Craigieburn West Precinct Structure Plan Expert Witness Statement Traffic and Transport

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1. INTRODUCTION

My name is Stephen Pelosi and I am a Director at *Movendo Pty Ltd* and a Consulting Traffic and Transport Engineer. *Movendo* conducts business from the Ground Floor at Unit 10 / 243 Flemington Road, North Melbourne.

I completed a Bachelor degree in Civil Engineering at RMIT in December 1985 and have over 35 years of experience in traffic engineering and transport planning, particularly in the areas of planning and assessment of urban road networks, assessment of the traffic impacts of development proposals, preparation of local area traffic management strategies, town and regional centre traffic studies, pedestrian and bicycle design, parking studies and road safety audits. I have worked extensively across Australia, the Middle East, Asia and Latin America, advising private clients and government agencies on transport and infrastructure issues.

I have held senior executive positions in local government, as well as consultant firms. Prior to becoming a founding Director at *movendo*, I worked at various transport consultancies including AECOM (Technical Director 10 years), Aurecon (Associate 4½ years). I also worked at the City of Melbourne for 11 years in the traffic engineering office in various capacities.

I have been engaged by Hume City Council to consider various traffic engineering issues in relation to a Draft Amendment to the Hume Planning Scheme. The Draft Amendment has been prepared by the Victorian Planning Authority (VPA) and seeks to facilitate the use and development of land for residential and a mix of other uses generally in accordance with the Craigieburn West Precinct Structure Plan (Proposed PSP).

More particularly, I have been requested to consider a number of issues arising out of the Proposed PSP and its implementation as outlined in Hume City Council's submission to the VPA. These include:

- Significant concerns regarding the transport plan for the PSP area arising from the Transport Impact Assessment underpinning the Proposed PSP.
- The need for priority delivery of the duplication of Mickleham Road.
- The status and role of Whites Lane.

Within the preceding context, Council's fundamental traffic and transport related concerns and current position (as outlined in some detail in its submission to VPA) include:

1. Council's chief concern is the Proposed PSP and the Draft Amendment are not underpinned by the requisite traffic modelling and testing of the proposed road network.
2. Some of Council's concerns arise from the advice provided by GTA Consultants as outlined in the memorandum titled Technical Note Traffic and Transport Peer Review, dated 18 December 2020 (GTA Memorandum). The GTA Memorandum formed an attachment to the Council's submission to the Draft Amendment.
3. Broadly speaking, Council's traffic and transport related concerns can be captured as follows:
    a) Concern with the road network's capacity to support the proposed delivery of the Craigieburn West PSP;
    b) The impacts of land fragmentation and sequencing are not readily understood by the traffic work that has been undertaken to enable appropriate implementation of the Craigieburn West PSP;
    c) Additional measures such as signalised traffic intersections on connector roads need to be considered in the context of capacity, demand and proposed land uses.
4. Separately, Council is also concerned about over-capacity issues with the arterial road network as it relates to Mickleham road. The projected 8000 additional dwellings that are anticipated in the Craigieburn West PSP will further exacerbate the congestion experienced. Council submits Mickleham Road duplication works must be undertaken as a matter of priority.
5. Council's submission also refers to its view of the role and operation of Whites Lane which should be delivered with an amended cross section in accordance with the attachment to Council's submission.
6. Council is also concerned with achieving bus capability, including for local access streets, and providing a bus capable network to encourage alternative travel options to private vehicles – particularly to reduce reliance on private vehicles and their impact on traffic volumes on the connector and local road network.

The scope of my expert evidence is limited to consideration of the above matters, as detailed in this report.

Appendix A contains a statement setting out my qualifications and experience, and the other matters raised by Planning Panels Victoria 'Guide to Expert Evidence'. A copy of my curriculum vitae is provided in Appendix B.

