, the PSP is designed as a long-term strategic planning document which will allow for the development of the Craigieburn West area over an extended period, and any development proposal will still require independent assessment of traffic impacts. Considering typical timeframes for development (including subdivision design, planning, approval, infrastructure construction, dwelling construction, etc), it would be unlikely that the Craigieburn West area would experience any considerable development within 3 or 4 years from approval and gazettal of the PSP. Further, development is expected to occur gradually, and over multiple frontages, distributing the traffic generation to multiple connecting roads, and at the same time, creating additional road links and connections.

With the land area required for duplication already available, and noting the typical timeframes for development within a PSP area even after gazettal of a PSP, I consider that committal to the duplication of Mickleham Road is not critical to the approval of the Craigieburn West PSP, and approval of the Craigieburn West PSP may actually assist in prioritising the upgrade of Mickleham Road.

6.3 Matters Pertaining to the Traffic Model

Several submissions received by the VPA had various queries with the traffic model that was prepared by my firm. I have separated each of these concerns and my responses to each below.

6.3.1 Use of VITM Modelling

Several submissions questioned using my firms in-house traffic modelling software in lieu of VITM modelling.

VITM is generally considered to be the appropriate modelling tool for large scale regional area modelling, or for corridor modelling, where the provision of new arterial roads can create traffic distribution changes over a wider area, or various arterial road options are being tested. Whilst commonly used for reviewing traffic volumes on a local road network, and even intersection turning movements, VITM may not provide reliable results to this level of detail.

In the case of the Craigieburn West PSP, the arterial road network has been predetermined and is existing, and the modelling exercise is predominantly related to internal local roads, and locally generated traffic, with few through traffic routes provided. Consequently, a fine grain model based on local catchment areas and specific traffic routes is considered to be appropriate.

The model used is a static traffic generation and distribution model, with manually assigned traffic routes based on engineering judgement and assessment, and was the basis of my firm's appointment by the VPA to undertake the traffic modelling for the PSP.

It is able to be interrogated to determine the origins and destinations of the resulting traffic volumes, and is considered to provide a suitable tool for the prediction of high-level future traffic volumes, and an assessment of the (predominantly local) road network proposed as part of the PSP.

It is acknowledged that inconsistencies related to previous modelling (undertaken by others) and the resulting road network in surrounding PSP areas, required manual adjustments to the model, though again, this is considered to be appropriate for a small-scale model such as that required for Craigieburn West.

I therefore believe the chosen traffic modelling method is sufficient to determine the local traffic volumes within the Craigieburn West PSP.

6.3.2 Assumed Lot Yield

Several submissions had raised queries with the previously adopted residential lot yield, which was based on an area of 600 m^2 per lot and resulted in a total of 6,153 residential lots delivered as part of the Craigieburn West PSP.

As mentioned earlier in my evidence, my firm has issued an addendum to our original Transport Impact Assessment which adopted the following residential yield.

- Standard density residential – 18.5 dwellings / net developable hectare
- Medium density residential (within walkable catchment) – 26.5 dwellings / net developable hectare

Based on the above residential yield, it is anticipated that approximately 8,230 residential lots will be delivered as part of the Craigieburn West PSP. My firms traffic model has been updated with the revised residential yield and is included in the addendum.

6.3.3 Traffic Generation Rates

Concerns were raised with our traffic generation rate of 9 vehicle movements per day per residential lot. These concerns were further emphasised with no case study data provided to support this traffic generation rate.

As mentioned earlier in my evidence, my firm has issued an addendum to our original Transport Impact Assessment which adopted the following traffic generation rates for the two types of residential developments.

- Standard density residential – 9 vehicles movements per day / lot
- Medium density residential (within walkable catchment) – 7 vehicles movements per day / lot

I note that the above traffic generation rates are generally industry standard traffic generation rates for outer suburban areas, with some allowance for other traffic generators such as schools, retail areas etc. Whilst case study data is available to support slightly lower rates, these are all dependant on the area and therefore I consider the above rates to be both conservative and appropriate.

6.3.4 Traffic Directional Splits

Several submissions raised queries with the adopted traffic directional splits, which consisted of an inbound/outbound ratio split of 30:70 in the AM peak and 60:40 in the PM peak. These concerns were further emphasised as no case study data was provided in the assessment to support this traffic distribution split.

I note that the above traffic distribution split is generally an industry standard traffic distribution rate for residential subdivisions. Importantly though, it should be recognised that adoption of alternative directional splits would have little impact on the findings of the assessment in terms of road hierarchy, as the recommendations are based on daily two-way volumes as opposed to peak hourly volumes.

6.3.5 Traffic Distribution

Submissions questioned aspects of the adopted traffic distribution, which included 9% internal trips and the appropriateness of the chosen VISTA travel survey results.

In relation to the latter, the VISTA travel survey results were utilised to identify the typical trip purpose for residentially generated traffic (such as shopping, education, employment, etc), which enabled a more comprehensive analysis of the likely destinations of traffic generated from each of the defined residential areas within the Craigieburn West area. I can confirm that the VISTA traffic distribution that was adopted was for outer Melbourne which I consider appropriate for the Craigieburn West PSP.

In regard to the internal traffic distribution, the distribution was calculated by manually assigning trips based on the ultimate land uses within the PSP area, in the surrounding areas, and the broader Melbourne metropolitan area, including schools, employment, shopping and recreational areas. The internal distribution of 9% is generally in accordance with the industry standard rate of 10% for internal trips for residential areas.

6.3.6 Through Traffic Growth

Submissions questioned aspects of the traffic growth along Craigieburn Road and non-arterial roads within the vicinity.

In regard to the traffic growth along Craigieburn Road, review of Department of Transport (VicRoads) historical traffic volume data for Craigieburn Road suggests that traffic volumes have risen from approximately 11,800 vehicles per day in 2001 to approximately 17,600 vehicles per day in 2015. This data shows that the traffic volumes have had a growth rate of approximately 3% (compounding) over the last 14 years, which is what my firm had adopted in our Transport Impact Assessment.

In regard to the non-arterial roads, it is noted that we have only adopted the 1% traffic growth for non-arterial roads to the north of Craigieburn Road (Marathon Boulevard, Brookfield Boulevard and Grand Boulevard) where we did not rely on any existing modelling. Aerial imagery shows this area is still under residential development, and considering the relatively low volume of existing traffic along these roads it is considered that the 1% traffic growth is appropriate.

In regard to traffic growth along Mickleham Road and within the Craigieburn R2 PSP (south of Craigieburn Road), the traffic volumes from the previous PSP traffic reports were adopted with no additional growth applied.

6.4 Matters Pertaining to the Road Hierarchy

Several submissions had raised concerns with the proposed road hierarchy for the Craigieburn West PSP. I note that the majority of these queries were in relation to several roads carrying traffic volumes significantly over their theoretical capacity.

As mentioned earlier in my evidence, my firm has issued an addendum to our original Transport Impact Assessment which provided a recommendation for a revised road hierarchy which is designed to align road classifications with the traffic volumes they are anticipated to carry. This involved both upgrades and downgrade to road classifications previously considered where appropriate.

The updated mid-block capacity assessment shows that all roads will operate within or near their theoretical capacity within an appropriate margin of area. Whilst Elevation Boulevard (east of North-South Connector Boulevard 1) and East-West Connector Road 3 (Between Horizon Boulevard & Vantage Boulevard) are expected to operate at approximately 19% above their theoretical capacity, given their short sections of road (150 metres each), I consider this to be acceptable.

6.5 Location of Intersections along Mickleham Road

Several submissions requested additional left-on/left-out intersections along Mickleham Road.

In this regard, it should be recognised that the proposed signalised intersections along Mickleham Road are generally spaced in accordance with VPA and DoT guidelines with approximately 400 metres between intersections. Furthermore, the majority of the intersections to the south of Craigieburn Road are appropriately located to provide east-west connections between the existing roads within Craigieburn R2 PSP and Mickleham Road.

Additional left-in/left-out intersections to Mickleham Road are not required to be shown on the PSP and will referred to the Department of Transport at the subdivision approval stage.

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Appendix A Transport Impact Assessment

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Craigieburn West Precinct Structure Plan

Transport Impact Assessment

190690TIA002D-F.docx

9 November 2020

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Prepared by	Martin Kropiewnicki & Stuart Valentine	**Reviewed by**	Ross Hill
Signature		**Signature**	

EXECUTIVE SUMMARY

onemile**grid** has been requested by the Victorian Planning Authority (VPA) to prepare a Transport Impact Assessment for the Craigieburn West Precinct Structure Plan.

The Craigieburn West PSP is located along the Urban Growth Boundary within the City of Hume. The PSP area comprises approximately 565 hectares and is bound by Mount Ridley Road to the north and Mickleham Road to the west. The PSP area is bisected by Craigieburn Road, which runs east-west through the proposed PSP.

In addition, several other PSP areas abut the proposed PSP, including Lindum Vale (Mt Ridley West) to the north, Craigieburn (R2) to the east and Greenvale North (R1) to the south.

onemile**grid** has previously undertaken an existing conditions assessment of the study area which analysed the existing transport networks within the vicinity.

A traffic model has been prepared for the study area considering the anticipated land uses as provided by the VPA and the Future Urban Structure Plan. In addition, the traffic model took into consideration the neighbouring PSP developments and any major road network improvements expected in the future.

The traffic model was used to provide an estimate of future traffic volumes along adjoining arterial roads and local roads within the PSP area.

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APPENDICES

1 INTRODUCTION

onemile**grid** has been requested by Victorian Planning Authority to undertake a Transport Impact Assessment of the proposed Craigieburn West Precinct Structure Plan.

A traffic model has been prepared to allow all major intersections proposed to be designed to accommodate traffic volumes anticipated to be generated by future development within the area.

As part of this assessment the study area has been inspected with due consideration of the PSP area and surrounding precincts, traffic data has been sourced and relevant background reports have been reviewed.

2 EXISTING CONDITIONS

2.1 Area Context

The Craigieburn West PSP area is currently utilised for predominantly farming uses, with a number of large non-farming single dwelling residential properties also located within the PSP area.

In addition to residential uses, the PSP area also includes:

- Mickleham Primary School (Corner of Mickleham Road/Mount Ridley Road);
- Aitken Hill Conference Centre (Located at the end of Dunhelen Lane);
- A Buddhist Temple – Daham Niketanaya (Located on Mickleham Road); and
- Mor Yacoub Syrian Orthodox Church (Located on Whites Lane).

Land to the west of Mickleham Road is outside of the urban growth boundary.

An aerial view of the Craigieburn West PSP area is provided in Figure 1.

Figure 1 Aerial Imagery Site Context- Aerial Dated 13 October 2019

Copyright Nearmap

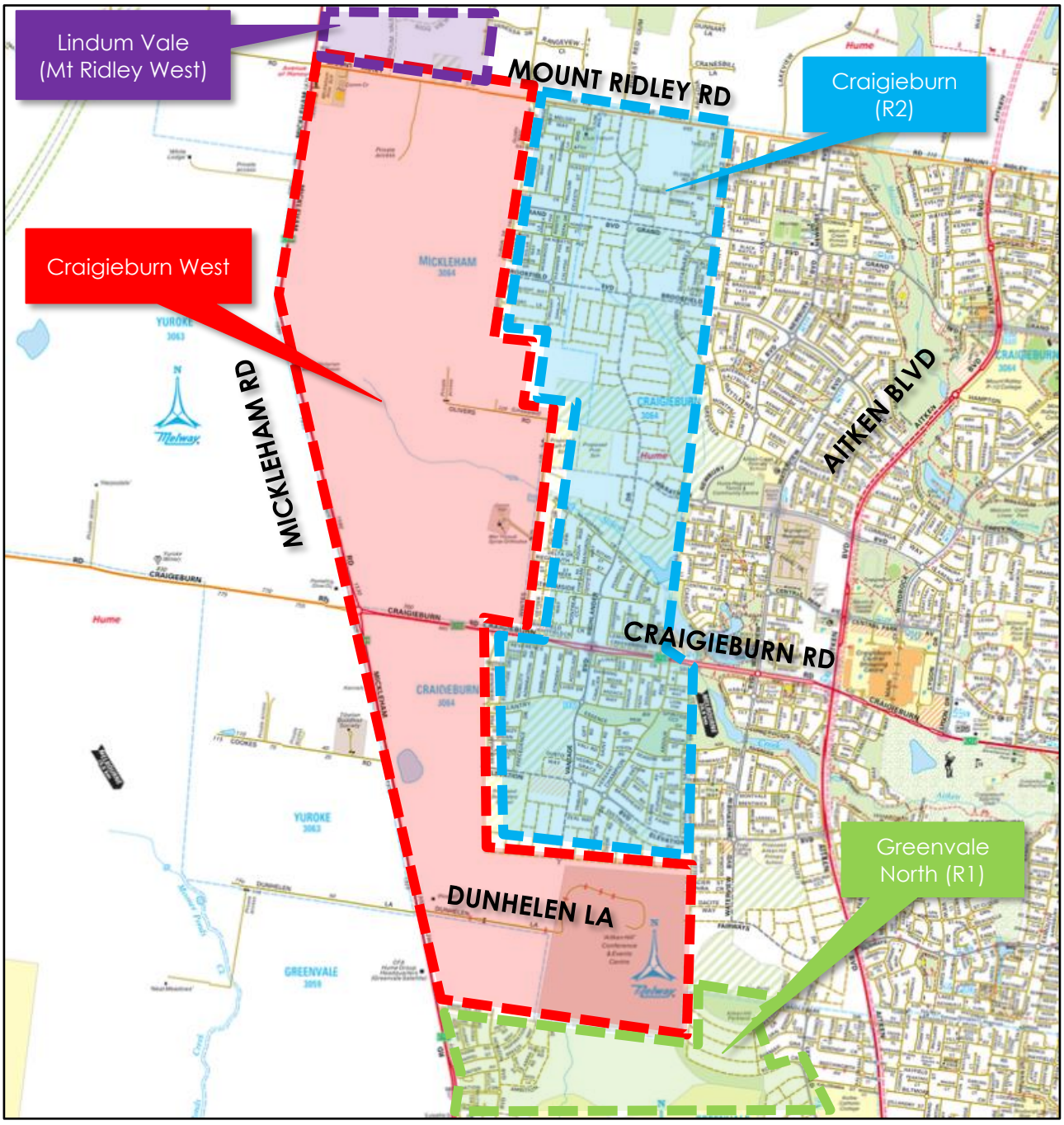
2.2 Adjacent PSP Areas

2.2.1 Context

The Craigieburn West PSP area is bordered by Mount Ridley Road to the north and Mickleham Road to the west. To the east and south the PSP area is bounded by properties, with no clearly defined road network boundaries. The PSP area is bisected by Craigieburn Road, which runs east – west through the PSP area.

In addition, several other PSP areas abut the Craigieburn West PSP, including Lindum Vale (Mt Ridley West) to the north, Craigieburn (R2) to the east and Greenvale North (R1) to the south, as shown in Figure 2 and discussed in subsequent sections of this report.

Figure 2 Site Context



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2.2.2 Craigieburn (R2)

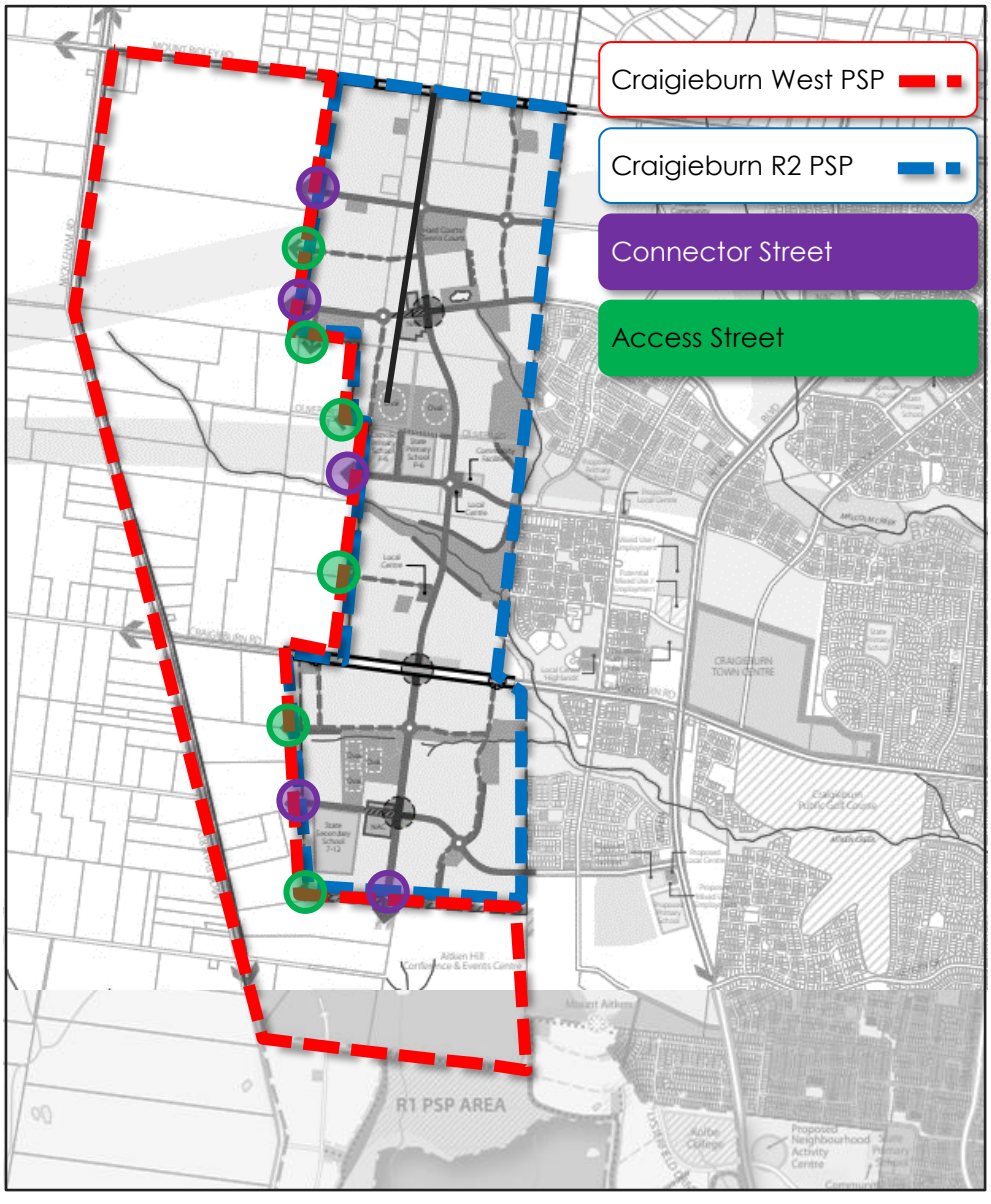
The Craigieburn (R2) PSP area is situated to the immediate east of the Craigieburn West PSP area and comprises 455 ha of land. The Craigieburn (R2) PSP was completed in 2010 with the construction of large parts of the PSP either completed or underway.

The PSP includes a number of recreation facilities, schools, employment areas and local retail centres.

Several road connections were envisaged between the Craigieburn (R2) PSP area and the Craigieburn West PSP as outlined in Figure 3. The majority of these connections will facilitate east-west connectivity between the two PSP areas and most importantly a direct connection to Mickleham Road in the southern portion of the Craigieburn R2 PSP.

Both Ashton Traffic Services Pty Ltd and Cardno prepared a Transport Impact Assessment which covered the Craigieburn R2 PSP.

Figure 3 Craigieburn (R2) Road Network Connections



2.2.3 Lindum Vale (Mt Ridley West)

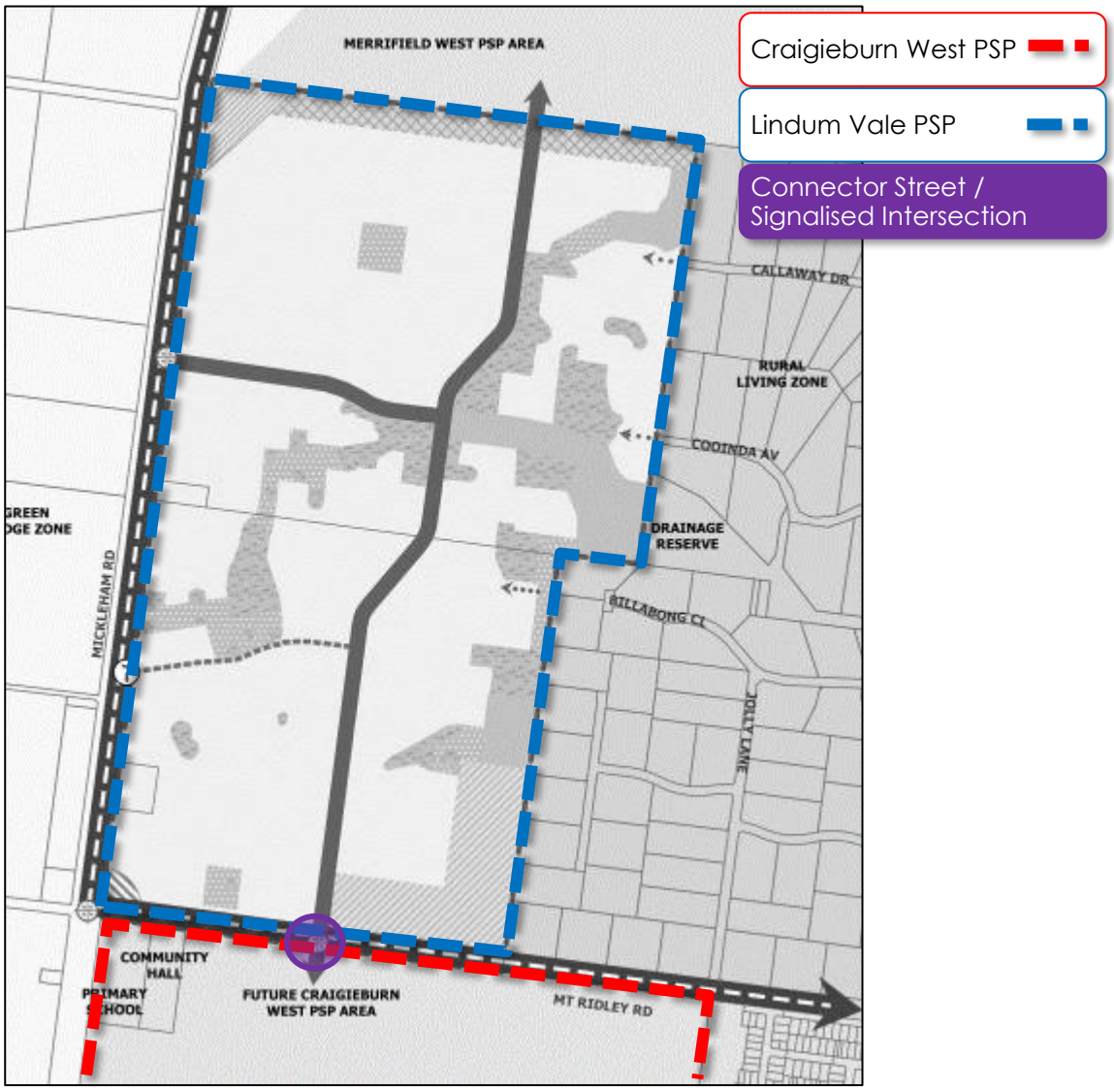
The Lindum Vale (Mt Ridley West) PSP area is situated to the immediate north of the Craigieburn West PSP area and comprises 144 ha of land. The Lindum Vale PSP was submitted for approval in July 2019. The PSP area is currently largely unoccupied.

It is noted that aside from nature reserve areas no community infrastructure is proposed within the Lindum Vale PSP area.

A single road connection is envisaged between the Lindum Vale PSP area and the future Craigieburn West PSP as outlined in Figure 4. The connection and associated signalised intersection will facilitate north-south connectivity between the two PSP areas.

It is noted that Cardno prepared a Transport Impact Assessment for the Lindum Vale PSP.

Figure 4 Lindum Vale (Mt Ridley West) Road Network Connections



2.2.4 Greenvale North (R1)

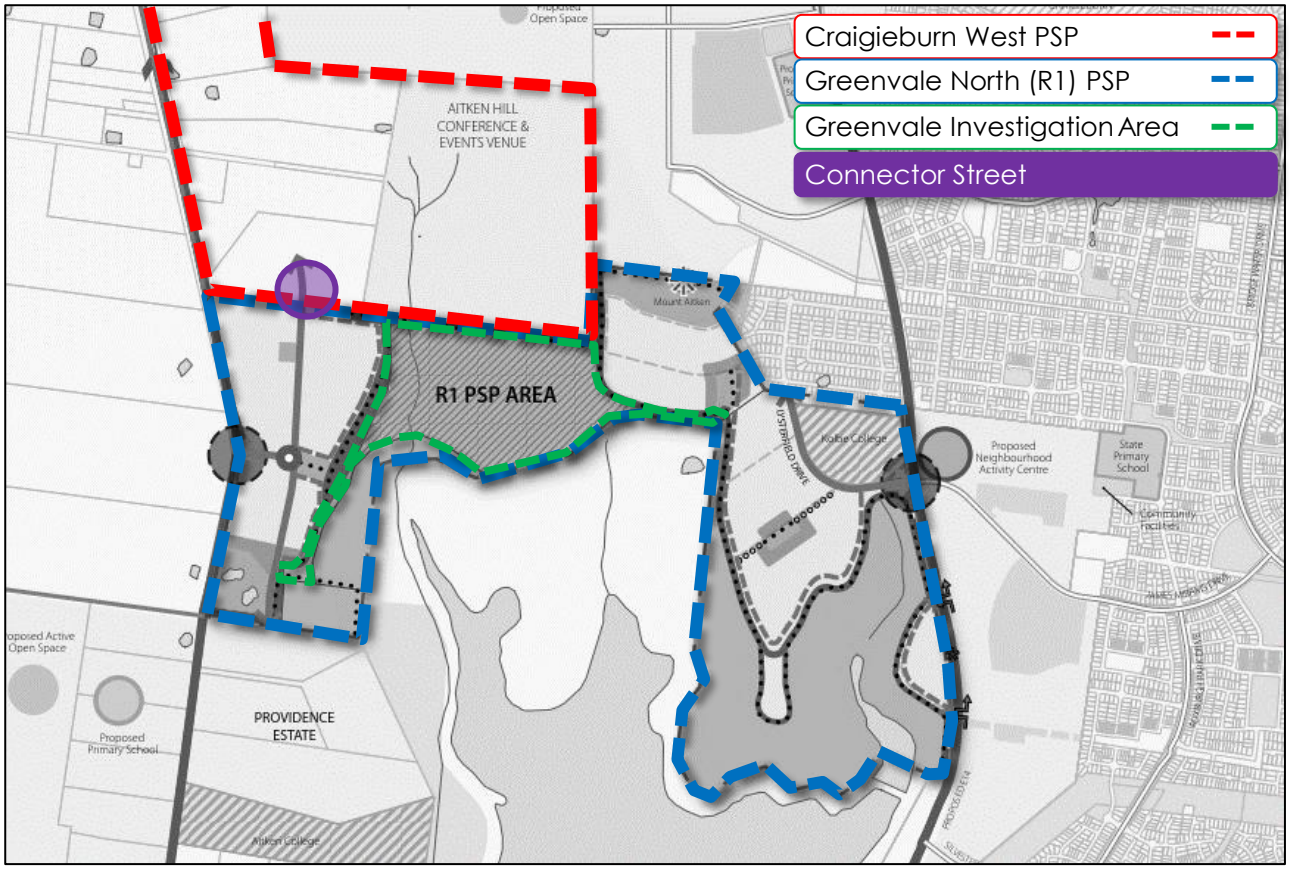
The Greenvale North (R1) PSP area is situated to the immediate south of the Craigieburn West PSP area and comprises 238 ha of land. The Greenvale PSP was approved in January 2011 with the construction of large parts of the PSP either completed or underway.

The Greenvale North PSP is predominately made of residential uses.

It is noted that the east and west sides of the Greenvale North PSP area are largely disconnected, with only the western portion of the PSP area to be directly connected to the Craigieburn West PSP area.

A single road connection is envisaged between the Greenvale North PSP area and the future Craigieburn West PSP as outlined in Figure 5. The connection will facilitate north-south connectivity between the two PSP areas.

Figure 5 Greenvale North (R1) Road Network Connections



2.3 Other Notables Uses

A number of other significant employment, shopping and recreational uses are located within the vicinity.

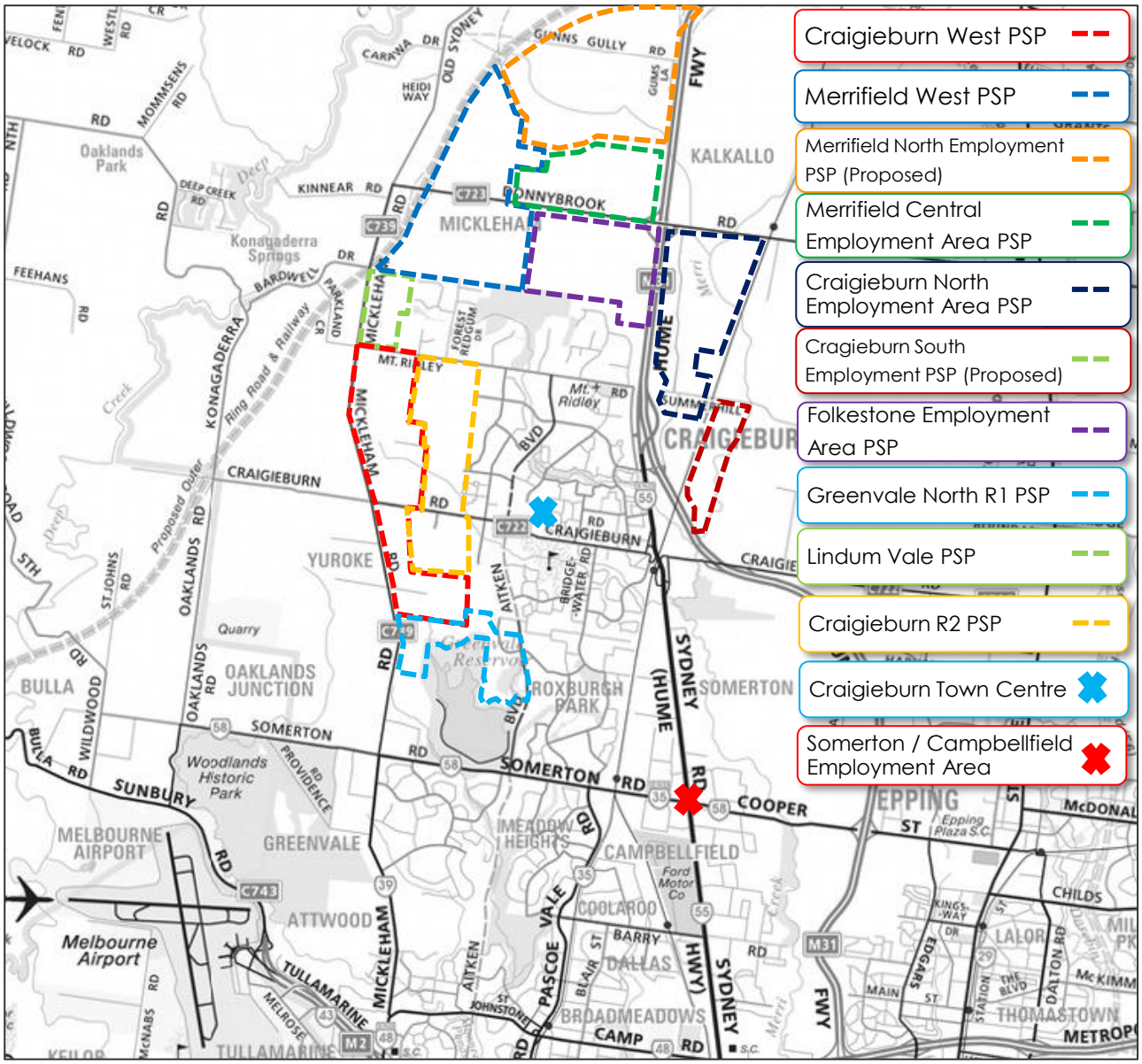
Merrifield West PSP is located to the north of the Craigieburn West PSP where several recreation facilities, schools and significant retail areas are provided.

Craigieburn town centre is located to the east of the Craigieburn West PSP where a number of recreational facilities are provided, as well as Craigieburn Central shopping centre.

Several large employment areas are located within varying distances from the Craigieburn West PSP and include the existing Somerton/Campbellfield employment area to the southeast. As well as several approved employment PSP's (Merrifield Central Employment Area, Folkestone Employment Area and Craigieburn North Employment Area), as well as several proposed employment PSPs (Merrifield North Employment and Craigieburn South Employment Area).

Figure 6 shows the other significant uses in the vicinity.

Figure 6 Notable Uses



2.4 Traffic Volumes

onemile**grid** previously prepared an existing conditions report of the Craigieburn West study area in preparation of the draft Urban Structure Plan. As part of the investigation, traffic volume surveys were undertaken by Trans Traffic Survey on behalf of **one**mile**grid** as outlined in Table 1 and Figure 7.

Table 1 Survey Summary

Survey Type	*Location*	*Times*
Peak Hour Intersection Count	Mickleham Road / Mt Ridley Road	Tuesday 12/11/2019 6:00 am – 9:30 am & 2:30 pm – 7:00 pm
	Vantage Boulevard / Craigieburn Road	
	Waterview Boulevard / Craigieburn Road	
	Mickleham Road / Craigieburn Road	
	Craigieburn Road / Debonair Parade	
	Gallantry Avenue / Vantage Boulevard	
	Elevation Boulevard / Vantage Boulevard	
Pneumatic Tube Count	Mickleham Road – North of Mt Ridley Road	12/11/2019 – 19/11/2019
	Mickleham Road – South of Mt Ridley Rd, North of Craigieburn Rd	
	Mt Ridley Road – East of Mickleham Road	
	Craigieburn Road – East of Mickleham Road	
	Mickleham Road – South of Craigieburn Rd, North of Dunhelen Ln	
	Debonair Parade – South of Craigieburn Road	
	Grand Boulevard – East of Highlander Drive	
	Vantage Boulevard – South of Craigieburn Road	
	Dunhelen Lane – East of Mickleham Road	

Figure 7 Survey Locations

2.4.1 Intersection Counts

The results of intersection counts are shown in Figure 8 and Figure 9. The combined road network peak hours have been displayed, with the AM Peak hour being 8:00am – 9:00am and the PM Peak hour being 3:30pm – 4:30pm.

Figure 8 Existing Traffic Volumes – AM Peak Hour (8:00am – 9:00am)

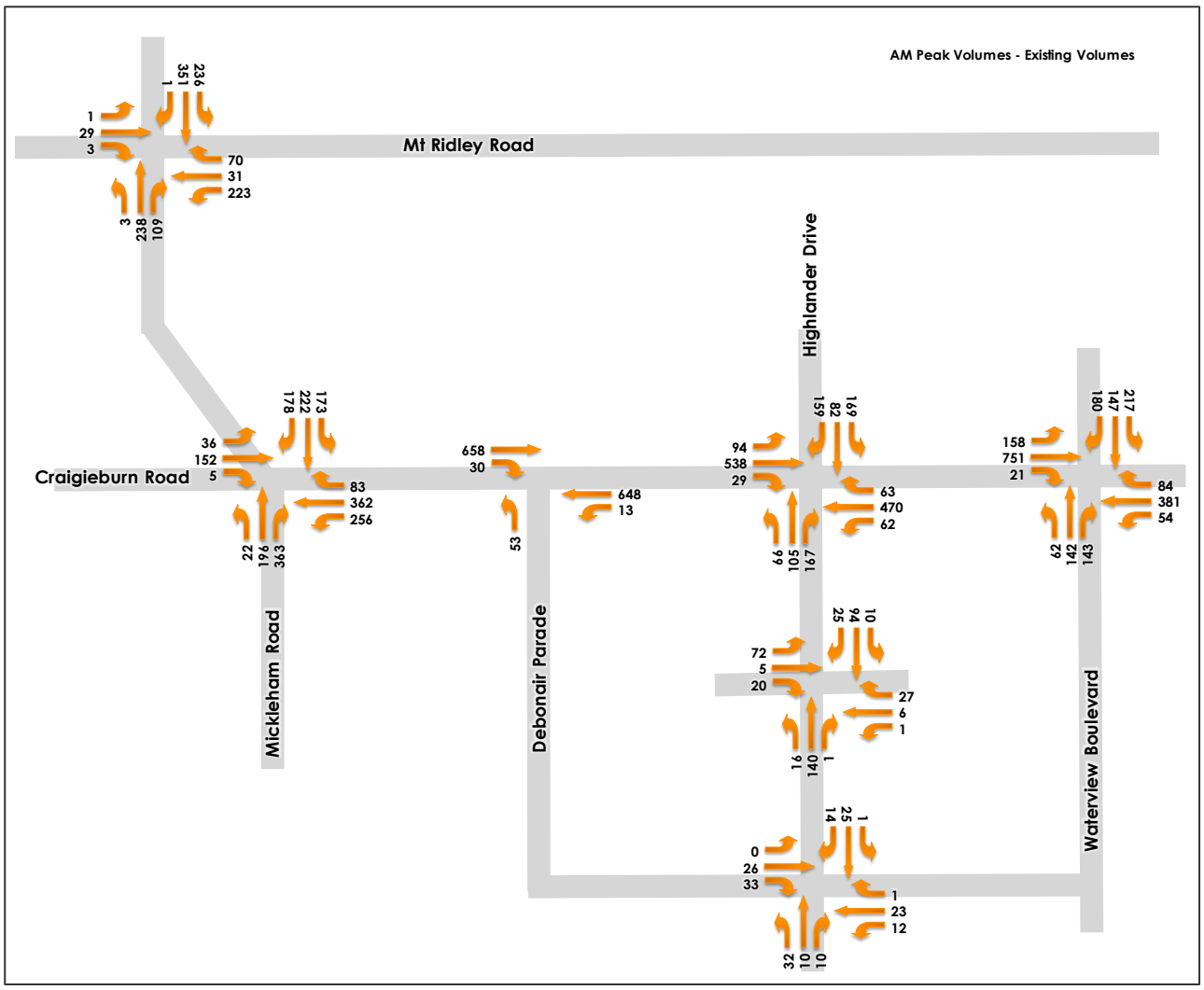
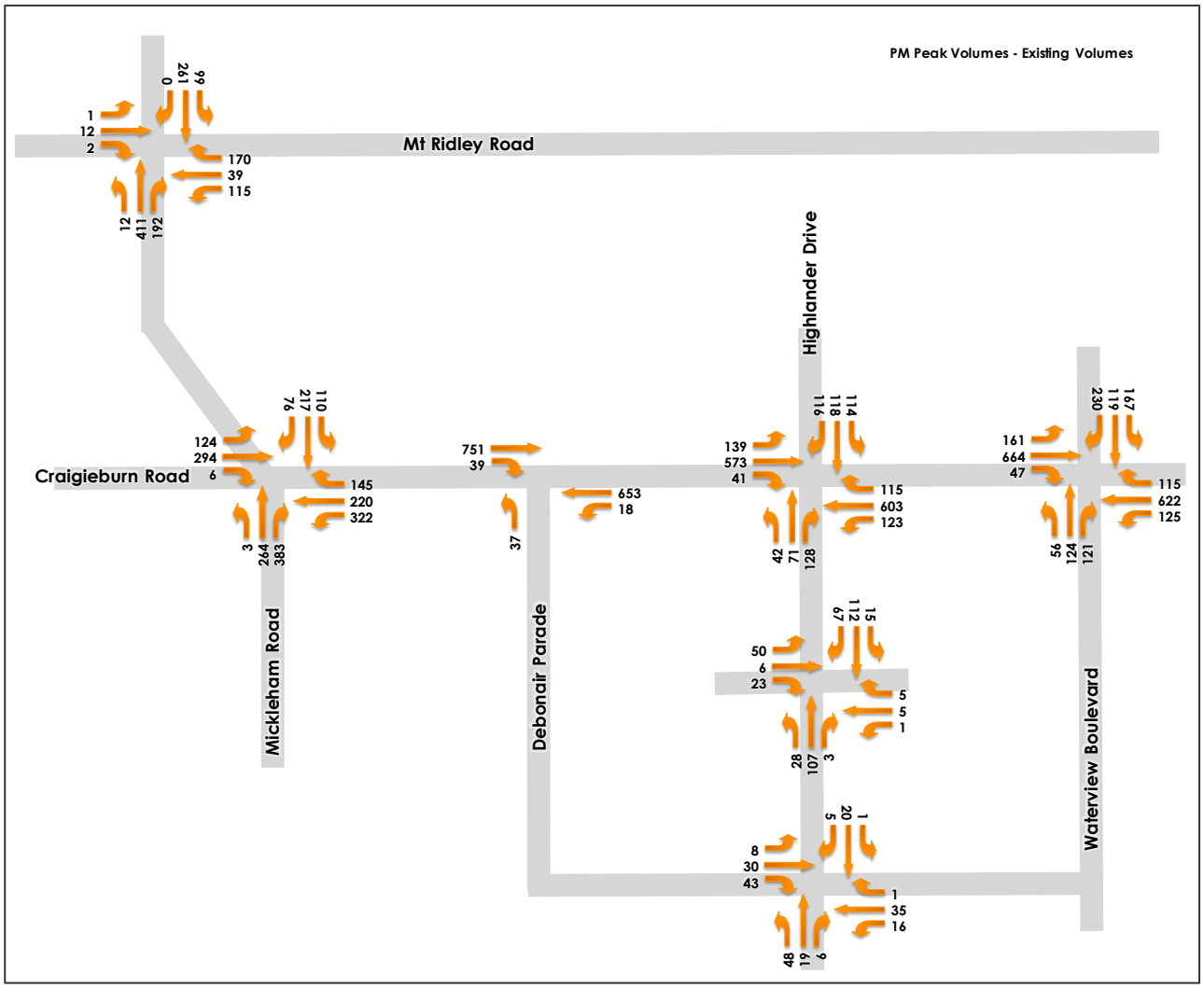


Figure 9 Existing Traffic Volumes – PM Peak Hour (3:30pm – 4:30pm)



2.4.2 Tube Counts

The results of the tube count surveys are provided in Table 2.