2. CRAIGIEBURN WEST PRECINCT STRUCTURE PLAN

The draft amendment to the Hume Planning Scheme for the Craigieburn West Precinct Structure Plan (the PSP) 1068 has been prepared to facilitate future urban development. The Victorian Planning Authority (VPA) is the planning authority in respect of the amendment. The PSP covers an area of 562 hectares (ha), consisting of 40 land parcels, ranging in size from approximately 0.14 ha to 79 ha. The PSP area is expected to accommodate around 8,234 housing lots. The PSP has an irregular shape, with a North South linear orientation. It is bounded by the Craigieburn PSP to the east, the Lindum Vale PSP to the north, the Greenvale North PSP to the south and Mickleham Road to the west (which also represents the western extent of the metropolitan Urban Growth Boundary). The PSP and surrounding areas ara shown in Figure 1.

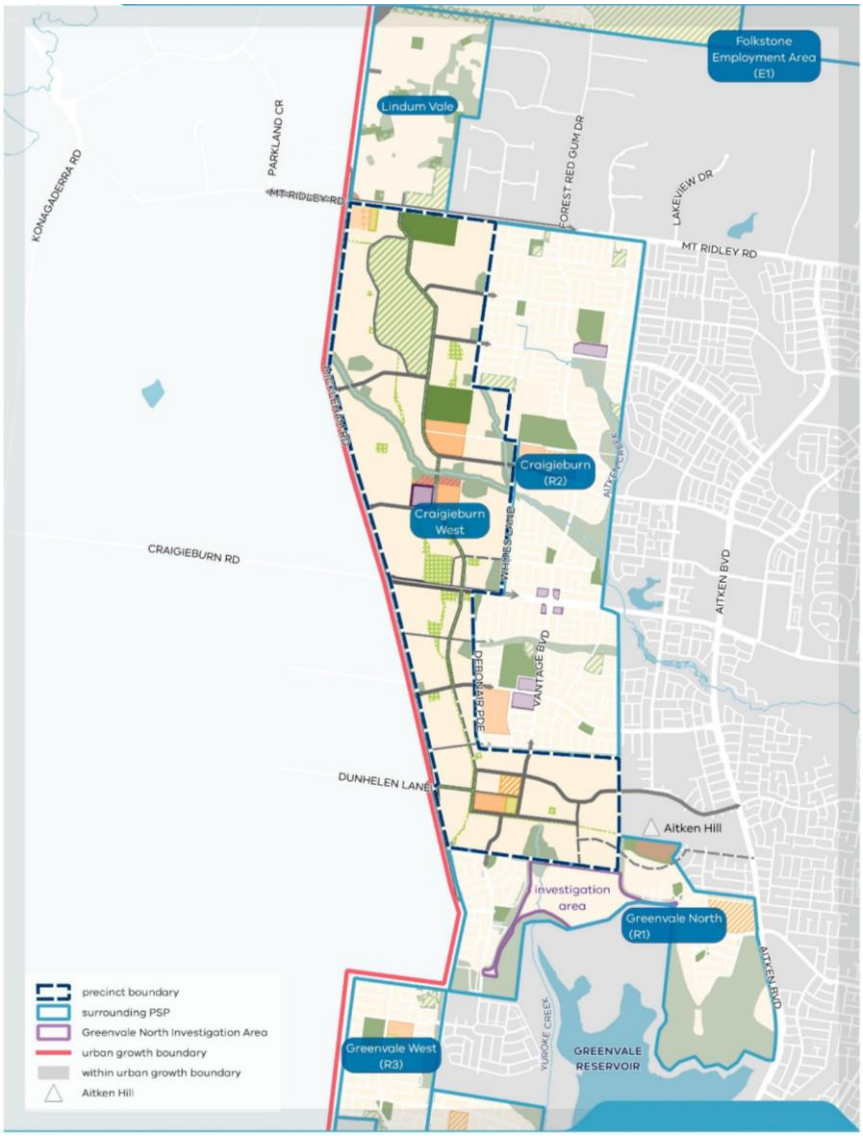

Figure 1: Craigieburn West PSP Precinct – Sub-Regional Context

3. HUME CITY COUNCIL ISSUES

I am instructed that Council is concerned that the Proposed PSP and the Draft Amendment are not underpinned by the requisite traffic modelling and testing of the proposed road network. The issues that I have been requested to examine include:

1. Traffic related work underpinning the Draft Amendment and Proposed PSP.
2. Matters raised in the Council's submission including:
    a. the methodology and findings made in the GTA Memorandum;
    b. the merits of adopting changes to the Craigieburn West PSP Proposed Transport Network Plan; to provide better integration of proposed road network and land use and designation of lower order roads and left in/left out intersections to arterial roads, as appropriate, to deal with orderly implementation of the PSP (in light of fragmented ownership) and options for delivery of bus services across the PSP
3. Priority delivery of the duplication of Mickleham Road.
4. The status and role of Whites Lane.
5. The VPA's response to the Council's submission and consideration of any other submissions insofar as they relate to my area of expertise, as relevant to Council's submission.
6. Possible solutions to manage traffic volumes in the Craigieburn West PSP including variations to the Transport Network Plan and ensuring capacity on the road network for public transport routes.

I have considered these issues in the sections that follow.

3.1. TRAFFIC RELATED WORK UNDERPINNING THE DRAFT AMENDMENT AND PROPOSED PSP: MODELLING PLATFORM

3.1.1 STATUS: TRAFFIC MODEL

1. Forecast traffic impacts associated with the proposed PSP are covered by two reports that have been prepared by onemilegrid for the VPA. The reports are titled "Craigieburn West Precinct Structure Plan Transport Impact Assessment" (dated 9 November 2020) and "Transport Impact Assessment – Addendum 1" (dated 26 March 2021).
2. From my review of the two reports it is not clear what modelling platform has been used for the assessment of the Craigieburn West PSP, as there are no details provided on the specific software used. It is assumed that the model that has been used is a spreadsheet model.

3.1.2 RELEVANT MATTERS FOR CONSIDERATION

1. Within Victoria, there are a number of models that are perpetual and maintained by private and government organisations for the purposes of strategic scale modelling – appropriate for testing the impacts of large projects or developments such as those covered by PSPs. The Department of Transport manages the Victorian Integrated Transport Model (VITM) which has been commonly used in PSP planning processes for a number of years.
2. Models such as VITM include detailed population and land-use characteristics and incorporate current and future statewide transport network details and travel behaviour characteristics which, collectively, enable robust transport system assessments.
3. A common feature of strategic models is their ability to redistribute traffic through the network and/or enable trips to switch between time periods and modes (as a result of transport system capacity limitations or the availability of valid alternatives for trip-making by other modes). Such features are extremely difficult to replicate on simpler modelling platforms such as spreadsheet models.
4. Strategic models are also able to provide reliable assessments of transport infrastructure staging and help to understand how to manage the sequencing of infrastructure provision.
5. Strategic models have typically been developed, with considerable investment, over a period of decades and incorporate the complex transport interactions that exist on a metropolitan scale. They are thus able to deliver transport assessments for large projects/developments with greater confidence levels than simpler spreadhseet models (which are unlikely to effectively reflect metropolitan wide transport dynamics).

3.1.3 CONCLUSION

1. The nature of the transport modelling approach used for the Craigieburn West PSP is unknown. However, it is likely that the modelling was spreadsheet based, in which case it is unlikely to possesses the complexity and analytical breadth of models such as VITM (or other strategic models that have been developed by private agencies in Victoria). It is my view that outputs from the Craigieburn West PSP transport modelling cannot be relied upon with a high degree of confidence.