Table 2 Traffic Volume and Speed Surveys

Road	*Direction*	*Traffic Volume (vpd)*	*85th Percentile Speed (km/h)*
Mickleham Road – North of Mount Ridley Road	Two-Way	11,410	81
Mickleham Road – South of Mount Ridley Road, North of Craigieburn Road	Two-Way	12,167	87
Mount Ridley Road – East of Mickleham Road	Two-Way	7,948	77
Craigieburn Road – East of Mickleham Road	Two-Way	19,301	78
Mickleham Road – South of Craigieburn Road, North of Dunhelen Lane	Two-Way	17,732	78
Debonair Parade – South of Craigieburn Road	Two-Way	1,534	54
Grand Boulevard – East of Highlander Drive	Two-Way	2,876	47
Vantage Boulevard – South of Craigieburn Road	Two-Way	5,321	60
Dunhelen Lane – East of Mickleham Road	Two-Way	182	58

3 CRAIGIEBURN WEST PSP OVERVIEW

3.1 General

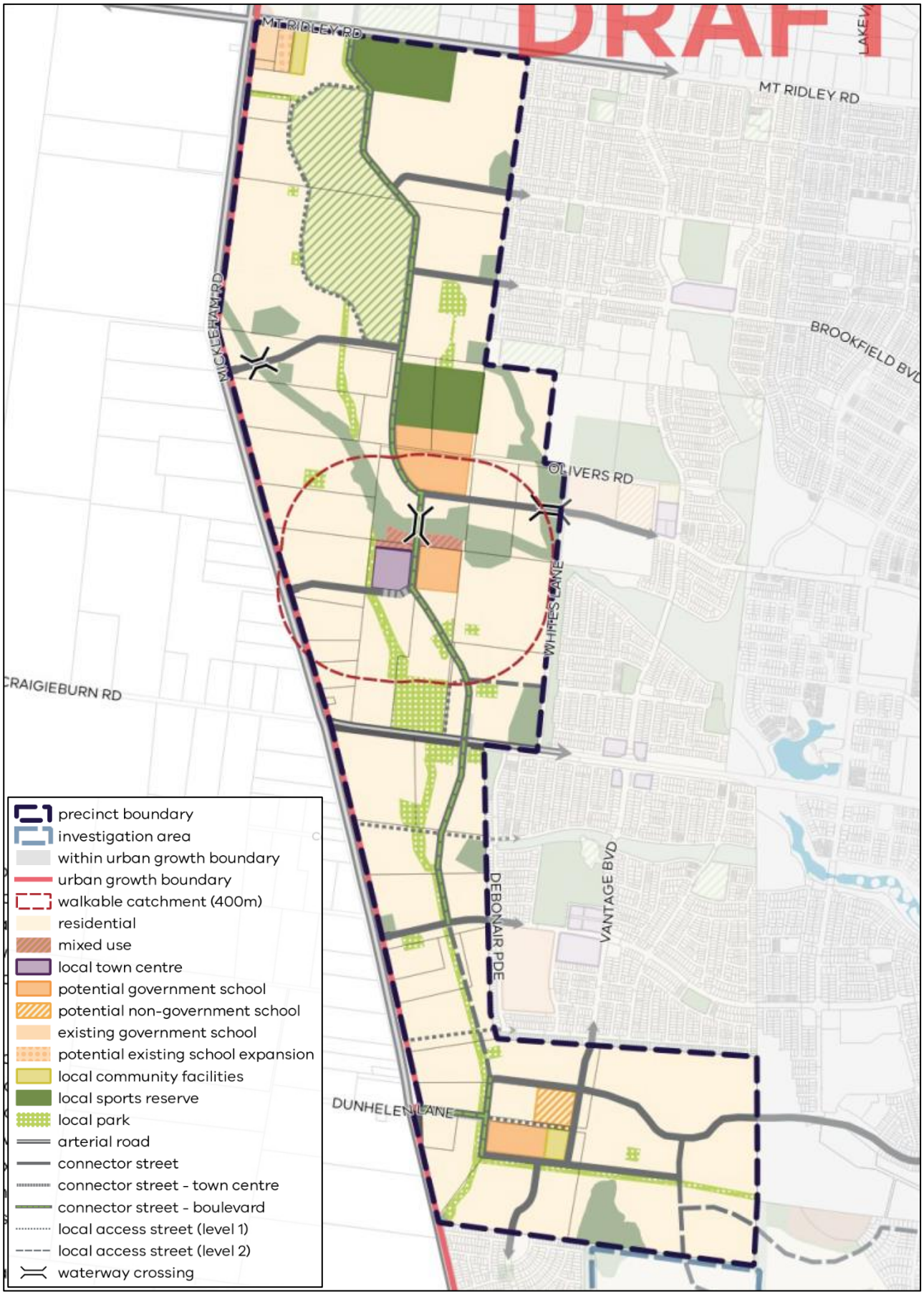
The PSP area will comprise predominantly standard-density residential development. A Local Town Centre (LTC) is proposed to be located centrally to the PSP area, approximately midway between Craigieburn Road and the extension of Marathon Boulevard (Connector Road). In addition, a local community facility and mixed-use zone is proposed adjacent to the LTC.

Five schools are proposed within the PSP area, comprising two government schools (expected to be one primary school and one secondary school) in close proximity of the LTC, and a government and non-government school (expected to both be primary schools) in the southern portion of the site. An existing government primary school is located at the south-eastern corner of the intersection between Mt Ridley Road / Mickleham Road.

A local park is proposed to bisect the PSP area in a north-south direction, beginning at the large local park in the northern portion of the site and continuing to the government school in the southern portion of the site. Two sports reserves are also proposed in the northern portion of the site.

The indicative Craigieburn West Precinct Structure Plan (draft) prepared by the VPA is shown in Figure 10.

Figure 10 Draft Craigieburn West PSP



3.2 Vehicular Access

The PSP area will largely be accessed via the existing arterial road network that runs adjacent and through the site. Craigieburn Road bisects the PSP area in an east-west alignment, whilst Mickleham Road runs along the PSP's western boundary, and Mt Ridley Road runs along the PSP's northern boundary. Access from the internal road network to the arterial road network will be as follows:

- Connector Roads – Signalised Intersections
- Access Streets – Left-in / Left-out

Additional access opportunities to the Craigieburn West PSP will be facilitated by the extension of the existing roads from the adjacent PSPs which will run through the site, as described in the sections below.

A view of the PSP access arrangements is shown in Figure 11 on page 24.

3.3 Road Network

The PSP road network has been designed generally in accordance with the principles set out in the Guidance for Planning Road Networks in Growth Areas handbook (VicRoads, 2015).

Further details of the network planning and design are presented below.

3.3.1 Arterial Roads

The PSP area will generally be serviced and accessed by the existing arterial road network as described above. Craigieburn Road, Mickleham Road and Mt Ridley Road are all slated to be duplicated to cater for additional traffic anticipated to be generated by the proposed Craigieburn West PSP, other adjacent PSPs, and general growth in the surrounding area.

3.3.1.1 Craigieburn Road

At the time of this report, Major Road Projects Victoria (MRPV) had commenced detailed designs to upgrade Craigieburn Road with a divided carriageway and an extra traffic lane in each direction between Mickleham Road and the Hume Highway. When this upgrade is complete, Craigieburn Road will have four lanes west of Whites Lane, and six lanes to the east. The upgrade will also provide new traffic lights at Waterview Boulevard to the east, upgraded intersections at Vantage Boulevard and Aitken Boulevard, a central median preventing right turns at Debonair Parade and new walking and cycling paths. Information made available by MRPV shows that construction is expected to commence in late 2020. Furthermore, Craigieburn Road is slated to be widened again in the future to ultimately provide three traffic lanes along its length.

3.3.1.2 Mickleham Road

Mickleham Road has a road reserve of 59.6 metres and currently has a single carriageway that provides for one traffic lane in each direction.

When traffic exceeds its current two lane capacity, Mickleham Road is to be duplicated to provide two traffic lanes in each direction separated by a central median.

In the ultimate, Mickleham Road is to be widened again to provide three traffic lanes in each direction.

3.3.1.3 Mt Ridley Road

Mt Ridley Road has a road reserve of 40 metres and currently has a single carriageway that provides for one traffic lane in each direction.

When traffic exceeds its current two lane capacity, Mt Ridley Road is to be duplicated to provide two traffic lanes in each direction separated by a central median, with a shared path on both sides of the road.

In the ultimate, Mt Ridley Road is to be widened again to provide three traffic lanes in each direction.

3.3.2 Local Roads

Within the PSP area, key local roads have been nominated as local access streets, connector roads or boulevard connector roads, based on a range of factors including strategic network needs, access requirements, safety, and residential amenity. An overview of the local road network is provided below.

3.3.2.1 Connector Roads

Several connector roads from the neighbouring PSPs will be extended and run through the PSP area, as well as new connector roads to ensure a permeable and connected road network to the higher-order arterial roads.

A new north-south boulevard connector road in a north-south alignment is proposed through the PSP from Elevation Boulevard to Mt Ridley Road, where it will continue as a through road into the Lindum Vale PSP.

Marathon Boulevard, Grand Boulevard and Brookfield Boulevard will be extended from the Craigieburn R2 PSP and intersect with the north-south boulevard connector road.

Elevation Boulevard will be extended from the Craigieburn R2 PSP and provide a direct connection to Mickleham Road.

In addition, two east-west aligned connector roads are proposed in the northern portion of the PSP to provide additional connections to Mickleham Road.

A new interconnected connector road network is proposed in the southern portion of the PSP which will provide permeability in the area. The network will consist of both connector road and boulevard connector road cross-sections.

Vantage Boulevard and Fairway Boulevard will be extended from the Craigieburn R2 PSP and continue through the southern portion of the proposed PSP and connect with the new connector road network.

Horizontal Boulevard will be extended from the Greenvale North PSP and connect with the new connector road network.

Dunhelen Lane will be upgraded to have a boulevard connector road cross-section and connect Mickleham Road with the new connector road network.

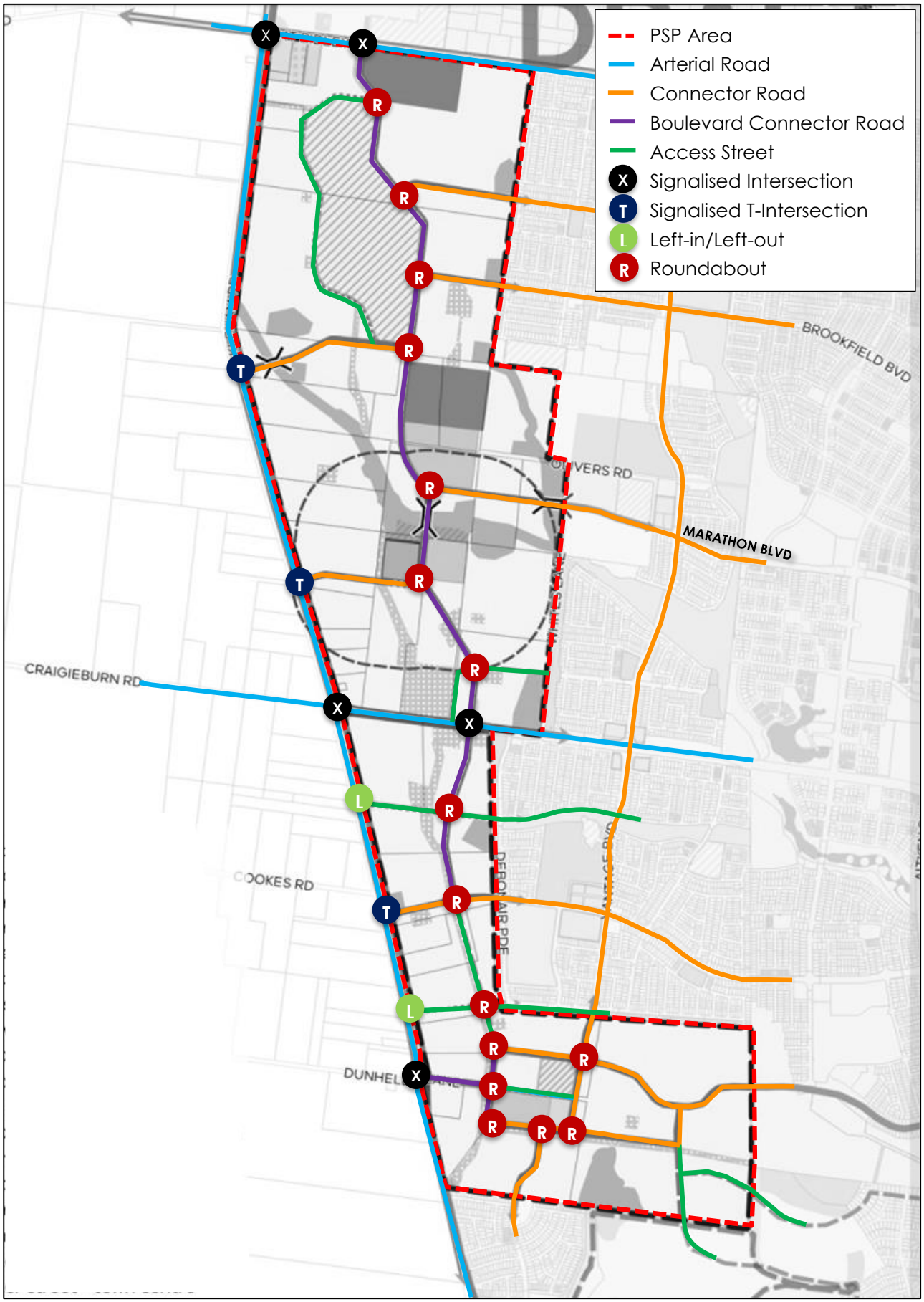
3.3.2.2 Local Access Streets

Several key local access streets are also shown within the PSP area to provide access to higher-order roads and provide for an interconnected and continuous network of streets within and between different precincts. Whilst not shown in the PSP plans, additional lower order access streets will be provided to provide access to individual dwellings and provide further permeability throughout the site.

3.3.3 Overall Road Network

A view of the PSP road network is shown in Figure 11 which includes details of the road hierarchy and intersection configurations.

Figure 11 PSP Road Network and Intersections



3.4 Pedestrian and Bicycle Network

The proposed Craigieburn West PSP layout provides a network of pedestrian and shared-user paths throughout.

All connector roads are proposed with either an off-road bicycle path on one side of the road or on-road bicycle lanes on both sides of the road.

All arterial roads are proposed with either an off-road bicycle path and separate footpath on both sides of the road or an off-road shared path on both sides of the road. Craigieburn Road which is currently in the process of having detailed designs prepared for the road is anticipated to have off-road shared paths on both sides of the road.

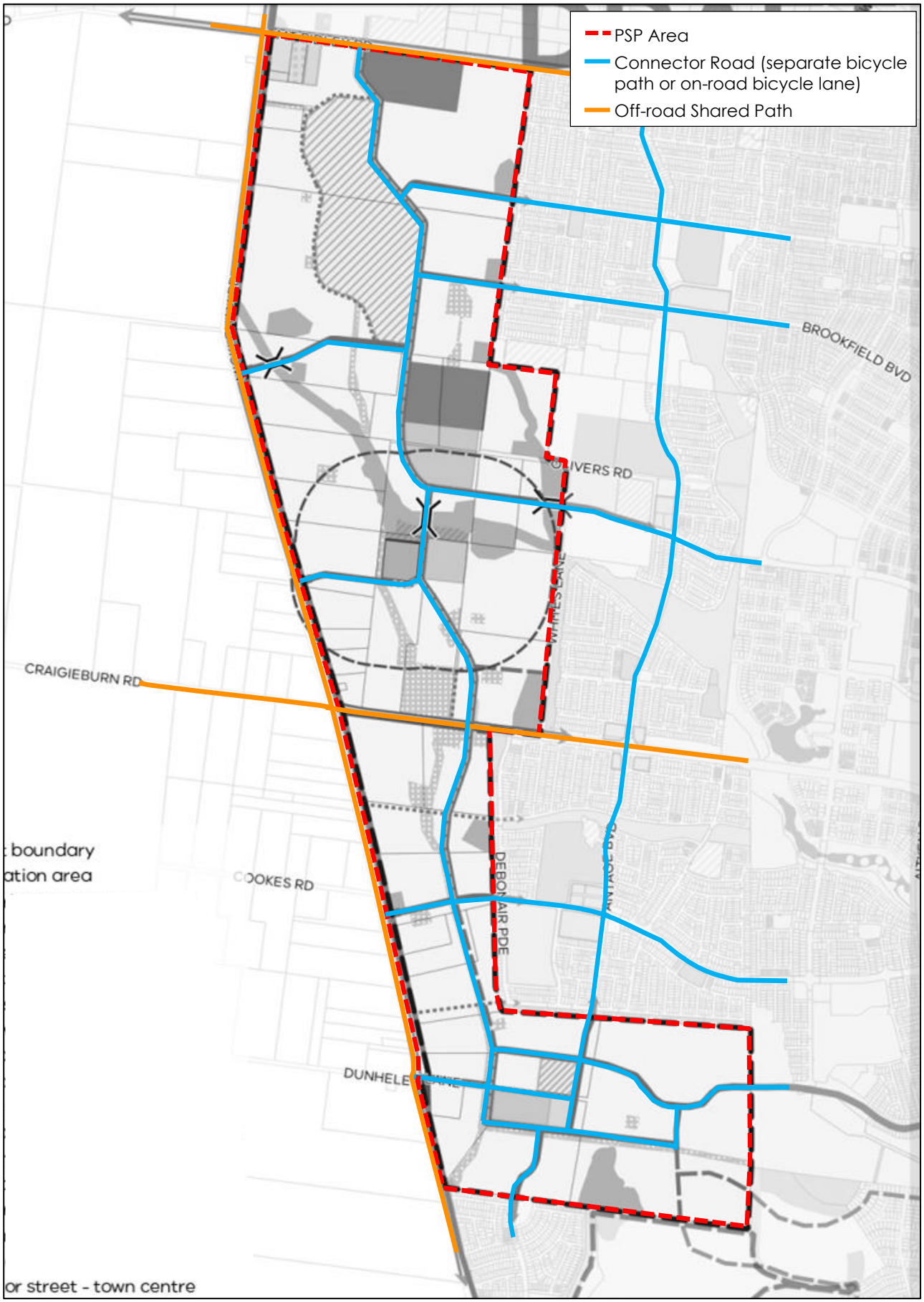
Footpaths will be provided along both sides of all connector and access roads.

The proposed internal pedestrian and bicycle network will connect with the pedestrian and bicycle network located to the north (Lindum Vale PSP), east (Craigieburn R2 PSP) and south (Greenvale North PSP).

The provision of the above footpaths, bicycle lanes and shared-user paths is expected to comfortably accommodate all pedestrian and cyclist movements through the Craigieburn West PSP.

The proposed pedestrian and bicycle network is shown in Figure 12.

Figure 12 Proposed Pedestrian and Bicycle Network

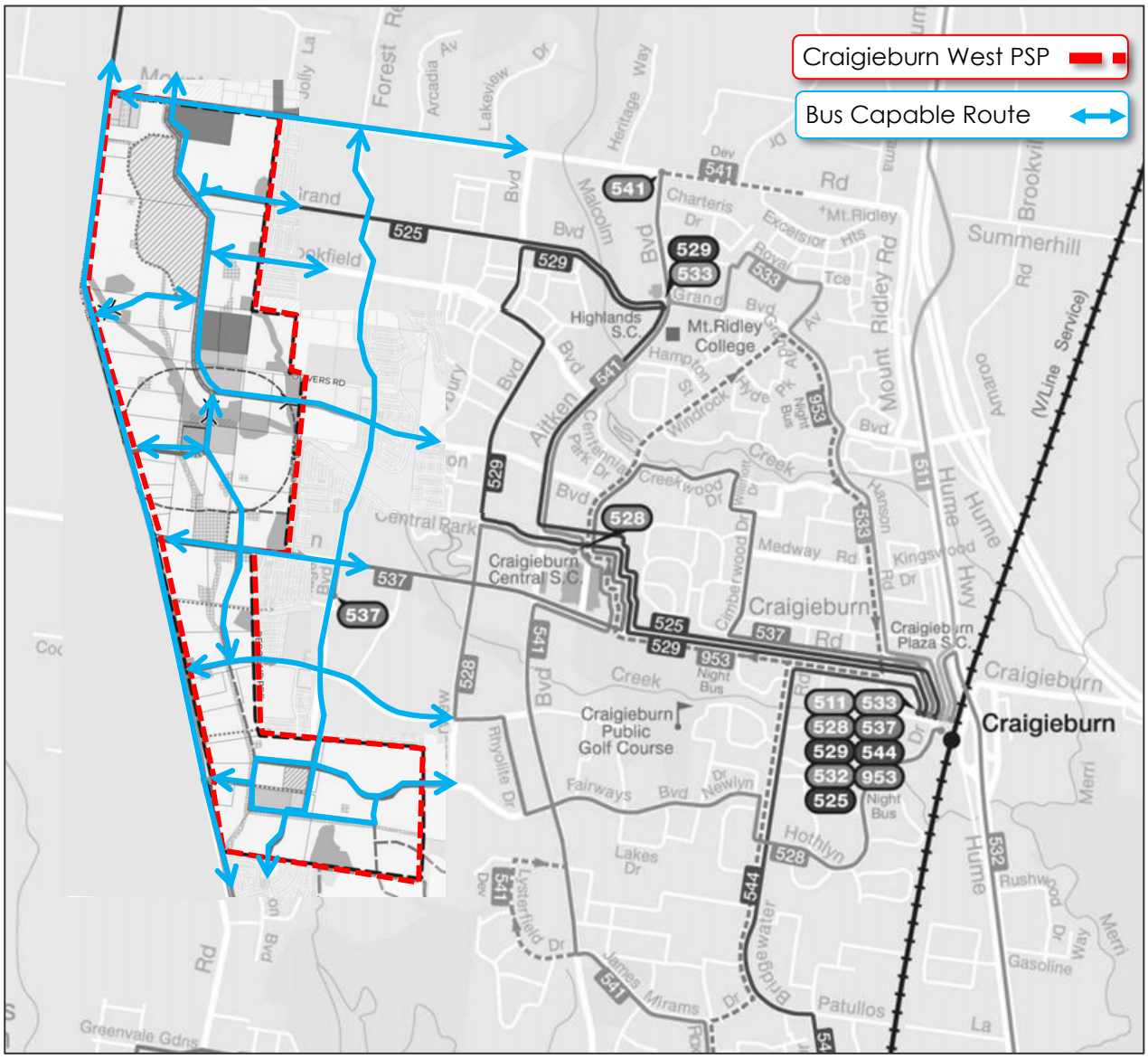


3.5 Public Transport

All of the connector roads within the PSP area will be bus-capable.