3.2. TRAFFIC RELATED WORK UNDERPINNING THE DRAFT AMENDMENT AND PROPOSED PSP: TRAFFIC GENERATION

3.2.1 STATUS: TRAFFIC GENERATION ASSUMPTIONS

1. My review of the Transport Impact Assessment has identified the following statement with respect to 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."
2. The justification for adopting a traffic generation rate of 9 movements per day for each standard density lot and the lower traffic generation rate of 7 movements per day for medium density housing has not been provided. In addition, the basis for the adoption of 10% of daily vehicle movements occurring during both the AM and PM peak hours has not been explained.
3. The "Transport Impact Assessment – Addendum 1" also advises that the Craigieburn West PSP area will accommodate around 8,234 lots, of which 6,334 are forecast to be standard density residential and 1,900 medium density residential. Thus, on the basis of these forecasts, the anticipated proportion of medium density housing in Craigieburn West would be 23%.

4. Finally, I have noted that the daily 'trip purpose' breakdown provided in the onemilegrid report from the Transport Impact Assessment report of 9 November 2020 identifies 'trip purpose' proportions of 40% daily for 'work' purposes and 9% daily for 'education'. The relevant extract (section 4.7.1) from the Transport Impact Assessment report of 9 November 2020 is shown in Figure 2.

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%

Figure 2: Trip Purpose Assumptions Used in Transport Impact Assessment Report (dated 9 November 2020)

3.2.2 RELEVANT MATTERS FOR CONSIDERATION

1. The matters that require consideration, in determining the appropriateness of traffic generation rates for Craigieburn West, are:
2. Whether the use of 9 traffic movements per day for each standard density lot (with 10% occurring during both the AM and PM peak hours – namely 0.9 car trips per household in each peak hour) is consistent with evidence of travel mode choices and patterns in the City of Hume?
3. Whether there is sufficient justification to adopt a lower generation rate of 7 traffic movements per day for medium density housing?
4. Insights into these queries and the likely household car trip generation rates in Craigieburn West can be obtained by consideration of relevant transport-related data – specifically the Australian Bureau of Statistics Census of Population and Housing 2011 and 2016 data sets (the Census data) as well as data from the Victorian Integrated Survey of Travel and Activity (VISTA). VISTA is an ongoing survey of household travel activity undertaken by the Victoria State Government Department of Transport and it provides the most com prehensive and detailed picture of Victorian household travel behaviour. The most recent VISTA data is based on 2018 surveys.

5. Using both the Census and VISTA data, I will first consider the traffic generation rate for standard density lots. Figure 2, on the previous page, reproduced the 'Trip Purpose Distribution' used in the Transport Impact Assessment report of 9 November 2020 (for 'typical households'). Table 1 compares the data from Figure 2 with the VISTA data for metropolitan Melbourne from the Department of Transport's VISTA website.

6. Table 1 reveals that there are some discrepancies between the daily trip purpose distributions adopted in the Transport Impact Assessment report of 9 November 2020 and the corresponding data from the Department of Transport's VISTA website. These discrepancies are particularly evident in the 'work' and 'recreation' categories. For the purposes of this assessment, I will utilise the data from the Department of Transport's VISTA website directly.

Table 1: Comparison of VISTA Daily Trip Purpose Distributions

Trip Purpose	Daily Proportion (%) Analysis by onemilegrid	Daily Proportion (%) VISTA 2018*
Work	40%	26%
Shopping	20%	15%
Education	9%	10%
Recreation	6%	21%
Other	25%	28%

* Metropolitan Melbourne Data Visualisation Tool
https://public.tableau.com/profile/vista#!/vizhome/VISTA-LGAProfilerAccess/LocalGovernmentAreaprofiles

7. In view of the discrepancies highlighted in Table 1, I have reviewed peak hour trip purpose distributions separately and focussing on the City of Hume (rather than the entire Melbourne metropolitan area). The findings of my analysis using the 2016 Census data and 2018 VISTA data reveal that in the City of Hume:

8. The number of dwellings was 63,208. Across the municipality, 13.9% of the dwellings were medium or high density whilst 85.1% were categorised as 'separate house'.

9. Total number of daily car trips for 'journey to work' was 109,579.

10. Proportion of 'journey to work' trips that occurred during the 8-9am morning peak hour was 18.4%.

11. Therefore, the number of work-related trips in Hume during the AM peak hour is 18.4% multiplied by 109,579 = 20,163 work-related car trips.

12. VISTA reveals that 'journey to work' trips represent 20.2% of all car trips in the AM peak hour between 8-9am (see Figure 3). Thus, the total car trips in the AM peak hour are 99,816 (applying the 20.2% factor to the 20,163 work-related car trips).

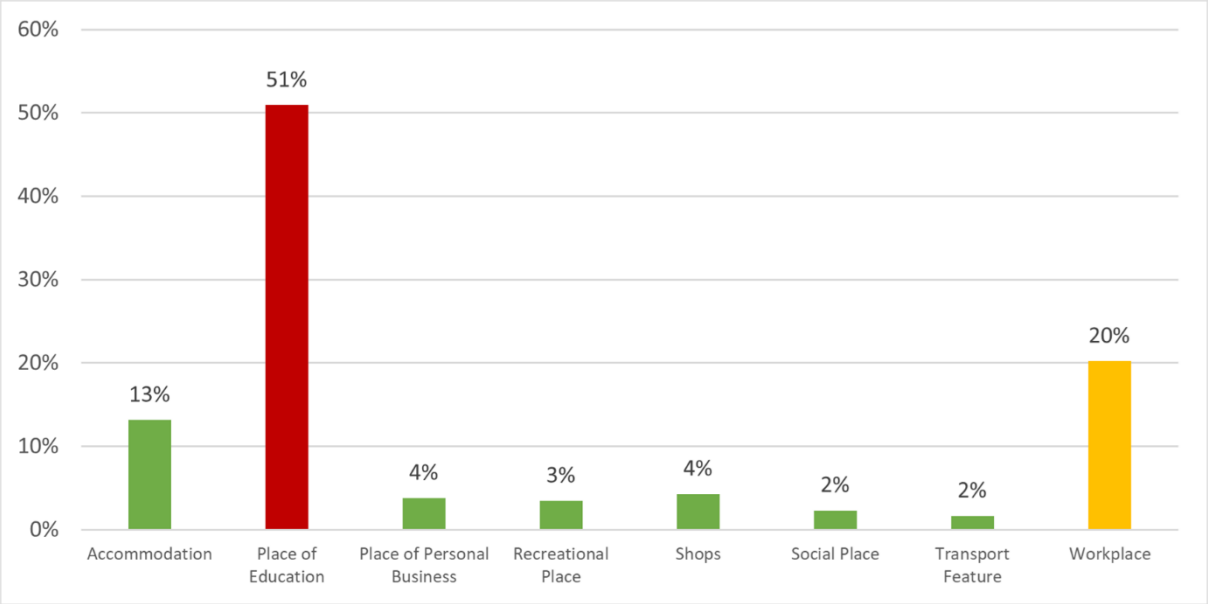

Figure 3: City of Hume: 8-9am Peak Hour Proportional Car Trip Purpose

13. In conclusion, during the AM peak hour of 8-9am, it is estimated that there 97,645 car trips in the City of Hume (using Census and VISTA data). This is equivalent to a traffic generation rate of 1.58 car trips per household (99,816 car trips divided by 63,208 dwellings). It is noted that in the City of Hume, the proportion of dwellings categorised as medium or high density was 13.9% in 2016. The rate of 1.58 car trips per household reflects that proportion of medium / high density housing in the municipality. Importantly, the 1.58 car trips per household is 76% higher than the estimate of 0.9 car trips per household used in the "Transport Impact Assessment – Addendum 1".