These potential bus routes will allow for the majority of the development to be within 400 metres walking distance of public transport and will allow bus services to be provided alongside the local town centre and future schools.

Figure 13 Public Transport Provision



4 TRAFFIC MODEL

4.1 Overview

In order to determine future traffic volumes generated by development of the Craigieburn West PSP, and their respective impacts on the surrounding road network, a traffic model was developed taking account of the following:

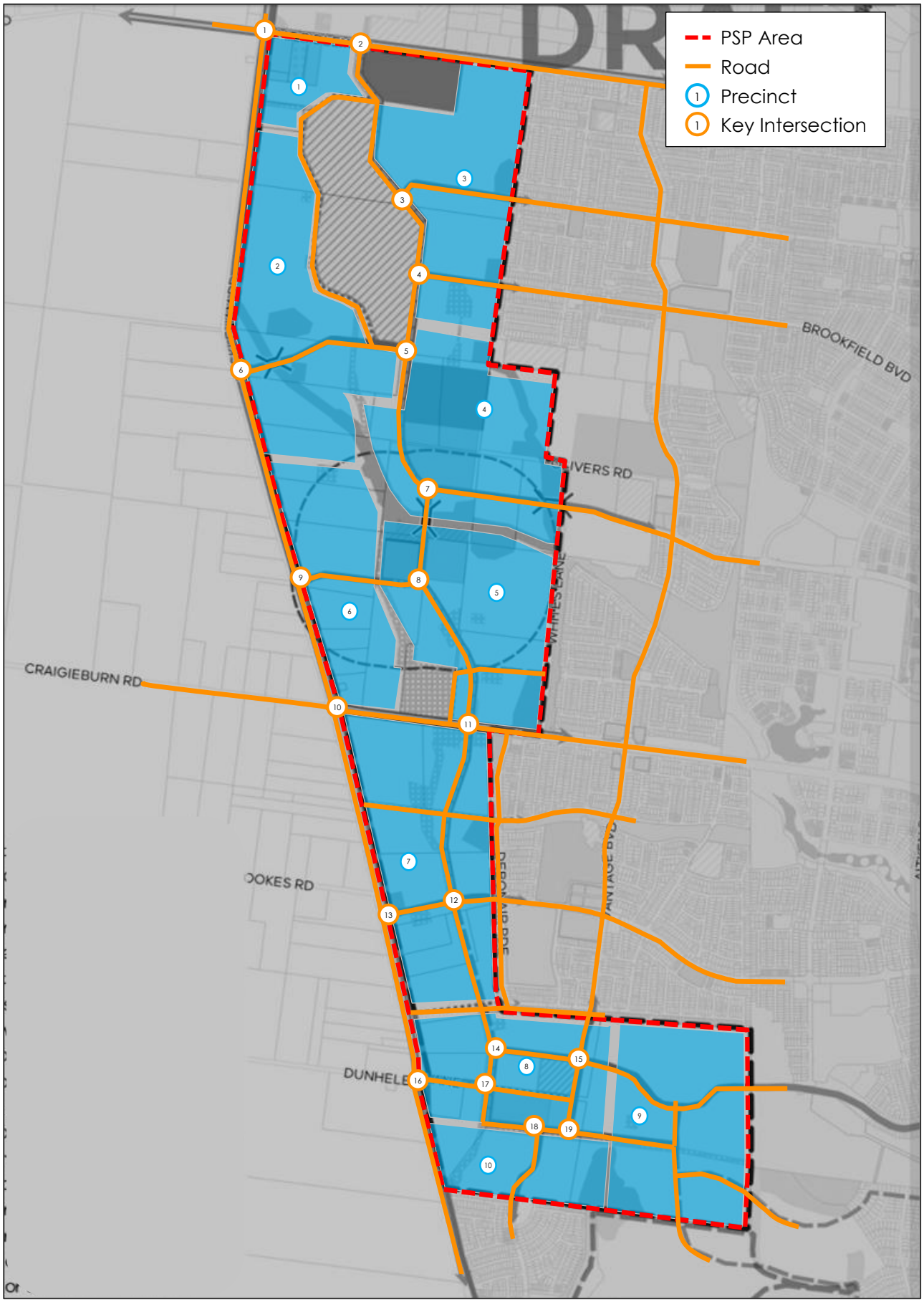
- Existing traffic volumes;
- Major road network improvements;
- Traffic generation of surrounding PSPs;
- Base conditions traffic growth;
- Proposed land uses;
- Traffic generations rates; and
- External traffic distributions.

The traffic model outputs interim and ultimate traffic volumes at key intersections and roads, which have been used to assess the requirements for the internal road infrastructure capacity.

A view of the traffic model prepared by **one**mile**grid** is shown in Figure 14 showing the key intersections and development precincts within the PSP.

The traffic model covers an interim scenario (2031) and ultimate scenario (2046) representing the 10-year and 25-year horizons respectively.

Figure 14 Traffic Model



4.2 Major Road Network Improvements

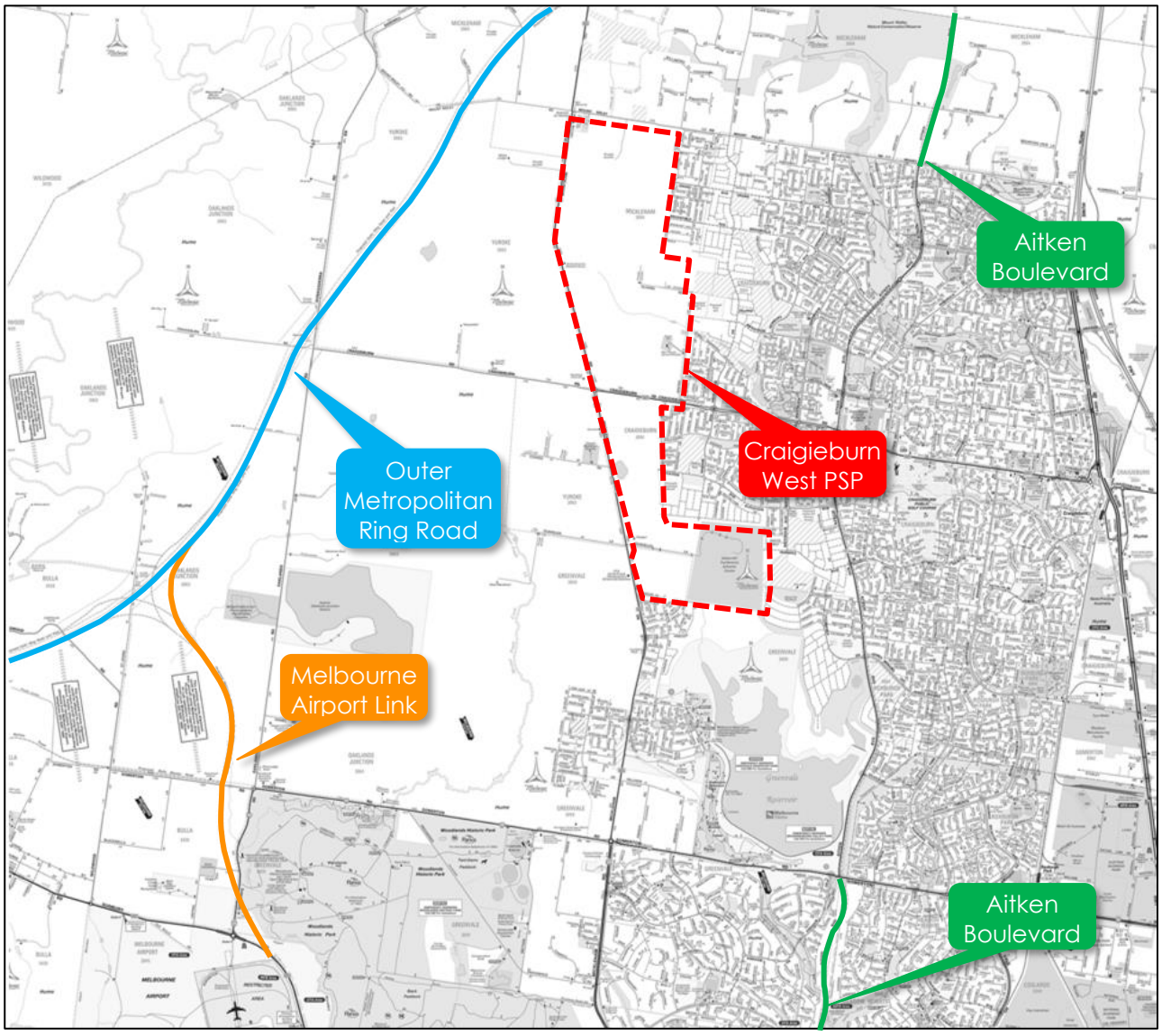
As noted above, the traffic model has been prepared for both the interim (2031) and ultimate (2046) scenarios due to the significant improvements expected to the external road network by the year 2046. The major improvements to the external road network which will have a significant impact on traffic volumes in the vicinity include the following:

- Extension of Aitken Boulevard from Mt Ridley Road to Donnybrook Road (likely to be constructed in the interim). It is noted that Aitken Boulevard is expected to be extended further north towards Wallan in the future;
- Extension of Aitken Boulevard from Somerton Road to the Western Ring Road;
- Construction of the Outer Metropolitan Ring Road (understood to be accessed via interchanges at Craigieburn Road and Donnybrook Road further north); and
- Construction of the Melbourne Airport Link to connect the Outer Metropolitan Ring Road with Sunbury Road (Tullamarine Freeway).

The above road improvements will provide additional road connections throughout the vicinity which is expected to significantly reduce the through traffic volumes along Mickleham Road.

A view of the above road improvements is shown in Figure 15.

Figure 15 Major Road Network Improvements



4.3 Traffic Growth

4.3.1 Traffic Generation of Surrounding PSPs

A summary of the impacts of each PSP is outlined below.

4.3.1.1 Merrifield West PSP and Lindum Vale PSP

The Lindum Vale PSP is located on the northern side of Mt Ridley Road, adjacent to the subject site. In 2014, Cardno prepared a Transport Impact Assessment for the Lindum Vale PSP which took into consideration the Lindum Vale PSP, as well as the development of Merrifield West PSP which is located further north of the site, which had a traffic model prepared for the interim and ultimate scenarios by SMEC in 2012.

Reference is made to the traffic model that was prepared for both these PSPs for both the interim and ultimate scenarios. The traffic reports prepared for both PSPs took into consideration the construction of the Outer Metropolitan Ring Road, extension of Aitken Boulevard, as well as the delivery of multiple employment areas in the north (Merrifield Employment Park and Folkestone Employment Park) which reduces the need for residents to drive south towards the Melbourne CBD and other employment areas for work compared to expected distributions based on existing land use distribution around the area.

It is noted that all traffic generated by the Lindum Vale PSP which is travelling south or west is required to travel south via Mickleham Road, and therefore under ultimate conditions, a portion of this traffic is expected to travel west along Craigieburn Road to use the Outer Metropolitan Ring Road, which wouldn't be the case in the interim scenario.

The expected traffic volumes at the intersections of Mickleham Road / Mt Ridley Road and Mt Ridley Road / Marathon Boulevard as a result of the Lindum Vale and Merrifield West PSP is provided below, reproduced from the modelling undertaken for the Merrifield West and Lindum Vale PSPs.

Figure 16 Interim Traffic Volumes from Lindum Vale and Merrifield West PSP

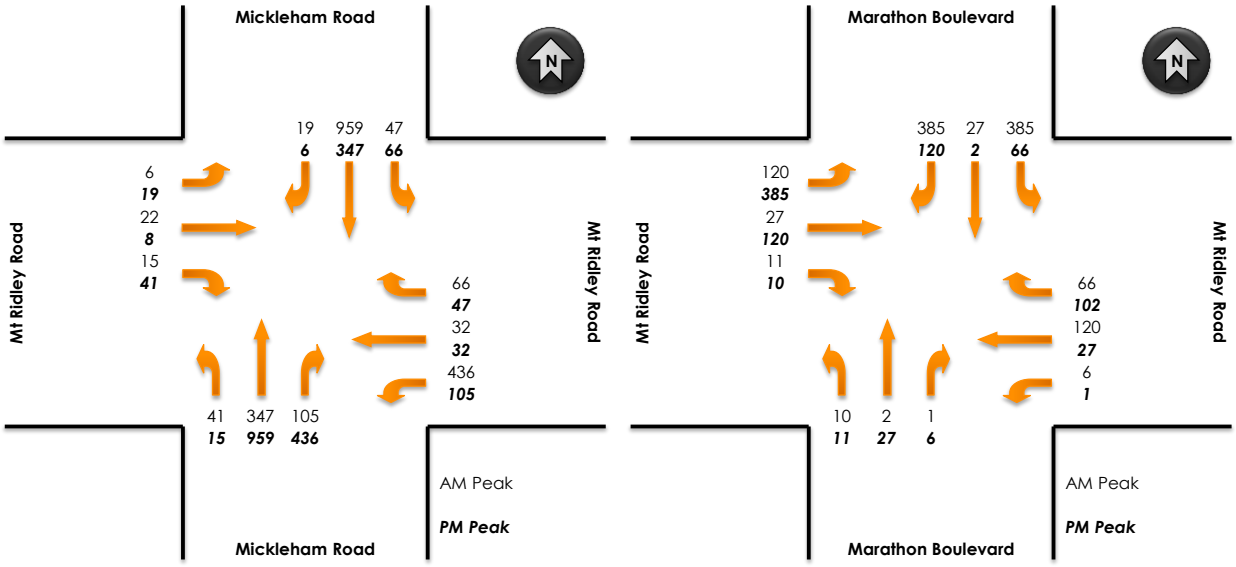
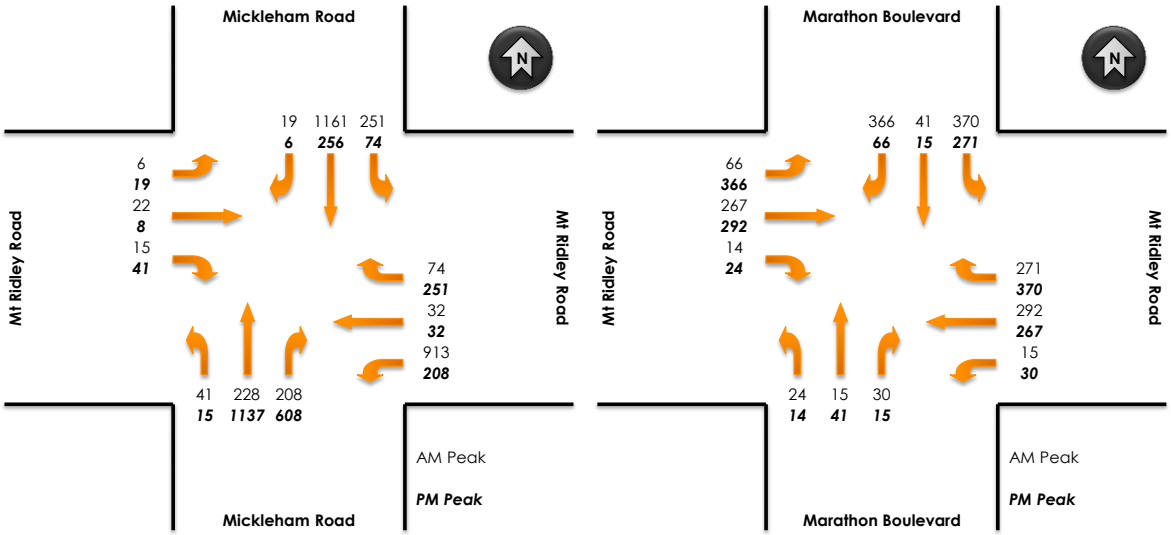


Figure 17 Ultimate Traffic Volumes from Lindum Vale and Merrifield West PSP



4.3.1.2 Craigieburn R2 PSP

The Craigieburn R2 PSP is located along the Craigieburn West PSP's eastern boundary. Ashton Traffic Services Pty Ltd prepared a traffic model of the PSP for Growth Areas Authority (now Victorian Planning Authority) in February 2010. In addition, Cardno prepared a Transport Impact Assessment for the Aston Estate (located within the Craigieburn R2 PSP) in November 2010 which included traffic modelling for the entire Craigieburn R2 PSP area. It is noted that the Cardno traffic report used the traffic volumes modelled within the Ashton Traffic Services report as a 'base' before further refining the projected volumes.

The modelling undertaken is of significance to the Craigieburn West PSP as the following roads assessed in the modelling connect through into the Craigieburn West PSP area:

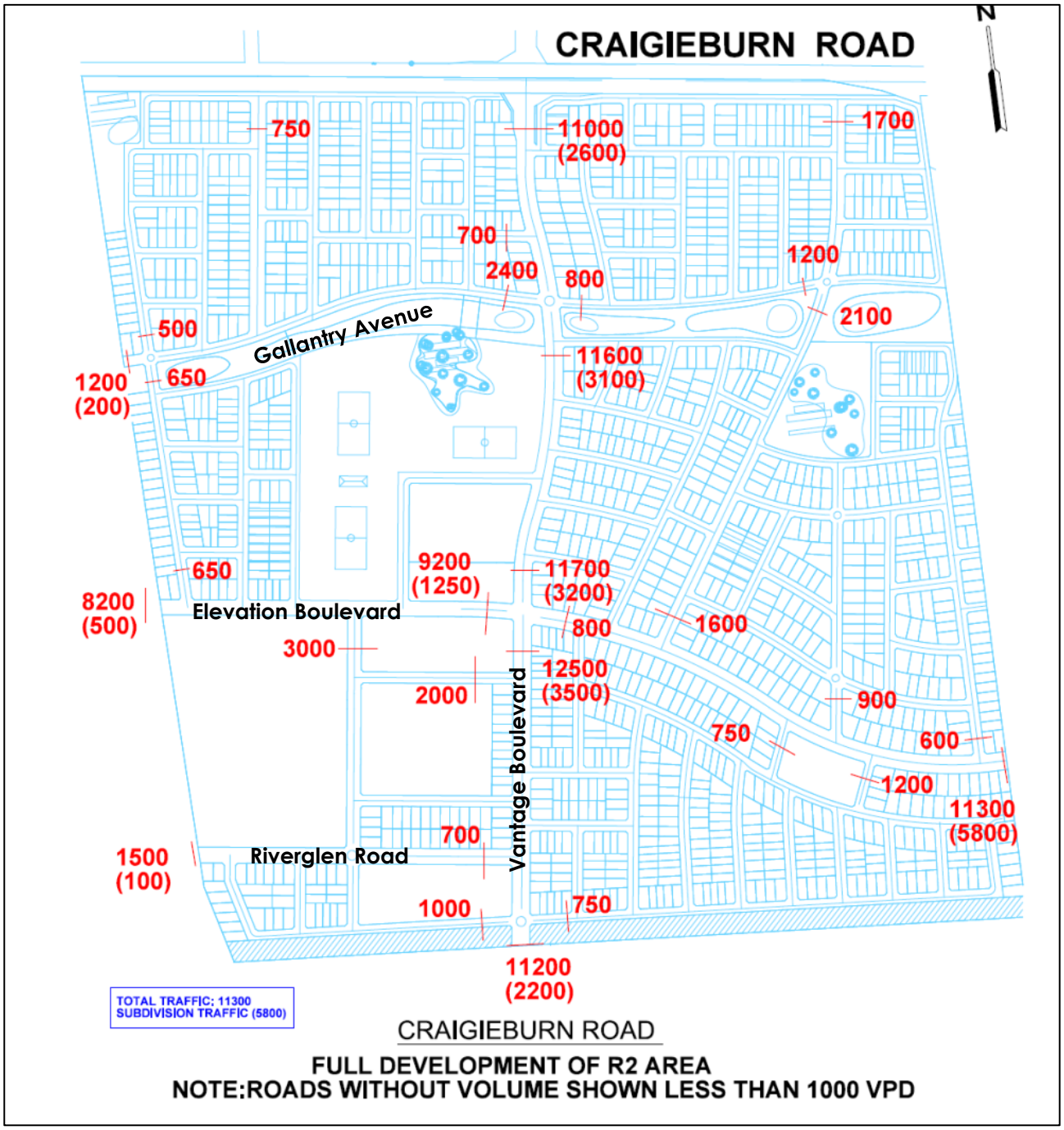
- Gallantry Avenue;
- Elevation Boulevard;
- Riverglen Drive; and
- Vantage Boulevard.

4.3.1.2.1 Cardno Traffic Report

Noting the additional information Cardno was provided regarding the internal road network of the Craigieburn R2 PSP, it will be used for projected volumes within the area due to the additional level of detail and refinement to the Ashton Traffic Services model. The daily through volumes along Vantage Boulevard and Elevation Boulevard did not differentiate by more than 4% between the Cardno and Ashton Traffic Services traffic report.

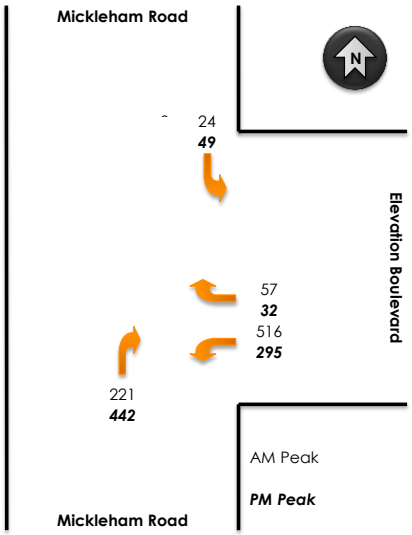
Figure 18 shows the ultimate traffic volumes from the Aston Estate modelling undertaken by Cardno.

Figure 18 Aston Estate Ultimate Traffic Volumes



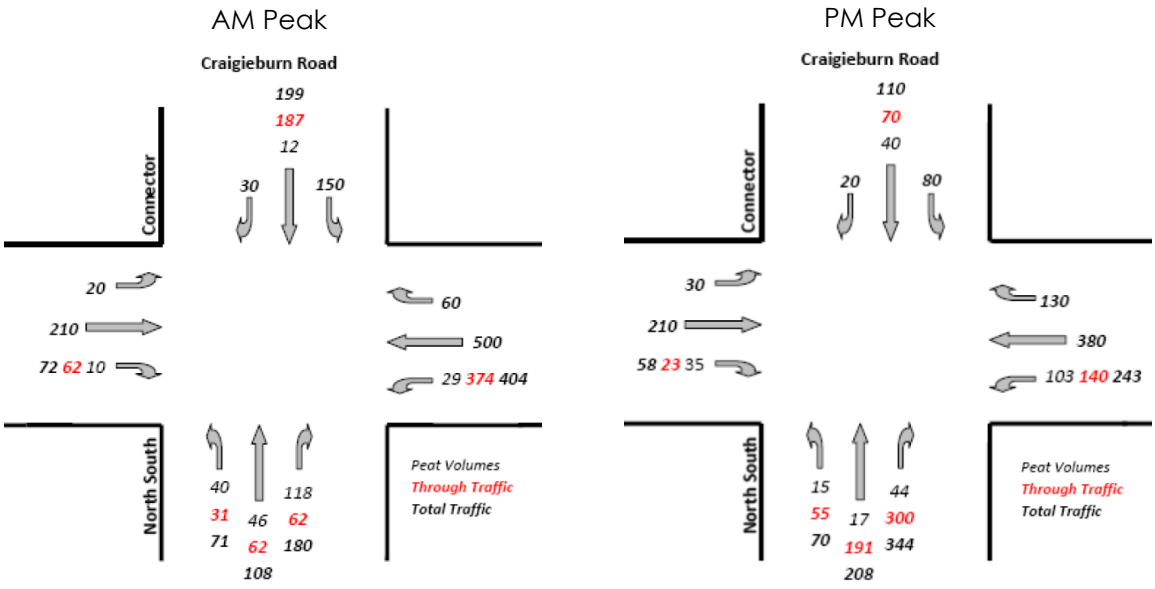
The distribution of traffic volumes anticipated to be generated by the Aston Estate at the intersection of Mickleham Road / Elevation Boulevard is shown below in Figure 19. The ultimate traffic volumes are based on the projected 8,200 vehicles per day along Elevation Boulevard as outlined in the Cardno modelling. A traffic distribution of 90% of traffic travelling south along Mickleham Road and 10% of traffic travelling north (**one**mile**grid** assumption based on the road network and surrounding land uses) along Mickleham Road has been adopted for the turning movements.

Figure 19 Ultimate Traffic Volumes from Craigieburn R2 PSP



The Aston Estate traffic report also projected that a total of 11,200 vehicles per day are expected along Vantage Boulevard at the boundary of the Craigieburn R2 PSP and the Craigieburn West PSP. This traffic is to comprise of both of non-Craigieburn R2 through traffic and Craigieburn R2 PSP traffic. An extract of the turning movements at the intersection of Vantage Boulevard / Craigieburn Road is shown below in Figure 20, with the 'Peat Volumes' referring to the Aston Estate traffic.

Figure 20 Future Turning Movements - Vantage Boulevard / Craigieburn Road



As shown above, the Cardno model anticipates that a large amount of non-Craigieburn R2 traffic will travel south via Vantage Boulevard to access Mickleham Road during the AM peak and vice versa during the PM peak (i.e. through traffic between Craigieburn Road and Mickleham Road). This non-Craigieburn R2 traffic results in approximately 4,400 vehicles per day using Vantage Boulevard to access Mickleham Road. Additionally, it is expected that the non-Craigieburn R2 traffic currently access Mickleham Road directly from Craigieburn Road and the extension of Vantage Boulevard will result in a diversion of traffic travelling between Mickleham Road and Craigieburn Road.

This traffic is expected to be further distributed within the Craigieburn West PSP site between the Aston Estate and the arterial road network.

Furthermore, **one**mile**grid** has reviewed the traffic volumes within the Aston Estate PSP report and considers them reasonable for the interim conditions. However, the projected volumes southbound along Mickleham Road are considered high for the ultimate scenario for the following reasons:

- The construction of the Outer Metropolitan Ring Road will result in a moderate amount of southbound traffic using Craigieburn Road to travel south and west;
- The delivery of the Merrifield Central Employment Area PSP and Folkstone Employment Area PSP will result in a small percentage of traffic travelling north for work; and
- The delivery of the Craigieburn North Employment Area PSP and Craigieburn South Employment Area PSP will result in a moderate percentage of traffic travelling east for work.

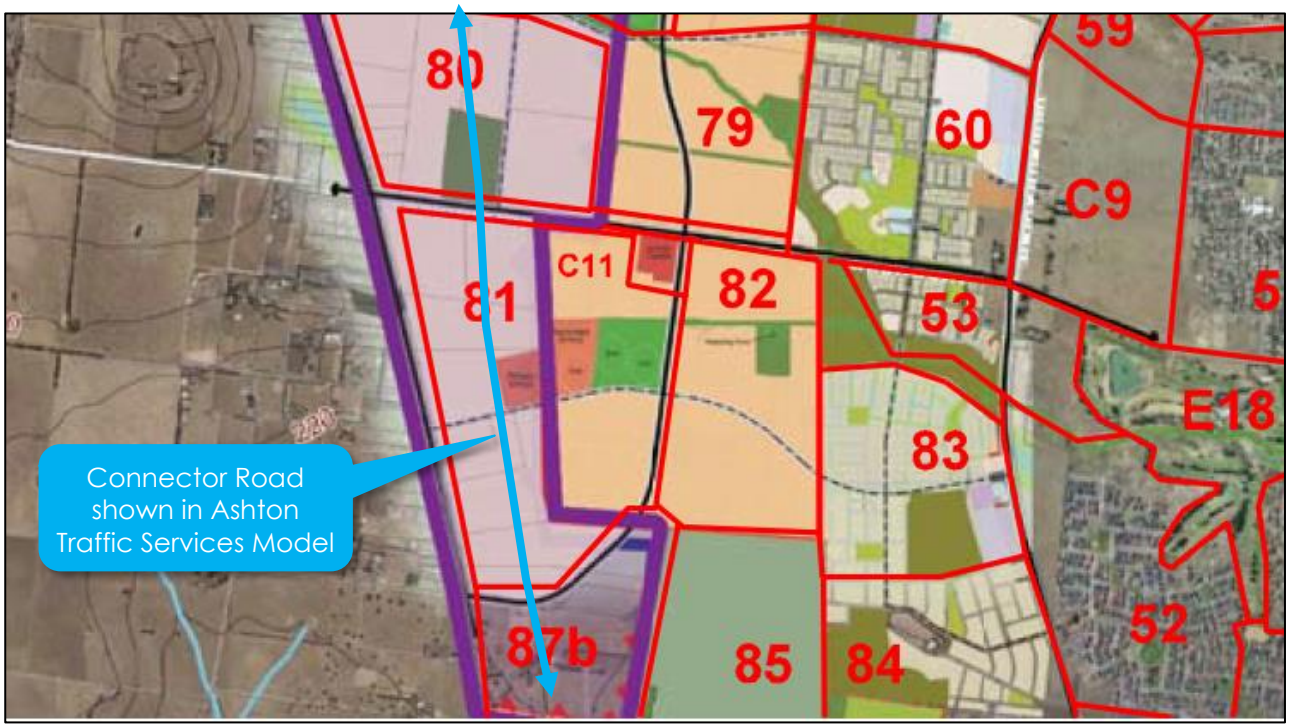
As such, the modelling for the ultimate scenario for the Craigieburn West PSP adopts a different distribution for traffic to the Aston Estate modelling.

4.3.1.2.2 Ashton Traffic Services Report

As mentioned above, the Cardno report used the Ashton Traffic Services traffic model as a 'base' for volumes within the vicinity before undertaking further refinement to the projected volumes. It is noted that the Ashton Traffic Services traffic model for the Hume Corridor included various zones within the municipality which estimated the anticipated households in 2031, total jobs, school enrolments and retail floor areas for each zone. These projected yields allowed for a traffic model to be prepared which project the daily traffic volumes along all major roads within the Hume Corridor.

Furthermore, the modelling included zones which are located within the proposed Craigieburn West PSP. Of note to this report is Zone 87b (shown in Figure 21) which assumed that a total of 545 dwellings may be provided in this area equating to 4,905 vehicles movements per day.

Figure 21 Traffic Zones – Extract from Ashton Traffic Services Report



Extract taken from original traffic model before Vantage Boulevard was recoded as a connector road.

There are no distribution assumptions provided for this, however with the North-South Connector Road shown within the Craigieburn West PSP area it is anticipated that no more than 20% of the total traffic for Zone 87b would have used Vantage Boulevard to access the northern portion of the Craigieburn R2 PSP or the Craigieburn Town Centre. Based on these assumptions, it is expected

that the future traffic volumes along Vantage Boulevard are required to be reduced by approximately 980 vehicles per day if including this area within the Craigieburn West PSP traffic model.

4.3.2 Through Traffic Growth

For the purposes of a conservative analysis, a growth rate of 1% per year (compound) has been applied to several non-arterial roads within the vicinity of the site over a 10-year period (interim) and 25-year period (ultimate), equivalent to a 10.5% and 28.2% increase in traffic volumes respectively along the non-arterial roads. The traffic growth has been applied to the east-west aligned connector roads in the northern portion of the site. Whilst no growth was applied to Vantage Boulevard and Elevation Boulevard in the southern portion of the site where the Cardno (Aston Estate) traffic volumes were used.

In addition, a growth rate of 3% per year (compound) has been applied to Craigieburn Road traffic volumes over a 10-year period (interim) and 25-year period (ultimate), equivalent to a 34.4% and 109.4% increase in traffic volumes respectively. Whilst the Mickleham Road and Mt Ridley Road projected traffic volumes were based on the Lindum Vale PSP.

It is acknowledged that a growth rate of 4% was adopted for earlier modelling forecasts, however since those previous assessments updated traffic surveys were undertaken to capture traffic volume growth generated by development along the Craigieburn Road corridor.

Additional modelling may need to be undertaken to understand the impact of the Outer Metropolitan Ring Road on Craigieburn Road, however that is considered to be outside the scope of the Craigieburn West PSP. For the purposes of this assessment it is considered that the growth rates adopted make allowance for traffic volumes to increase with the connection of Craigieburn Road to the Outer Metropolitan Ring Road to the west of Mickleham Road, near Oaklands Road.

It is expected that the Merrifield West PSP and Lindum Vale PSP traffic models that were outlined above sufficiently capture the anticipated future traffic volumes along Mickleham Road and Mt Ridley Road and therefore these volumes will be used for the 'base case' for arterial roads within the northern portion of the site.

4.4 Future Base Case Traffic Volumes

4.4.1 Overview

onemile**grid** has used the traffic reports outlined above and the expected traffic growth within the area to model the future traffic conditions within the vicinity for both the interim and ultimate conditions.

The assumptions and expected future traffic volumes are presented below.

4.4.2 Interim (10 Year Horizon)

The following assumptions have been made for the interim conditions:

- Through volumes along the internal road network have been included for the connector roads within the southern portion of the site, generally bounded by Mickleham Road, Craigieburn Road, and the Aston Estate. Currently, due to the incomplete nature of the road network between the Aston Estate and Mickleham Road, vehicles from the Aston estate are required to travel north to Craigieburn Road or use Aitken Boulevard which is located further east of the site to access Mickleham Road, whilst the through roads within the southern portion of the Craigieburn West PSP will provide for a direct connection between the Aston estate and Mickleham Road, and the 'base case' scenario makes allowances for these volumes to be redistributed;
- A reduction of 980 vehicles per day was applied to the abovementioned through traffic along Vantage Boulevard due to a portion of the Craigieburn West PSP (Zone 87b) being accounted for within the Ashton Traffic Services model;
- Any additional through volumes along new connector roads in the northern portion of the site (north of Craigieburn Road) are expected to be negligible. Vehicles wishing to travel south along Mickleham Road are able to travel south along Vantage Boulevard to Craigieburn Road to access Mickleham Road, which is expected to be favoured over the less direct east-west connections proposed within the Craigieburn West PSP;
- The through volumes previously modelled along Elevation Boulevard have been adopted for Elevation Boulevard, and have been applied to the intersection with Mickleham Road;
- The through volumes for Elevation Boulevard have also been applied to Dunhelen Lane, and have been applied to the intersections with Mickleham Road. It is noted that Dunhelen Lane is expected to gain access to Vantage Boulevard via a signalised intersection and therefore a large portion of traffic wishing to access Mickleham Road will continue south along Vantage Boulevard and gain access to Mickleham Road via Destination Drive;
- Provision has been made for additional through volumes along Fairways Boulevard (200 vehicles per hour during the AM and PM peak);
- The traffic movements modelled at the intersections of Mickleham Road / Mt Ridley Road and Mt Ridley Road / Marathon Boulevard as part of the Lindum Vale and Merrifield West PSP have been adopted with no changes to traffic distributions;
- A 34.4% increase (3% for 10 years) has been applied to all existing through movements and turning movements along Craigieburn Road;
- After the above growth was applied to Craigieburn Road, a reduction of 4,400 vehicles per day was applied to the daily volumes (and proportionately peak hour volumes) between Craigieburn Road (west of Vantage Boulevard) and Mickleham Road (north of Dunhelen Lane) to account for traffic utilise Vantage Boulevard for travel between Craigieburn Road and Mickleham Road;
- The through volumes along the northern portion of Mickleham Road (north of Craigieburn Road) have been calculated using the turning movements under interim conditions at Mickleham Road / Mt Ridley Road which were provided as part of the Lindum Vale PSP; and
- The Mickleham Road through movements at the intersection of Mickleham Road / Craigieburn Road have been calculated by removing the turning movements (the surveyed turning movements plus 34% growth) from the through movements identified from the Lindum Vale PSP modelling.

Based on the above, the anticipated daily traffic volumes in the vicinity under interim conditions without the Craigieburn West PSP development is attached in Appendix A.

4.4.3 Ultimate (25 Year Horizon)

Generally, the same assumptions have been made for both interim and ultimate conditions, however with the below minor modifications for the ultimate conditions:

- A 20% reduction in the proportion of traffic accessing the Aston Estate via the intersection of Elevation Boulevard / Mickleham Road and Dunhelen Lane / Mickleham Road has been applied compared to the interim scenario. The reduction in traffic volumes is to account for the additional employment opportunities provided to the north and east of the Craigieburn R2 PSP which are anticipated to reduce the number of vehicles from the Aston Estate travelling south along Mickleham Road. Furthermore, it is expected that the construction of the Outer Metropolitan Ring Road would reduce the distribution of traffic from the Aston Estate to Mickleham Road, with vehicles instead using Craigieburn Road to access the Outer Metropolitan Ring Road when required;
- A 109.4% increase (3% for 25 years) has been applied to all existing through movements and turning movements along Craigieburn Road, on top of the surveyed traffic volumes;
- After the above growth was applied to Craigieburn Road, a reduction of 4,400 vehicles per day was applied to the daily volumes (and proportionately peak hour volumes) between Craigieburn Road (west of Vantage Boulevard) and Mickleham Road (north of Dunhelen Lane) to account for traffic utilise Vantage Boulevard for travel between Craigieburn Road and Mickleham Road;
- The traffic movements modelled under ultimate conditions at the intersections of Mickleham Road / Mt Ridley Road and Mt Ridley Road / Marathon Boulevard as part of the Lindum Vale and Merrifield West PSP have been adopted with no modifications to distributions;
- The through volumes along the northern portion of Mickleham Road (north of Craigieburn Road) have been calculated using the turning movements under ultimate conditions at Mickleham Road / Mt Ridley Road which were provided as part of the Lindum Vale PSP; and
- The Mickleham Road through movements at the intersection of Mickleham Road / Craigieburn Road have been calculated by removing the turning movements (the surveyed volumes plus 109.4% growth) from the through movements.

Based on the above, the anticipated daily traffic volumes in the vicinity under ultimate conditions without the Craigieburn West PSP development is attached in Appendix B.

4.5 Proposed Land Uses

Based on the Place Based Plan prepared by the Victorian Planning Authority, land uses that are expected to generate traffic are provided in Table 3. It is noted that all residential uses have been assumed to have an average lot size of 600m^2. In addition, the existing primary school and community facilities (which is to be shifted with the school expansion) in the north-western portion of the site (Precinct 1) have been excluded from the below development yield.

Table 3 Proposed Land Uses

Precinct	*Use*	*Area*
1	Residential	9.2 ha (153 dwellings)
	Government School Expansion	1.3 ha
2	Residential	53.3 ha (889 dwellings)
3	Residential	48.5 ha (808 dwellings)
4	Residential	34.1 ha (568 dwellings)
	Government School	8.3 ha
5	Residential	36.3 ha (604 dwellings)
	Local Town Centre	2.2 ha
	Mixed Use	2.2 ha
	Government School	3.3 ha
6	Residential	40.6 ha (677 dwellings)
7	Residential	51.5 ha (858 dwellings)
8	Residential	32 ha (534 dwellings)
	Community Facilities	1.2 ha
	Non-Government School	2.2 ha
	Government School	3.6 ha
9	Residential	46.5 ha (776 dwellings)
10	Residential	17.1 ha (286 dwellings)
Total Dwellings		**~6,153 lots**

4.6 Traffic Generation

4.6.1 Residential

It is generally accepted that single dwellings on a lot in outer suburban areas may generate traffic at up to 10 vehicle trips per day, whilst in areas with good public transport, and for higher density dwellings, lower traffic generation rates are often recorded.

Considering the anticipated size of the lots within proposed PSP (~600m^2) and the proximity of the site to the existing bus network which is expected to be extended into the site, it is anticipated that the proposed development may generate up to 9 vehicle trips per day per lot, with 10% of trips occurring during both the AM and PM peak hours. It is noted that this includes internal trips within the PSP where following full development of the area, a number of schools, recreational facilities and retail precincts are expected.

It is noted that both the SMEC traffic report for the Merrifield West PSP and Cardno traffic report for the Lindum Vale PSP adopted 8.5 vehicles per lot. Whilst Ashton Traffic Services adopted a rate of 9 vehicles per lot when modelling the Craigieburn R2 PSP.

Application of the above traffic generation rates to the anticipated 6,153 lots expected to be provided as part of the Craigieburn West PSP is expected to generate up to approximately 55,380 vehicle trips per day, and approximately 5,538 vehicle trips per hour during both the AM and PM peak.

Traffic volumes generated by residential uses is typically tidal, with the majority of movements generated during the AM peak hour occurring in the outbound direction and the majority of movements during the PM peak hour occurring in the inbound direction.

For the purposes of this assessment, the following directional splits will be adopted:

- AM peak hour: 70% outbound, 30% inbound; and
- PM peak hour: 40% outbound, 60% inbound.

The peak hour traffic volumes anticipated to be generated by the residential component of the Craigieburn West PSP are outlined in Table 4.

Table 4 Anticipated Peak Hour Traffic Generation

Period	*Outbound*	*Inbound*	*Two-Way*
AM Peak Hour	3,877	1,661	5,538
PM Peak Hour	2,215	3,323	5,538

4.6.2 Other Uses

The proposed Craigieburn West PSP includes a variety of other uses including five schools, a Local Town Centre, a mixed-use zone, community facilities, local parks and local sports reserves.

onemile**grid** and other traffic consultants generally consider the use of a higher traffic generation rate for the residential uses to be the more conservative and the appropriate approach in regard to traffic generation for new PSPs especially where no large employment precincts are provided (as is the case with the Craigieburn West PSP). The adoption of a higher rate for the residential component acknowledges that a high proportion of movements associated with uses such as the town centre and community facilities are internal trips, and in terms of modelling, the movement is allocated to the residential use rather than the destination to save double counting.