14. The second aspect relevant to traffic generation rates is to consider whether there is sufficient justification to adopt a lower generation rate for medium density housing.

15. To this end, I have compared for the locality of Craigieburn the journey-to-work statistics between 2011 and 2016 (shown in Table 2). In that period, the proportion of dwellings categorised as 'medium density housing' increased from 7.1% of dwelling types in 2011 to 13.2% of dwelling types in 2016; such a change represents a proportional increase of 85.9%. During the same period the proportion of 'employed persons' using motorised vehicles to travel to work decreased from 75.8% in 2011 to 74.3% in 2016; such a change represents a proportional decrease of 2%. In summary the data suggests that in Craigieburn (an existing locality immediately adjacent to the Craigieburn West PSP) the significant rise in the proportion of medium density housing (between 2011 and 2016) has been accompanied by a modest drop in the overall proportion of motorised trips to work. In this context, the evidence to adopt a lower generation rate for medium density housing is not compelling and greater justification is required.

Table 2: Comparison of Method of Travel to Work in Craigieburn 2011 to 2016

Census Year	Total employed persons aged 15+ in Craigieburn	Proportion of Dwelling Types		Method of Travel to Work	
		Separate house	Medium density housing	Motorised vehicle (driver or passenger)	Public transport, walk or cycle
2011	15,473	92.8%	7.1%	75.8%	11.8%
2016	21,848	86.6%	13.2%	74.3%	13.4%

16. An indication of the potential for localities that feature high proportions of 'medium' and 'high density' housing (within the City of Hume) to exhibit significantly lower car use compared with other localities in the municipality can also be obtained by examining Census 'journey to work' data more broadly across the Hume municipality.

17. The locality with the highest proportion of 'medium' and 'high density' housing in the City of Hume is Tullamarine with 39.2% of such dwellings. In Tullamarine, the use of motorised vehicles for the 'journey to work' was 77% – a little higher than the municipal average of 75%. The locality with the second highest proportion of 'medium' and 'high density' housing Broadmeadows. In this area, 28.4% of all dwellings are categorised as 'medium' and 'high density' housing (2016 Census). The municipal average for the proportion of 'medium' and 'high density' housing in the City of Hume is much lower at 13.9%. Despite the high proportion of 'medium' and 'high density' housing in Broadmeadows (and the generous availability of public transport services compared to other parts of Hume) the use of motorised vehicles for the 'journey to work' was 69% – a little lower than the municipal average of 75%. The proportions of motorised vehicles for the 'journey to work' across Hume's various localities is shown in Figure 4.