The possible exception to this is the school uses, which are likely to draw a larger proportion of external trips than the other non-residential uses. Traffic volumes generated by school uses are generally best expressed as a function of student numbers, and such information is not available at this stage. Nevertheless, it is noted that the residential traffic generation rates adopted for the

Craigieburn West PSP and neighbouring residential developments include the proportion of traffic associated with movements to and from education uses. This is discussed further in the following section of this report.

4.7 Traffic Distribution

4.7.1 Trip Purpose Distribution

Travel data sourced from the Victorian Integrated Survey of Travel and Activity (VISTA) indicates the following trip purpose distributions (as a proportion of total daily trips) for typical households, as outlined in Table 5. These distributions have been adopted in the Craigieburn West PSP traffic model.

Table 5 Trip Purpose Distribution

Purpose	*AM Peak*	*PM Peak*	*Daily*
Work	52%	45%	40%
Shopping	6%	18%	20%
Education	28%	11%	9%
Recreation	2%	5%	6%
Other	12%	21%	25%

4.7.2 Directional Distribution

Considering the location of the proposed PSP in relation to the public transport facilities, schools, recreation and retail and employment precincts, the directional distribution shown in Table 6 has been adopted.

Table 6 Adopted Directional Traffic Distribution

Origin/Destination	*Percentage*[1]	*Notable Uses*
North	14.5%	Merrifield Employment Park / Folkestone Employment Park / Mickleham Town Centre / Regional Victoria
South	32.7%	Tullamarine Employment Area / Inner Melbourne / Western Ring Road Access
East	39.4%	Craigieburn Town Centre / Craigieburn Employment PSP / Craigieburn Train Station / Craigieburn R2 PSP / Campbellfield Employment Area / Roxburgh Train Station / Alternative Western Ring Road Access
West	4.4%	Sunbury
Internal	9%	

[1]Daily Percentage. AM peak and PM peak vary slightly

It is expected that the traffic generated by the Craigieburn West PSP will be distributed onto both the arterial and connector road network. An overview of the likely inbound and outbound travel routes is provided below.

4.7.2.1 North

Northbound traffic is expected to be relatively evenly distributed on both Mickleham Road and Marathon Boulevard. Marathon Boulevard runs through Lindum Vale PSP and the Merrifield West PSP and therefore provides direct access to a number of schools, employment and retail precincts. Therefore, it is anticipated that the majority of residents within the northern portion of the Craigieburn West PSP will utilise Marathon Boulevard, whilst residents in the southern portion of the PSP will use Mickleham Road.

4.7.2.2 South

All southbound traffic is expected to utilise Mickleham Road in the interim. However, with the delivery of the Outer Metropolitan Ring Road a portion of the southbound traffic is expected to travel west along Craigieburn Road to access the Outer Metropolitan Ring Road which will then connect to the Tullamarine Freeway.

4.7.2.3 East

Eastbound traffic is expected to be evenly distributed along the connector roads and Craigieburn Road when travelling to different Craigieburn precincts. Vehicles travelling outside of the Craigieburn precinct are expected to utilise Craigieburn Road or a connector road before connecting to another arterial road.

4.7.2.4 West

In the interim, the majority of dwellings located to the north Craigieburn Road will travel west along Craigieburn Road, whilst dwellings located to the south of Craigieburn Road travel south along Mickleham Road.

In the ultimate, it is expected that all westbound traffic will utilise Craigieburn Road to access the Outer Metropolitan Ring Road.

4.8 Generated Traffic Volumes

Based on the above, the expected daily traffic volumes generated by the Craigieburn West PSP in the interim scenario is provided in Appendix C. Whilst the expected daily traffic volumes generated in the ultimate scenario is provided in Appendix D.

4.9 Resultant Traffic Volumes

The resultant daily traffic volumes in the interim and ultimate scenario is provided in Appendix E and Appendix F respectively.

4.10 Traffic Impact

4.10.1 Arterial Road Intersections

Arterial-arterial intersections and arterial-connector road intersections are expected to be planned and designed generally in accordance with the Guidance for Planning Road Networks in Growth Areas handbook (VicRoads, 2015). The PSP will make adequate provision for intersection land take in accordance with the handbook. Detailed design of intersection layouts would generally be undertaken at the time of delivery.

4.10.2 Midblock Capacity Assessment

The VPA PSP Guideline – *PSP Note – Our Roads: Connecting People* (August 2011) provides appropriate road classifications and threshold volumes for existing and future roads.

The road types and their indicative daily threshold as outlined in the document are summarised in Table 7.

Table 7 Our Roads: Connecting People – Road Characteristics

Element	*Access Street - Level 2*	*Connector Street*	*Secondary Arterial*	*Arterial*
Traffic Volume	2000-3000 vpd	3000-7000 vpd	12,000 – 40,000	>30,000

In addition to the above, VPA has provided the recommended traffic volumes for a Boulevard Connector Road which is 7,000 – 12,000 vehicles per day.

An assessment of the anticipated ultimate traffic volumes along the proposed road network is provided in Table 8 overleaf.

The results provided in Table 8 show that Mickleham Road and Craigieburn are expected to carry up to approximately 49,000 and 33,000 vehicles per day respectively which are both in accordance of their theoretical capacity of an arterial road. Mt Ridley Road is expected to carry approximately 16,000 vehicles per day which is well below of its target vehicle capacity of >30,000 vehicles per day.

The mid-block capacity assessment also show that the majority of connector roads are expected to operate within their respected connector street capacity of 3,000-7,000 vehicles per day, except for Elevation Boulevard, Fairways Boulevard, East-West Connector Road 1 and East-West Connector Road 3. These four connector roads are anticipated to carry between 7,300 and 8,800 vehicles per day which is slightly higher than the theoretical capacity of a connector road (3,000 – 7,00 vehicles per day). Furthermore, Vantage Boulevard is anticipated to carry 11,100 vehicles day which is significantly higher than the target traffic volumes (3,000 - 7,000 vehicles per day).

Dunhelen Lane, North-South Connector Boulevard 1 and North-South Connector Boulevard 2 are both expected to operate of their theoretical capacity for a Connector Boulevard which is 7,000-12,000 vehicles per day.

Gallantry Boulevard, Candlebark Drive and Navigation Road are all best described as Access Street – Level 2 and are expected to operate within their theoretical capacity of 2000-3000 vehicles per day.

Table 8 Mid-Block Capacity Assessment

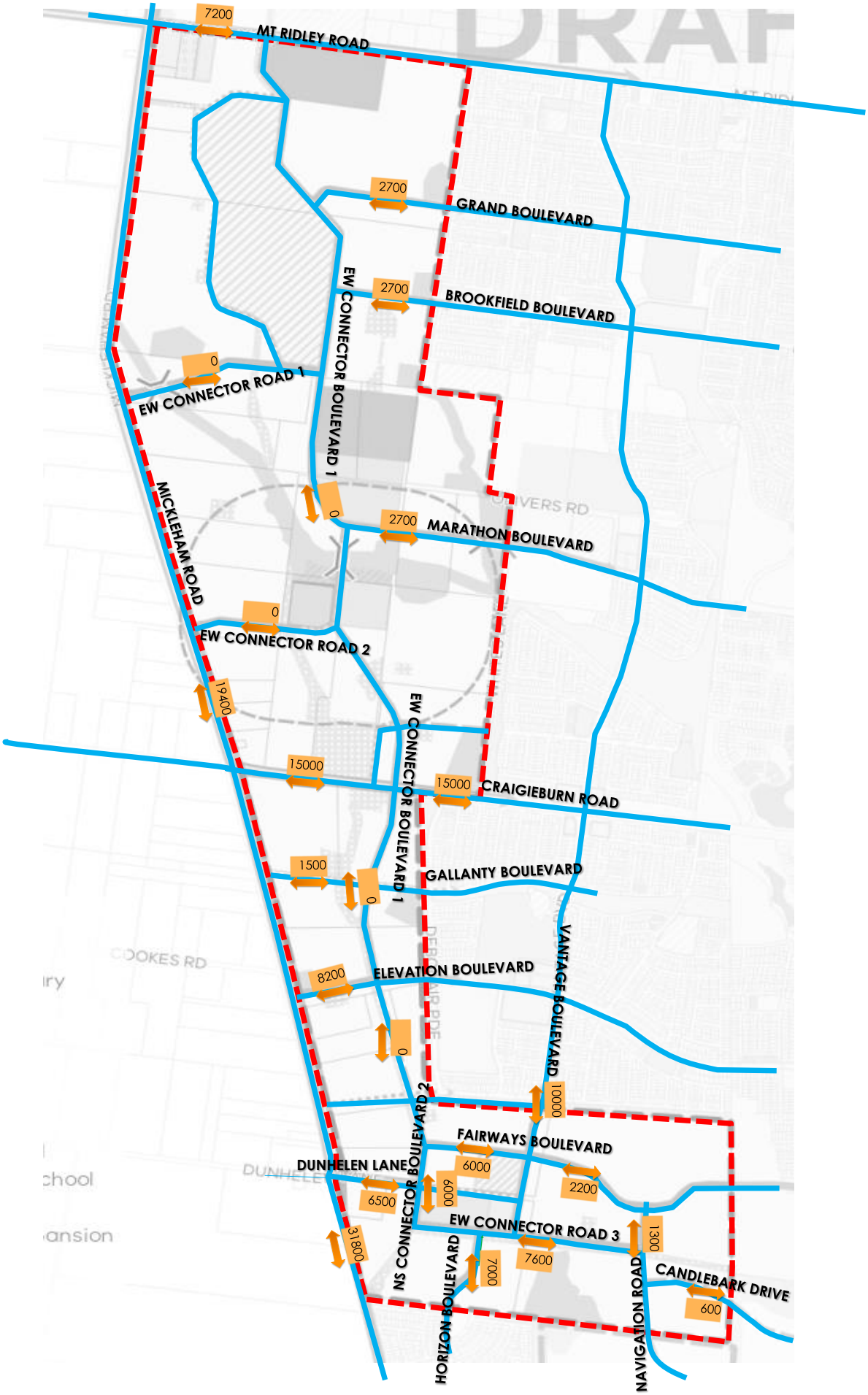
Road	*Road Classification*	*Theoretical Traffic Capacity (vpd)*	*Anticipated Ultimate Traffic Volumes (Two-Way)*	*Within Theoretical Capacity?*
Mickleham Road – North of Craigieburn Road	Arterial	>30,000	38,100	Yes
Mickleham Road – South of Craigieburn Road	Arterial	>30,000	49,800	Yes
Mt Ridley Road	Arterial	>30,000	15,800	Yes
Craigieburn Road	Arterial	>30,000	33,300	Yes
Marathon Boulevard	Connector Street	3000-7000	6,900	Yes
Grand Boulevard	Connector Street	3000-7000	4,200	Yes
Brookfield Boulevard	Connector Street	3000-7000	4,300	Yes
Elevation Boulevard	Connector Street	3000-7000	8,800	No
Dunhelen Lane	Connector Boulevard Road	7,000-12,000	10,400	Yes
Vantage Boulevard – South of Fairways Boulevard	Connector Street	3000-7000	6,800	Yes
Vantage Boulevard – North of Fairways Boulevard	Connector Street	3000-7000	11,000	No
Fairways Boulevard – West of Vantage Boulevard	Connector Street	3000-7000	7,300	No
Fairways Boulevard – East of Vantage Boulevard	Connector Street	3000-7000	5,100	Yes
North-South Connector Boulevard 1 – North of Craigieburn Road	Connector Boulevard Road	7,000-12,000	11,600	Yes
North-South Connector Boulevard 1 – South of Craigieburn Road	Connector Boulevard Road	7,000-12,000	3,900	Yes
North-South Connector Boulevard 2	Connector Boulevard Road	7,000-12,000	8,200	Yes
East-West Connector Road 1	Connector Street	3000-7000	7,300	No
East-West Connector Road 2	Connector Street	3000-7000	5,100	Yes
East-West Connector Road 3	Connector Street	3000-7000	7,800	No
Gallantry Boulevard	Access Street – Level 2	2000-3000	2,200	Yes
Navigation Road	Access Street – Level 2	2000-3000	2,800	Yes
Candlebark Drive	Access Street – Level 2	2000-3000	2,600	Yes

5 CONCLUSIONS AND RECOMMENDATIONS

Considering the analysis presented above, it is concluded that:

- The Craigieburn West PSP has a total area of approximately 565 ha and abuts the Lindum Vale (Mt Ridley West) PSP to the north, Craigieburn (R2) PSP to the east, and Greenvale North (R1) PSP to the south;
- A draft Place Based Plan has been prepared for the area which contemplates developing the area for predominately standard-density residential development, as well as providing a Local Town Centre, schools, community facilities and local parks;
- Based on an average lot size of 600m^2, it is assumed that approximately 6,153 lots may be provided within the PSP area;
- The PSP area will primarily be accessed via the existing arterial road network that runs adjacent and through the site (Craigieburn Road, Mickleham Road and Mt Ridley Road). Secondary access opportunities will be provided via the extension of existing roads from the adjacent PSPs which will run through the proposed PSP area;
- The Lindum Vale PSP, which abuts the northern boundary, has had a traffic model prepared for interim (2031) and ultimate (2046) conditions, whilst the Craigieburn R2 PSP, which abuts the eastern boundary, has had a traffic model prepared for what can be considered interim conditions;
- A traffic model has been prepared for the Craigieburn West PSP where the future base conditions were based on the abovementioned traffic modelling as well as external growth along the arterial and connector roads within the vicinity;
- A traffic generation rate of 9 vehicle trips per day per lot (with 10% of trips occurring during the AM and PM peak hour) was adopted for the residential component. Application of these rates results in the PSP area generating 55,380 vehicle trips per day inclusive of 5,538 vehicle trips per hour during the AM and PM peaks;
- It has been assumed that the AM peak hour will consist of 70% outbound movements and 30% inbound movements. Whilst the PM peak hour will consist of 40% outbound movements and 60% inbound movements;
- The trip purpose traffic distribution has been based on the Victorian Integrated Survey of Travel and Activity (VISTA) which specifies different percentages for work, shopping, education, recreation, and other purposes. Furthermore, the directional distribution was based on existing and future uses within the vicinity;
- The mid-block capacity assessment shows that all roads will operate within or near their theoretical capacity, except for Vantage Boulevard which is expected to carry volumes significantly higher than the theoretical capacity for a connector road. It is noted that all previous modelling undertaken by other traffic engineering consultants showed that Vantage Boulevard will carry volumes in excess of its theoretical capacity.

Appendix A Future Base Conditions Daily Volumes - Interim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0
2700
MARATHON BOULEVARD
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EW CONNECTOR ROAD 2
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15000
15000
CRAIGIEBURN ROAD
1500
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GALLANTY BOULEVARD
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ELEVATION BOULEVARD
VANTAGE BOULEVARD
0
10000
FAIRWAYS BOULEVARD
DUNHELEN LANE
6000
6500
6000
2200
EW CONNECTOR ROAD 3
1300
31800
NS CONNECTOR BOULEVARD 2
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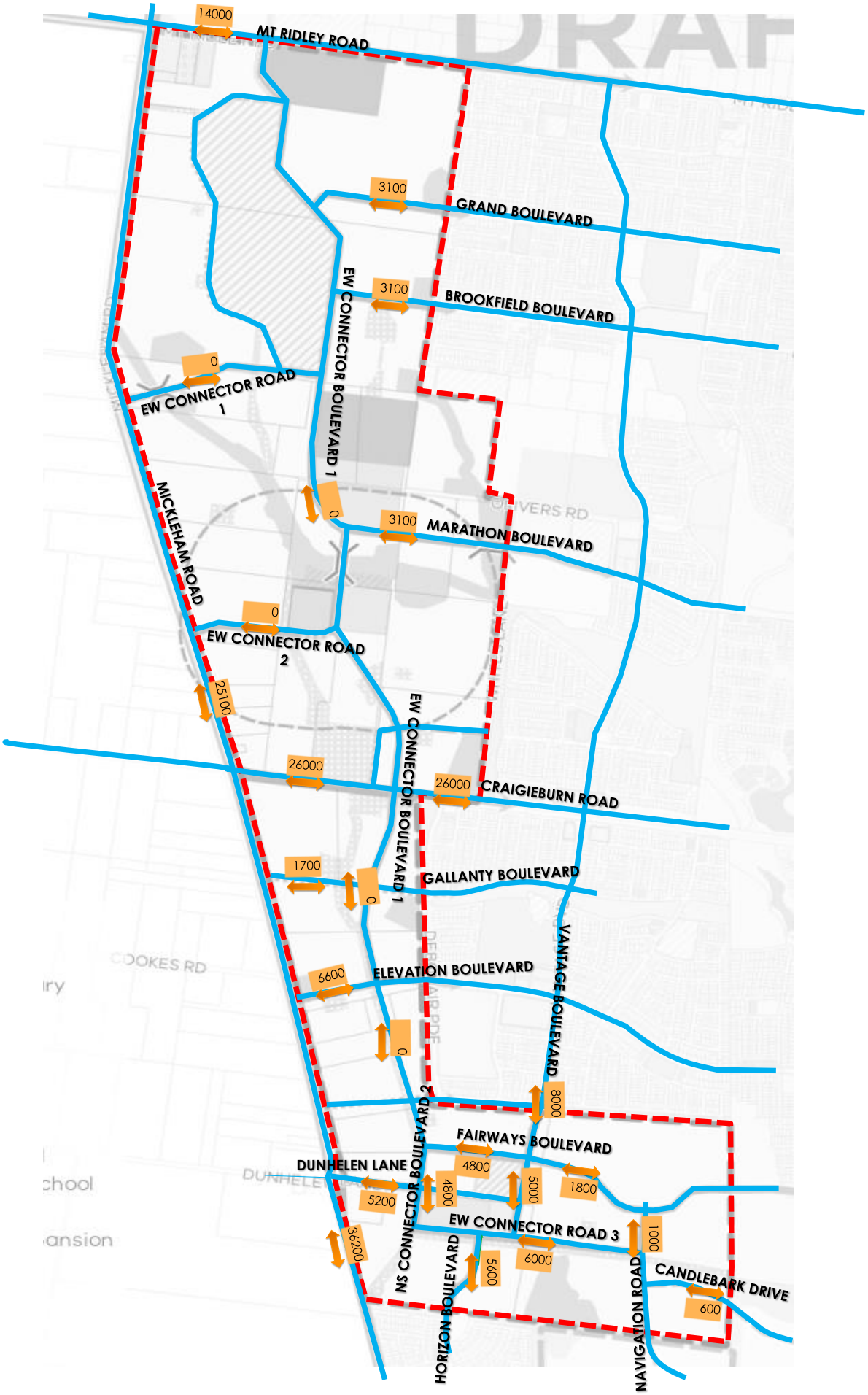
7000
HORIZON BOULEVARD
NAVIGATION ROAD
CANDLEBARK DRIVE
600

Appendix B Future Base Conditions Daily Volumes – Ultimate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0
3100
MARATHON BOULEVARD
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EW CONNECTOR ROAD 2
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EW CONNECTOR BOULEVARD 1
26000
26000
CRAIGIEBURN ROAD
1700
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ELEVATION BOULEVARD
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VANTAGE BOULEVARD
8000
EW CONNECTOR BOULEVARD 2
FAIRWAYS BOULEVARD
DUNHELEN LANE
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5200
4800
5000
1800
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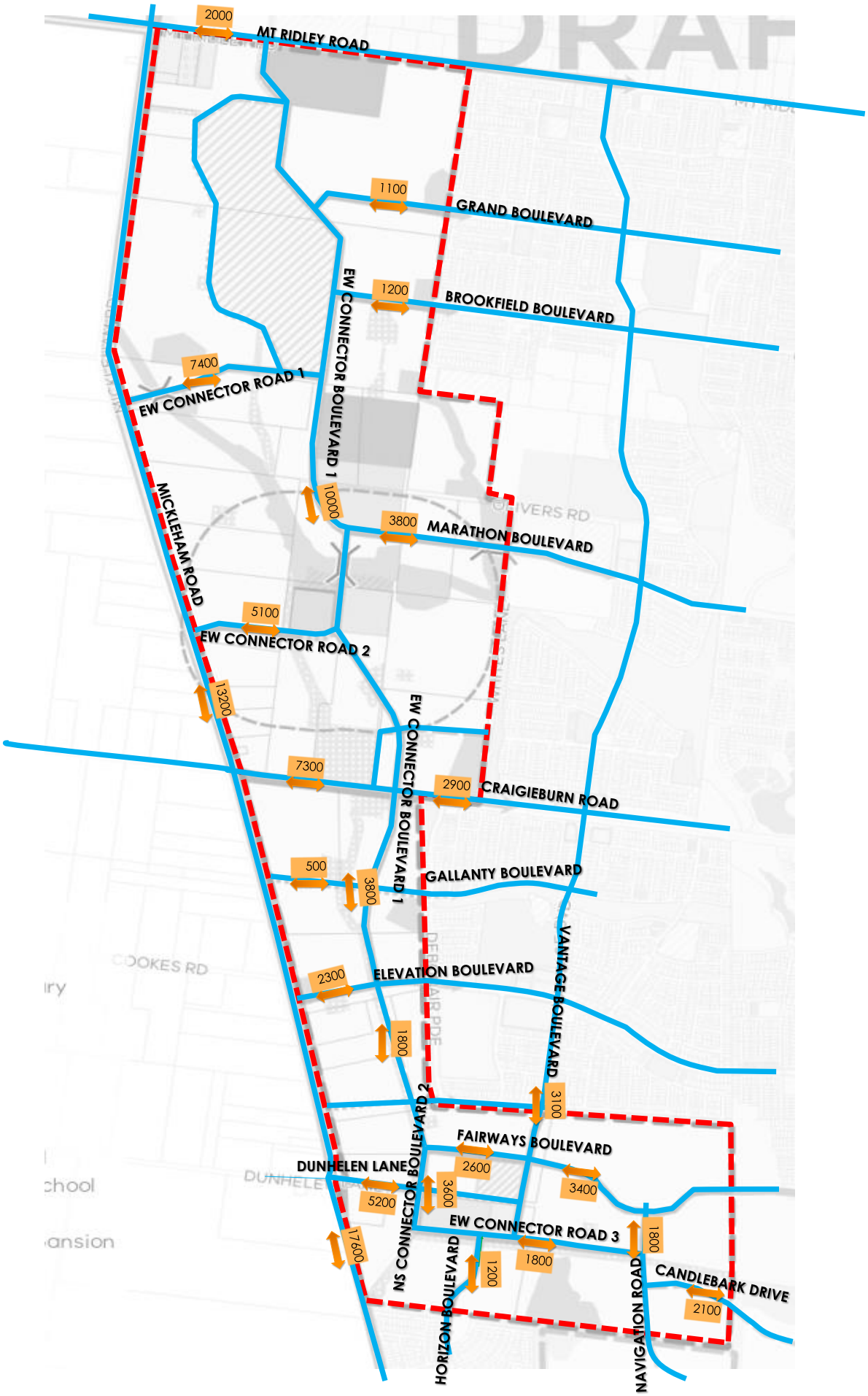
NAVIGATION ROAD
CANDLEBARK DRIVE
600

Appendix C Generated Daily Volumes – Interim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3800
MARATHON BOULEVARD
5100
EW CONNECTOR ROAD 2
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7300
2900
CRAIGIEBURN ROAD
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3800
GALLANTY BOULEVARD
2300
ELEVATION BOULEVARD
VANTAGE BOULEVARD
1800
3100
FAIRWAYS BOULEVARD
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DUNHELEN LANE
5200
3600
3400
EW CONNECTOR ROAD 3
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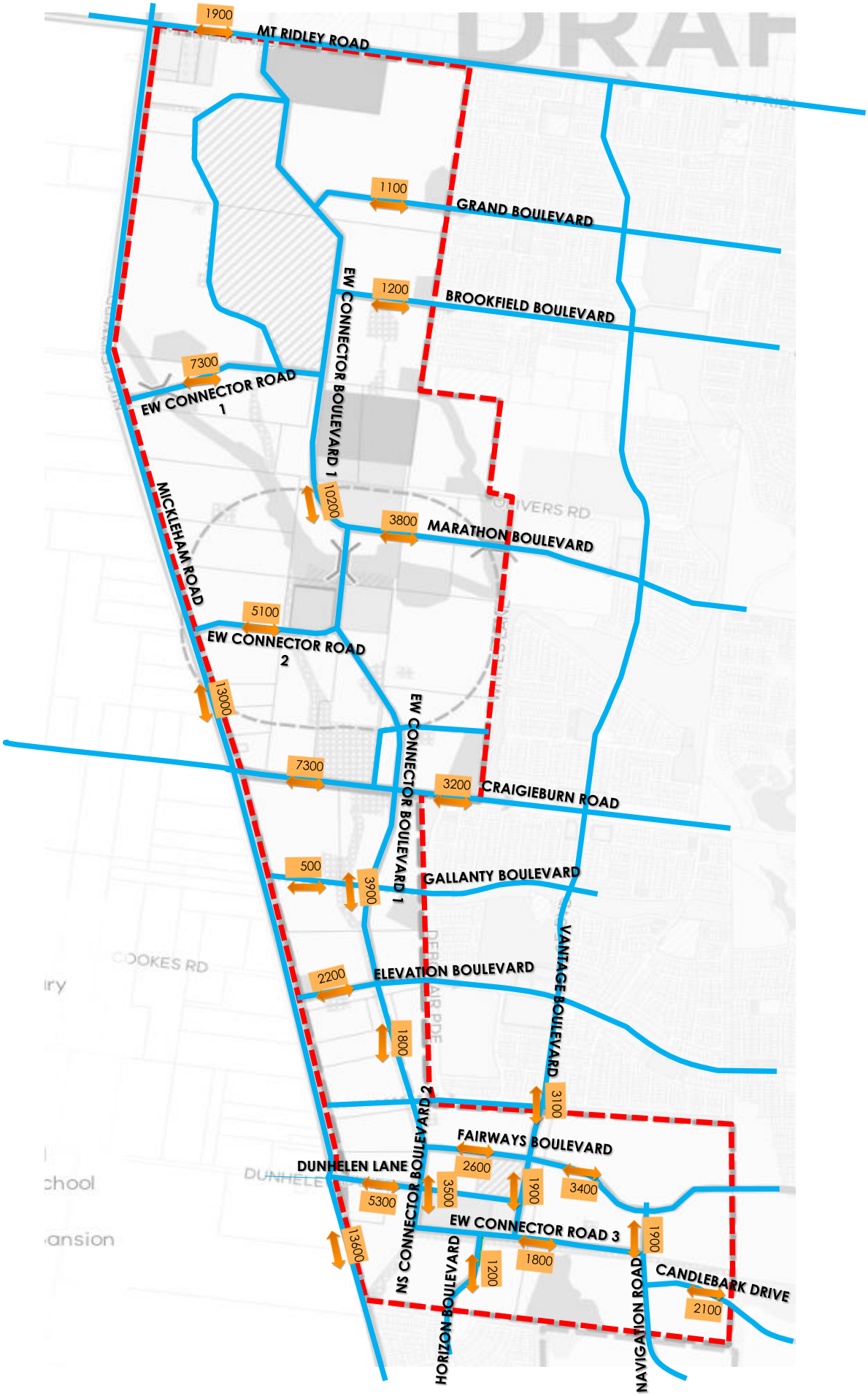
HORIZON BOULEVARD
NAVIGATION ROAD
CANDLEBARK DRIVE
2100

Appendix D Generated Daily Volumes – Ultimate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3800
MARATHON BOULEVARD
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EW CONNECTOR ROAD 2
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7300
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5300
3500
1900
3400
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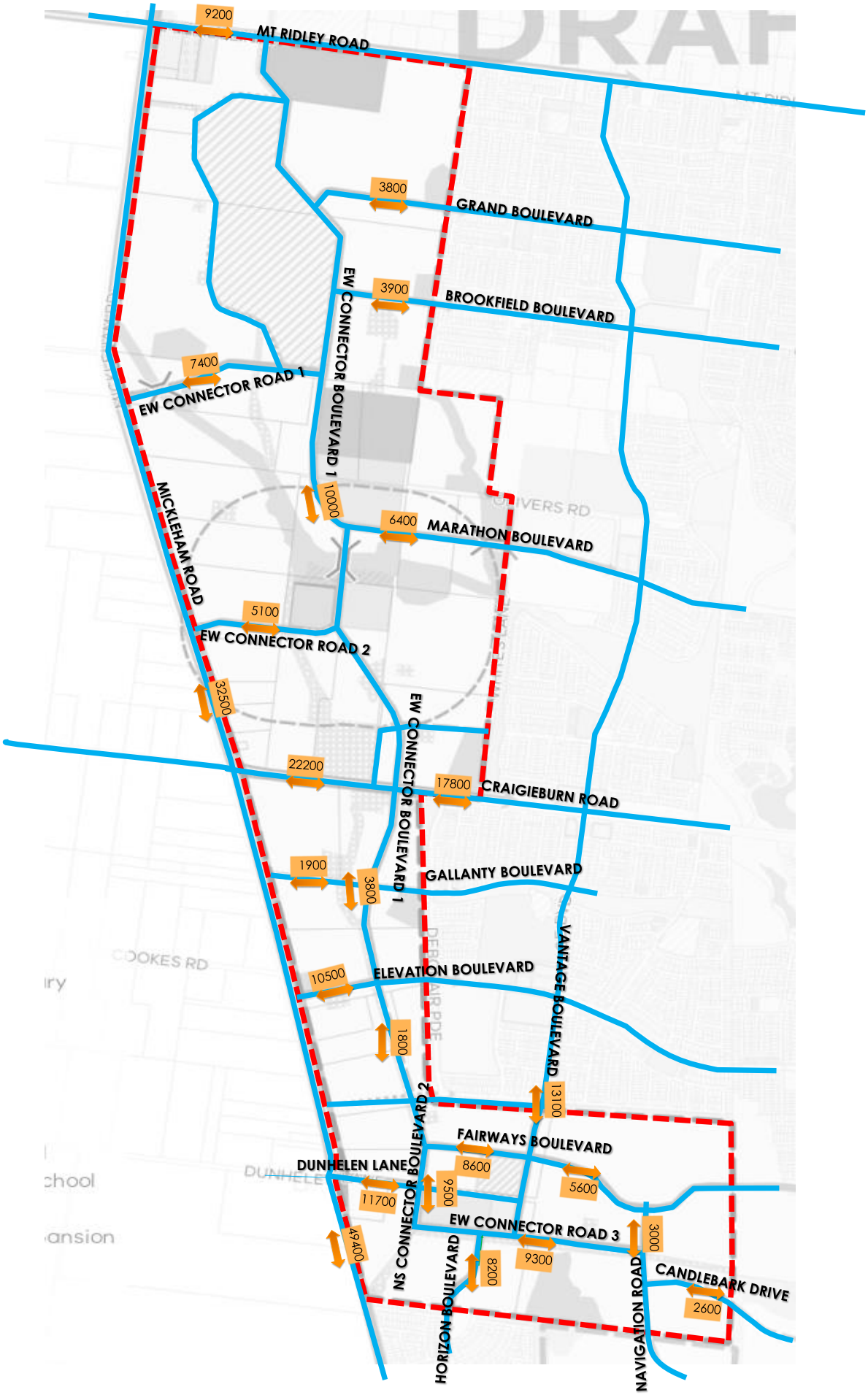
1800
1200
1900
CANDLEBARK DRIVE
2100
HORIZON BOULEVARD
NAVIGATION ROAD

Appendix E Resultant Daily Volumes – Interim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EW CONNECTOR ROAD 1
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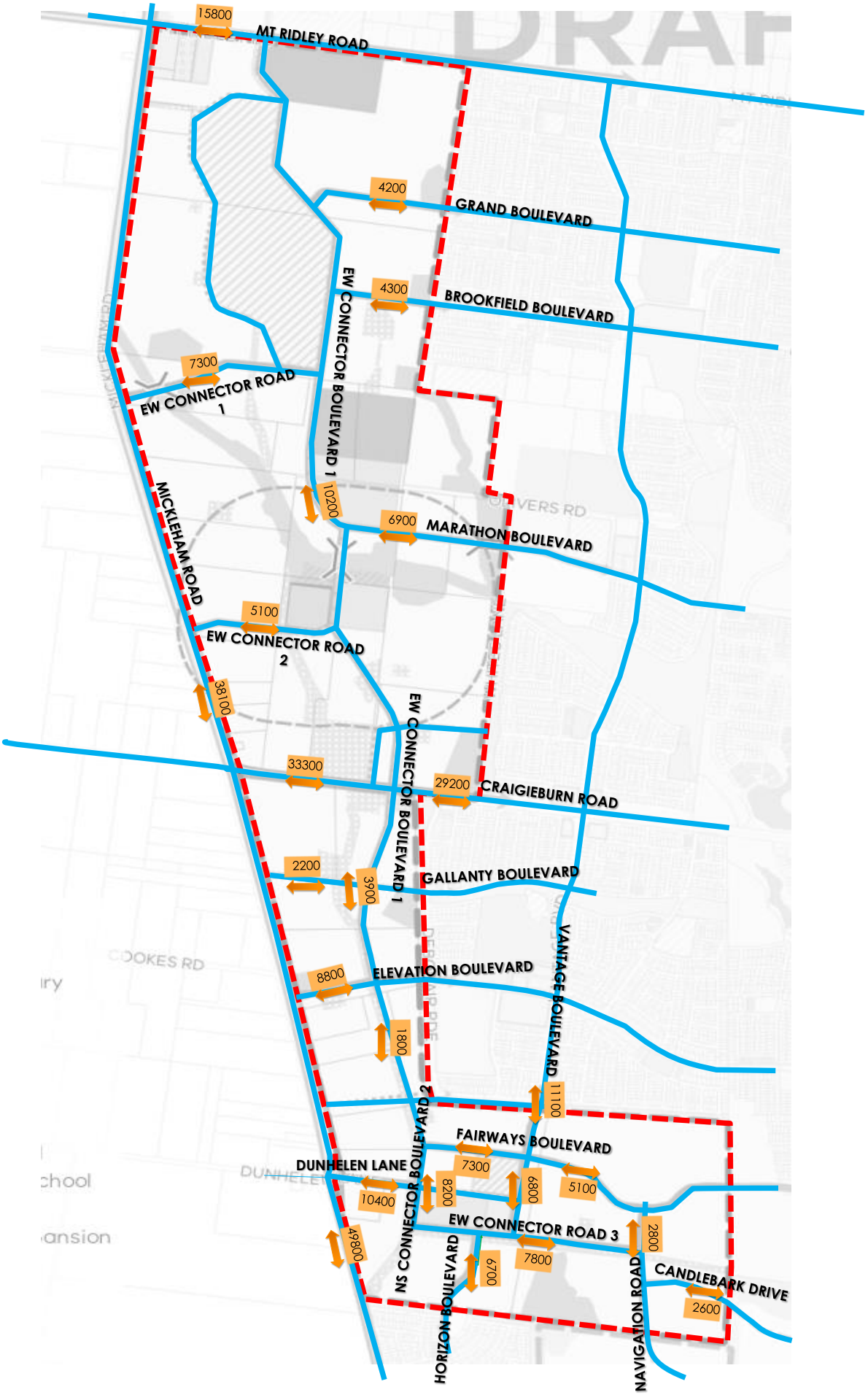
10000
6400
MARATHON BOULEVARD
5100
EW CONNECTOR ROAD 2
32500
EW CONNECTOR BOULEVARD 1
22200
17800
CRAIGIEBURN ROAD
1900
3800
GALLANTY BOULEVARD
VANTAGE BOULEVARD
10500
ELEVATION BOULEVARD
1800
13100
FAIRWAYS BOULEVARD
DUNHELEN LANE
8600
5600
11700
900
EW CONNECTOR ROAD 3
3000
4400
NS CONNECTOR BOULEVARD 2
9300
8200
CANDLEBARK DRIVE
2600
HORIZON BOULEVARD
NAVIGATION ROAD

Appendix F Resultant Daily Volumes – Ultimate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10200
6900
MARATHON BOULEVARD
5100
EW CONNECTOR ROAD 2
38100
EW CONNECTOR BOULEVARD 1
33300
29200
CRAIGIEBURN ROAD
2200
3900
GALLANTY BOULEVARD
VANTAGE BOULEVARD
8800
ELEVATION BOULEVARD
1800
11100
EW CONNECTOR BOULEVARD 2
FAIRWAYS BOULEVARD
DUNHELEN LANE
7300
10400
8200
6800
5100
EW CONNECTOR ROAD 3
4980
6700
7800
2800
HORIZON BOULEVARD
NAVIGATION ROAD
CANDLEBARK DRIVE
2600

Appendix B Transport Impact Assessment – Addendum 1

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1 April 2021

Victorian Planning Authority

Via email: James.Paull@vpa.vic.gov.au

Attention: James Paull

Craigieburn West PSP

Transport Impact Assessment – Addendum 1

Dear James,

onemile**grid** has previously prepared a Transport Impact Assessment (ref: 190690TIA002D-F) for the Craigieburn West PSP.

Following the preparation of the above referenced Transport Impact Assessment, the draft Craigieburn West PSP document was prepared and released for public consultation. Of importance, the document provides guidelines in regard to the recommended residential densities within the Craigieburn West PSP.

A revised traffic model has since been prepared to reflect the different residential yields considered in the PSP compared to those previously assessed in the Transport Impact Assessment report.

Recommended revisions to the road hierarchy have also been devised and are discussed in this document, which is to be read in conjunction with and as an addendum to the previously prepared Transport Impact Assessment report.

Revised Traffic Model

Residential Lot Yield

Table 1 provides a comparison of the residential lot yields assessed under the previously prepared report, and the revised lot yields adopted for this updated assessment. It should be noted that there have also been minor updates to what has been considered as 'developable area' between the earlier and amended models.

Table 1 Residential Yield

	Previous Assessment	*Amended Assessment*
Lot Yield Adopted	600 m^2 per lot	Standard density residential – 18.5 dwellings / net developable hectare Medium density residential (within walkable catchment) – 26.5 dwellings / net developable hectare
Total Lots	**6,153**	**8,230**

The residential densities adopted in this updated assessment are in accordance with the densities provided within the draft Craigieburn West PSP document and results in an average of 20 dwellings / net developable hectare. The revised modelling assesses a net developable area (NDA) of 414 hectares, with a summary of the residential component expected to generate traffic provided in Table 2. A map showing the locations of these precincts is provided as Figure 14 of the previously prepared Transport Impact Assessment (ref: 190690TIA002D-F).

Table 2 Proposed Residential Uses

Precinct	*Residential Type*	*Area*
1	Standard Density	10 ha (187 dwellings)
2	Standard Density	57.5 ha (1,063 dwellings)
3	Standard Density	52.9 ha (978 dwellings)
4	Standard Density	24.6 ha (456 dwellings)
	Medium Density	14.2 ha (377 dwellings)
5	Standard Density	11.6 ha (215 dwellings)
	Medium Density	28 ha (743 dwellings)
6	Standard Density	14.1 ha (260 dwellings)
	Medium Density	29.4 ha (780 dwellings)
7	Standard Density	58.4 ha (1,080 dwellings)
8	Standard Density	41.7 ha (771 dwellings)
9	Standard Density	52.2 ha (965 dwellings)
10	Standard Density	19.4 ha (359 dwellings)
Total Dwellings		**~8,234 lots (6,334 standard density / 1,900 medium density)**

Traffic Generation

The updated model assesses a traffic generation rate of 9 vehicle movements per day for each standard density lot, as was the case within the Transport Impact Assessment. Medium density lots, particularly in walkable areas close to amenities, generate lower traffic volumes than standard density lots. As such a traffic generation rate of 7 movements per day has been adopted for each medium density lot.

Application of these traffic generation rates results in a total traffic generation of 70,310 vehicle movements per day, with 10% (7,031 vehicle movements) expected to occur during both the AM and PM peak hours.

Adopting the same directional splits as per the Transport Impact Assessment results in the AM and PM peak traffic volumes summarised in Table 3 below.

Table 3 Anticipated Peak Hour Traffic Generation

Period	*Outbound*	*Inbound*	*Two-Way*
AM Peak Hour	4,921	2,109	7,030
PM Peak Hour	2,812	4,218	7,030

Generated and Resultant Traffic Volumes

The updated generated and resultant daily traffic volumes are attached to this letter.

These volumes are based on the traffic distributions presented in Section 4.7 of the Transport Impact Assessment report, and include traffic growth from the surrounding areas as discussed in Section 4.4 of the Transport Impact Assessment Report.

Updated Road Hierarchy

Noting the updated traffic volumes, it is recommended that the road hierarchy is updated to replicate that shown in Figure 1.

A mid-block capacity comparison between the previously proposed road network and the recommended road network is provided in Table 4 with the anticipated ultimate daily traffic volumes. Corresponding street names are shown on the enclosed traffic volume diagrams.

Figure 1 Updated Road Hierarchy

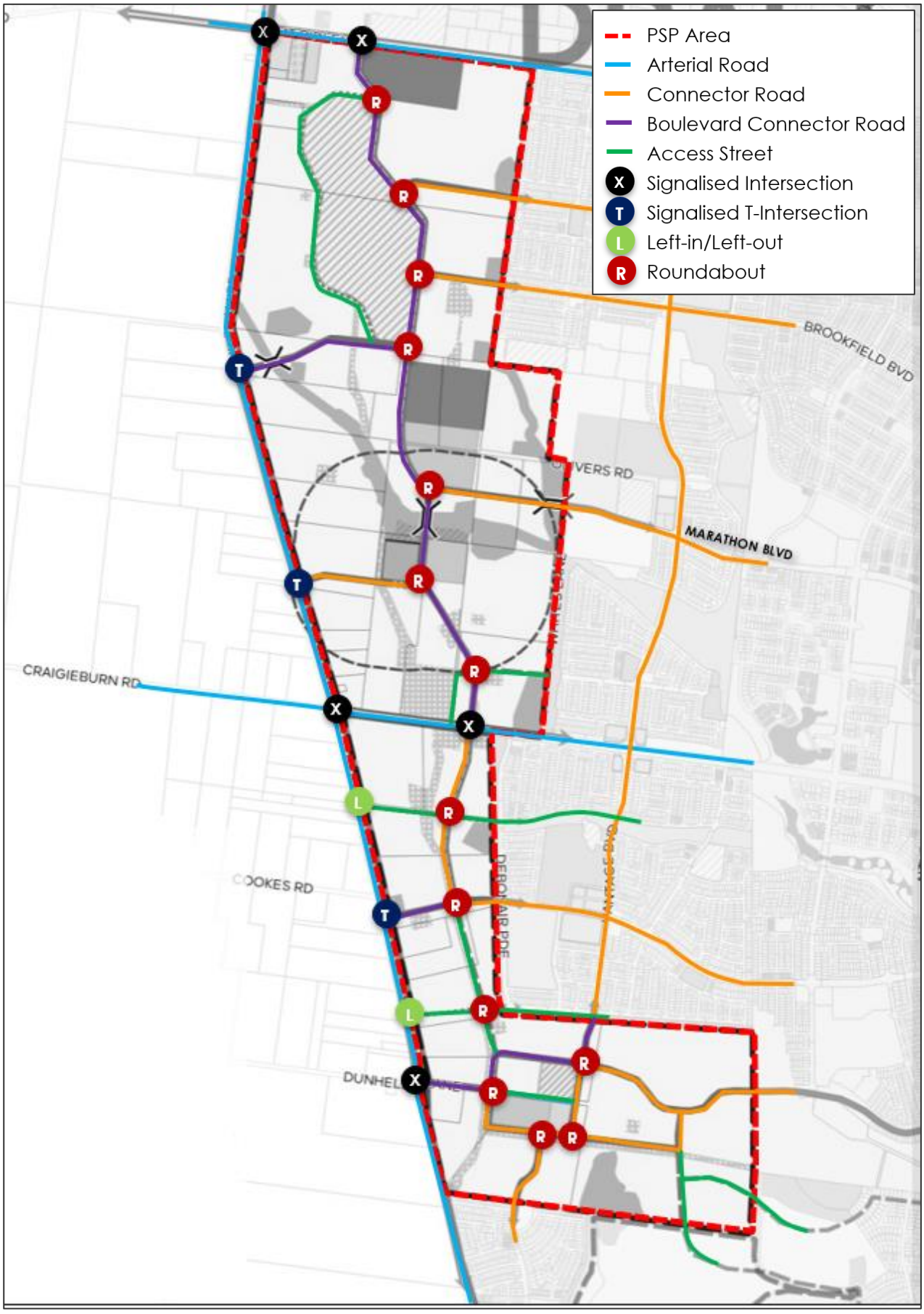

Table 4 Mid-Block Capacity Assessment

Road	*Previous Road Classification*	*New Road Classification*	*Theoretical Traffic Capacity (vpd) – New Classification*	*Anticipated Ultimate Traffic Volumes (Two-Way) – Updated Model*	*Within Theoretical Capacity? – Updated Model & New Classification*
Mickleham Road – North of Craigieburn Road	Arterial	Arterial	>30,000	41,300	Yes
Mickleham Road – South of Craigieburn Road	Arterial	Arterial	>30,000	53,500	Yes
Mt Ridley Road	Arterial	Arterial	>30,000	16,300	Yes
Craigieburn Road	Arterial	Arterial	>30,000	35,300	Yes
Marathon Boulevard	Connector Street	Connector Street	3,000-7,000	7,800	No
Grand Boulevard	Connector Street	Connector Street	3,000-7,000	4,400	Yes
Brookfield Boulevard	Connector Street	Connector Street	3,000-7,000	4,500	Yes
Elevation Boulevard – West of N-S Connector Boulevard 1	Connector Street	Connector Boulevard	7,000-12,000	9,300	Yes
Elevation Boulevard – East of N-S Connector Boulevard 1	Connector Street	Connector Street	3,000-7,000	8,300	No
Dunhelen Lane	Connector Boulevard	Connector Boulevard	7,000-12,000	12,200	No
Vantage Boulevard – South of Fairways Boulevard	Connector Street	Connector Street	3,000-7,000	7,400	No
Vantage Boulevard – North of Fairways Boulevard	Connector Street	Connector Boulevard	7,000-12,000	12,000	Yes
Fairways Boulevard – West of Vantage Boulevard	Connector Street	Connector Boulevard	7,000-12,000	8,200	Yes
Fairways Boulevard – East of Vantage Boulevard	Connector Street	Connector Street	3,000-7,000	6,000	Yes
North-South Connector Boulevard 1 – North of Marathon Boulevard	Connector Boulevard	Connector Boulevard	7,000-12,000	11,300	No
North-South Connector Boulevard 1 – North of Craigieburn Road	Connector Boulevard	Connector Boulevard	7,000-12,000	12,900	No
North-South Connector Boulevard 1 – South of Craigieburn Road	Connector Boulevard	Connector Street	3,000-7,000	5,000	Yes
North-South Connector Boulevard 2 – North of Dunhelen Lane	Connector Boulevard	Connector Boulevard	7,000-12,000	9,400	Yes
North-South Connector Boulevard 2 – South of Dunhelen Lane	Connector Boulevard	Connector Street	3,000-7,000	3,600	Yes
East-West Connector Road 1	Connector Street	Connector Boulevard	7,000-12,000	8,900	Yes
East-West Connector Road 2	Connector Street	Connector Street	3,000-7,000	6,600	Yes
East-West Connector Road 3 – West of Horizon Boulevard	Connector Street	Connector Street	3,000-7,000	3,000	Yes
East-West Connector Road 3 – Btw Horizon Boulevard & Vantage Boulevard	Connector Street	Connector Street	3,000-7,000	8,300	No
East-West Connector Road 3 – East of Horizon Boulevard	Connector Street	Connector Street	3,000-7,000	3,800	Yes
Gallantry Boulevard	Access Street – Level 2	Access Street – Level 2	2,000-3,000	2,300	Yes
Navigation Road	Access Street – Level 2	Access Street – Level 2	2,000-3,000	3,400	No
Candlebark Drive	Access Street – Level 2	Access Street – Level 2	2,000-3,000	3,200	No
Horizon Boulevard	Connector Street	Connector Street	3,000-7,000	7,000	Yes

Red text denotes recommended road classification change

As shown above, the majority of roads are expected to operate within their theoretical capacity except for several short sections of road.

In regard to Marathon Boulevard, Dunhelen Lane, Vantage Boulevard (south of Fairways Boulevard), North-South Connector Boulevard 1, Navigation Road and Horizon Boulevard, these roads are all anticipated to operate at a maximum of 11% over their theoretical capacity. This is considered to be within an acceptable range, given that the inclusion of lower order access streets within the network (which have not been modelled) is expected to reduce the actual traffic volumes on the modelled road network, and considering typical margins of error for large scale modelling such as that undertaken as part of this study, and from previous modelling undertaken by others.

Furthermore, Elevation Boulevard (east of North-South Connector Boulevard 1) and East-West Connector Road 3 (Between Horizon Boulevard & Vantage Boulevard) are both operating at approximately 19% above their theoretical capacity, these sections of roads are approximately 150 metres long and it is not considered appropriate to provide an upgraded cross-section for these sections of road. Again, these roads are anticipated to carry lower volumes once the lower order access road network is designed and delivered.

Conclusions

Considering the updated traffic model and road hierarchy presented above, and the analysis presented in the report, it is concluded that:

- The Craigieburn West PSP has a total area of approximately 565 ha and abuts the Lindum Vale (Mt Ridley West) PSP to the north, Craigieburn (R2) PSP to the east, and Greenvale North (R1) PSP to the south;
- A draft Place Based Plan has been prepared for the area which contemplates developing the area for predominately standard-density residential development, as well as providing a Local Town Centre, schools, community facilities and local parks;
- Based on densities of 18.5 dwellings per net developable hectare for standard density lots and 26.5 dwellings per net developable hectare for medium density lots, with an average of 20 dwellings per net developable hectare, approximately 8,230 lots may be provided within the PSP area;
- The PSP area will primarily be accessed via the existing arterial road network that runs adjacent and through the site (Craigieburn Road, Mickleham Road and Mt Ridley Road). Secondary access opportunities will be provided via the extension of existing roads from the adjacent PSPs which will run through the proposed PSP area;
- The Lindum Vale PSP, which abuts the northern boundary, has had a traffic model prepared for interim (2031) and ultimate (2046) conditions, whilst the Craigieburn R2 PSP, which abuts the eastern boundary, has had a traffic model prepared for what can be considered interim conditions;
- A traffic model has been prepared for the Craigieburn West PSP where the future base conditions were based on the abovementioned traffic modelling as well as external growth along the arterial and connector roads within the vicinity;
- A traffic generation rate of 9 vehicle trips per day per lot (with 10% of trips occurring during the AM and PM peak hour) was adopted for the standard density residential component. Whilst a traffic generation rate of 7 vehicle movements per dwelling was adopted for the medium density residential component. Application of these rates results in the PSP area generating 70,310 vehicle trips per day inclusive of 7,031 vehicle trips per hour during the AM and PM peaks;
- It has been assumed that the AM peak hour will consist of 70% outbound movements and 30% inbound movements. Whilst the PM peak hour will consist of 40% outbound movements and 60% inbound movements;
- The trip purpose traffic distribution has been based on the Victorian Integrated Survey of Travel and Activity (VISTA) which specifies different percentages for work, shopping, education,

recreation, and other purposes. Furthermore, the directional distribution was based on existing and future uses within the vicinity;

- The mid-block capacity assessment shows that all roads will operate within or near their theoretical capacity, except for Elevation Boulevard (east of North-South Connector Boulevard 1) and East-West Connector Road 3 (Between Horizon Boulevard & Vantage Boulevard). Nevertheless, considering these are short sections of road, and that actual traffic volumes are expected to reduce as a result of the inclusion of lower order access streets, this is considered appropriate.

Please do not hesitate to contact the undersigned, or Stuart Valentine on (03) 9982 9765 or at stuart.valentine@onemilegrid.com.au, should you wish to discuss the above.

Yours sincerely

Ross Hill

Director - Senior Engineer

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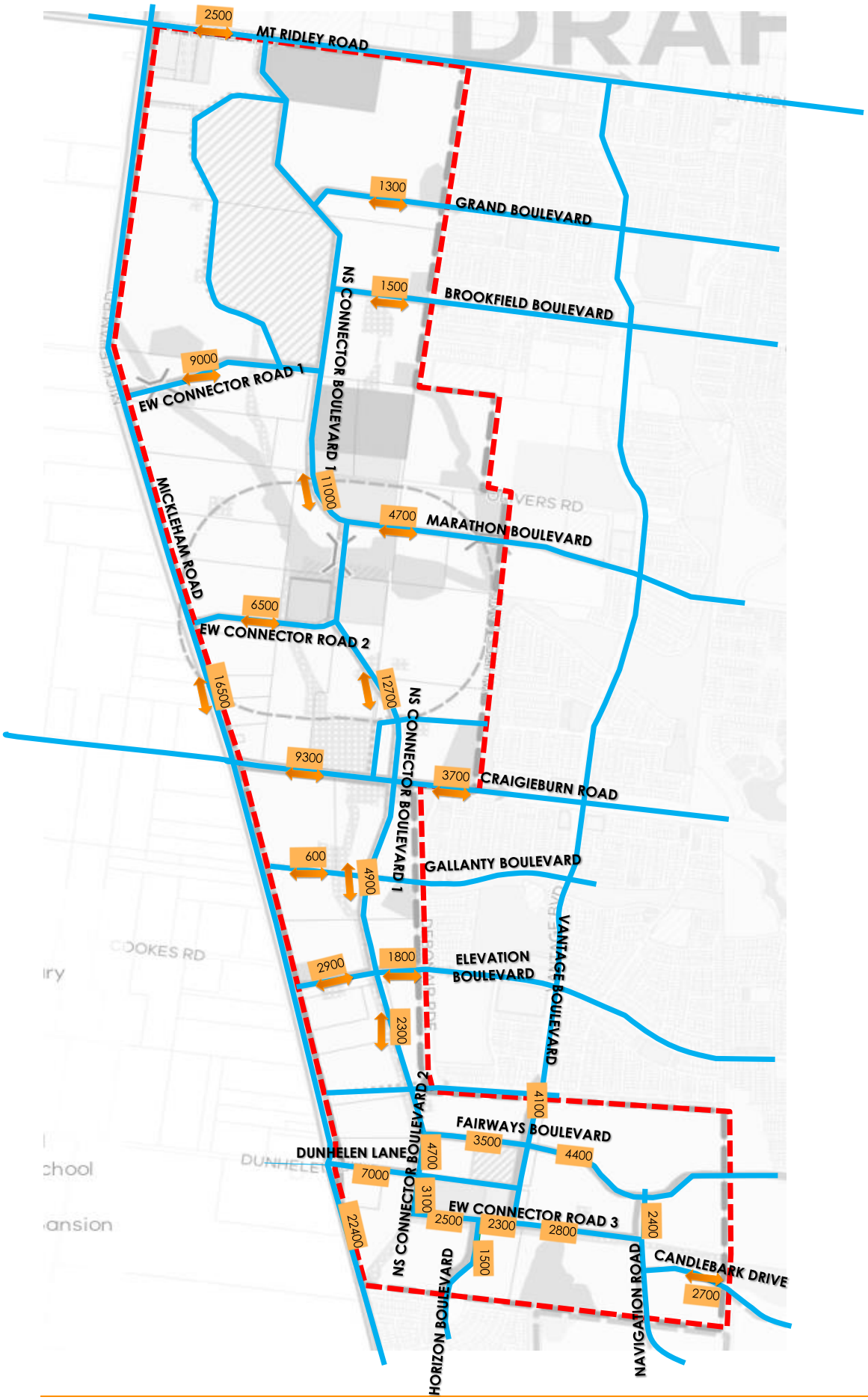
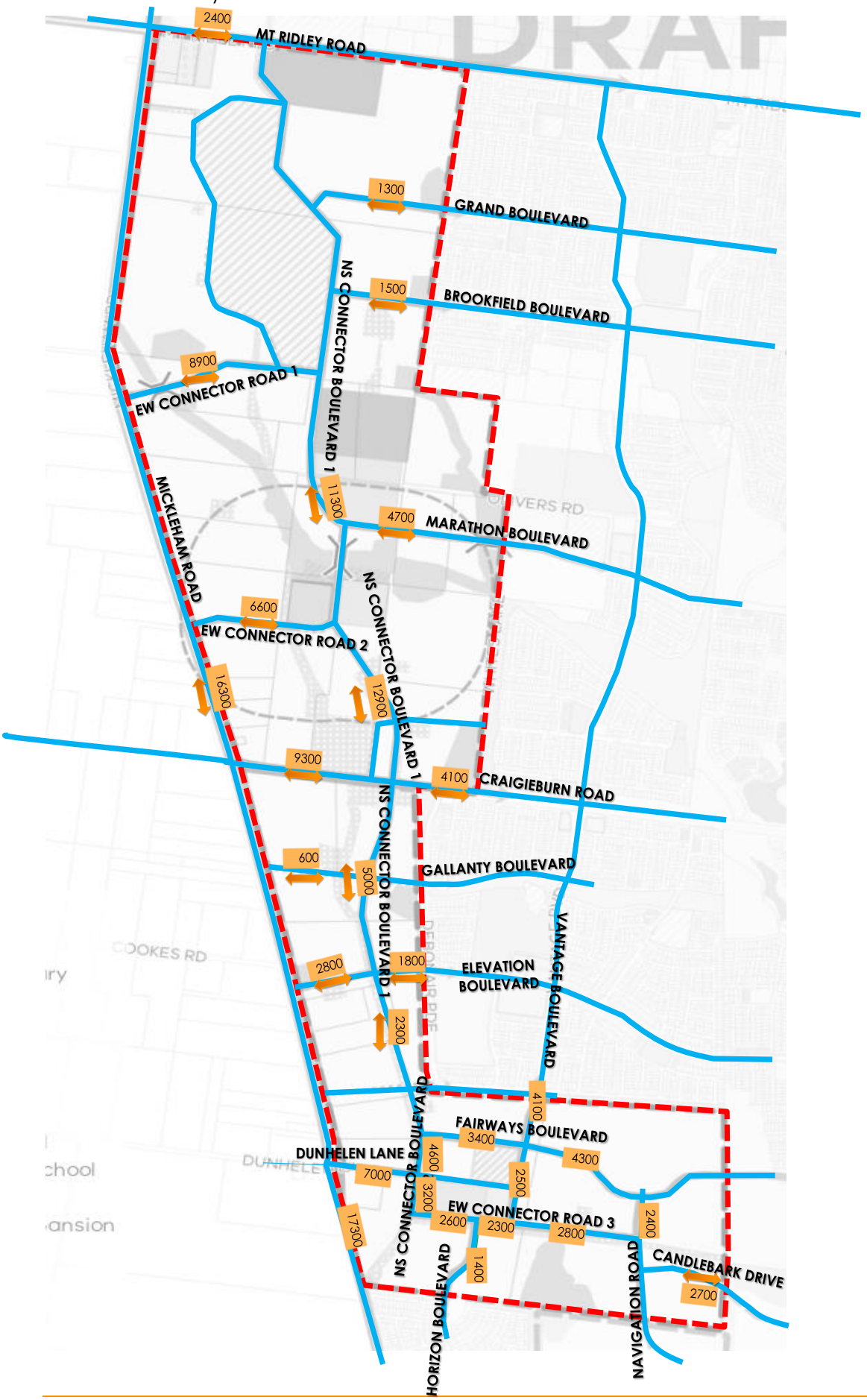
att: Generated and Resulted Daily Traffic Volumes

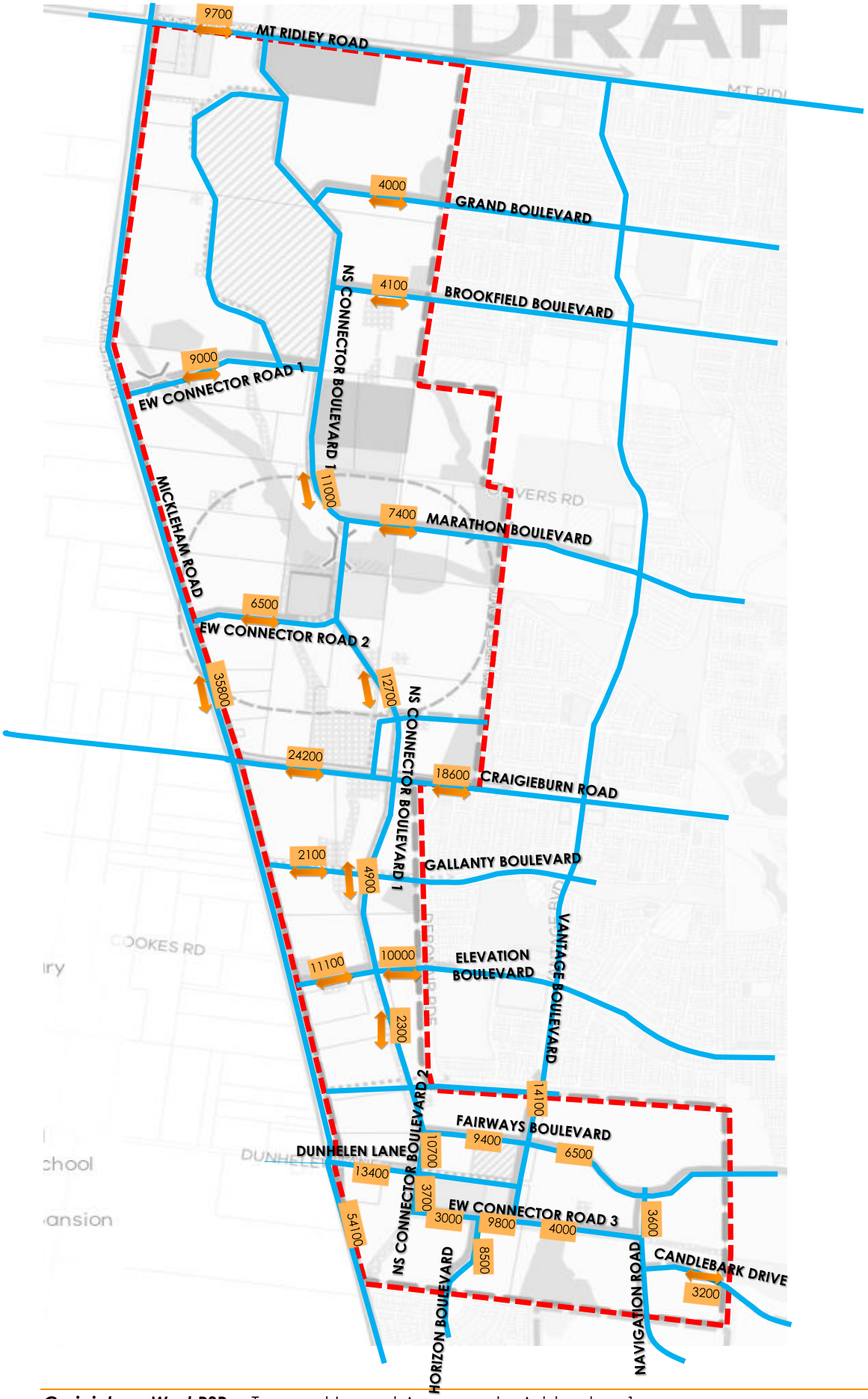
Generated Daily Volumes – Interim



Generated Daily Volumes – Ultimate



Resultant Daily Volumes – Interim



Resultant Daily Volumes – Ultimate