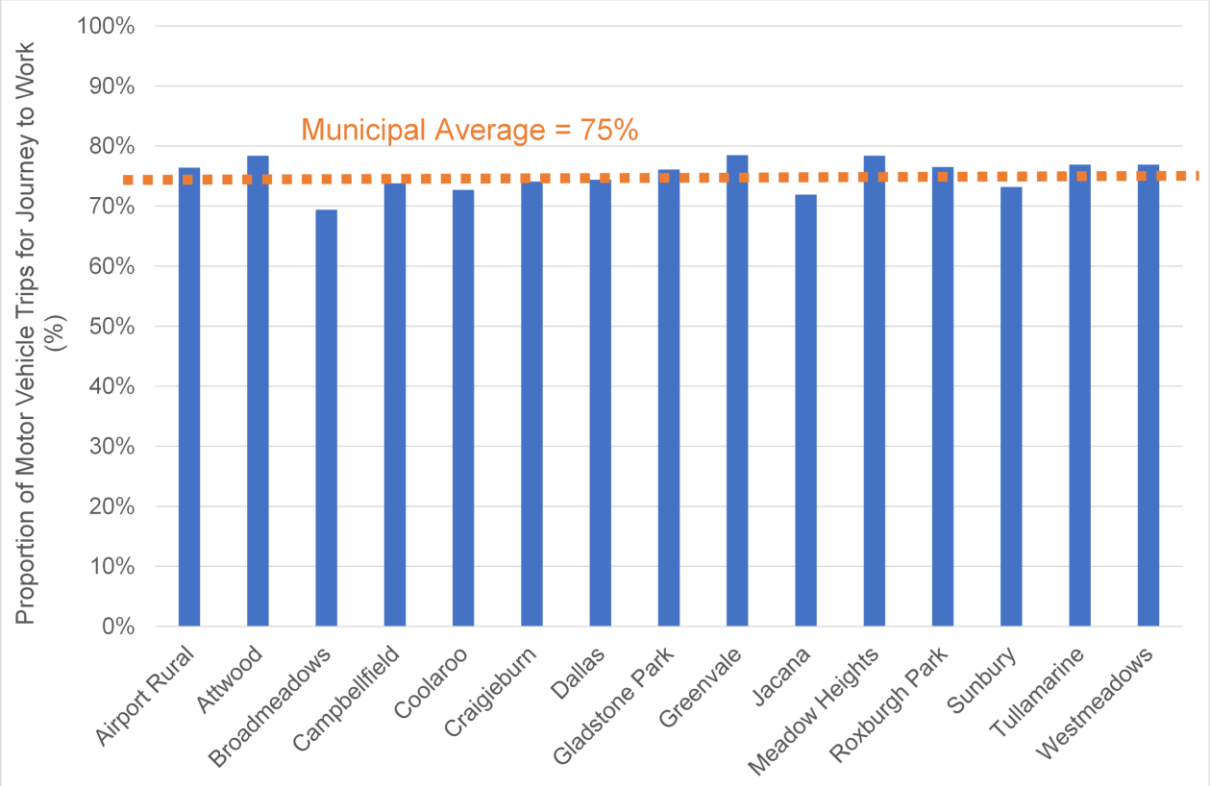

Figure 4: Travel mode for Journey-to-Work across Hume and its Suburban Localities

3.2.3 CONCLUSION

1. The use of 0.9 and 0.7 trips per dwelling for peak hours (as adopted in the "Craigieburn West Precinct Structure Plan Transport Impact Assessment", for standard and medium density lots respectively) may not accurately reflect future traffic generation in Craigieburn West. Use of Census and VISTA data for the entire Hume municipality suggests that the trips per dwelling rate may be as high as 1.58 car trips per household in the AM peak hour.
2. Furthermore, examination of the 'journey to work' statistics for different localities in Hume suggest that the presence of a comparatively higher proportion of 'medium' and 'high density' housing is not always reflected in lower car utilisation for the journey to work.

3.3. TRAFFIC RELATED WORK UNDERPINNING THE DRAFT AMENDMENT AND PROPOSED PSP: DIRECTIONAL SPLIT

3.3.1 STATUS: DIRECTIONAL SPLIT ASSUMPTIONS

1. The "Craigieburn West Precinct Structure Plan Transport Impact Assessment" (dated 9 November 2020) prepared by onemilegrid for the Victorian Planning Authority advises as follows with respect to directional splits:

   "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."

3.3.2 RELEVANT MATTERS FOR CONSIDERATION

1. A review of VISTA data for the City of Hume, with respect to trips generated by residential uses, reveals the following proportions:
   a) 8-9am – 91% outbound & 9% inbound
   b) 3-4pm – 24% outbound & 76% inbound
   c) 5-6pm – 22% outbound & 78% inbound

3.3.3 CONCLUSION

1. The directional split used in the "Craigieburn West Precinct Structure Plan Transport Impact Assessment" appear to underestimate the intensity of traffic flows in the both the AM and PM peak periods.
2. VISTA data indicates that directional flows are more 'tidal'. This requires more road traffic capacity to be provided in the peak flow directions.

3.4. TRAFFIC RELATED WORK UNDERPINNING THE DRAFT AMENDMENT AND PROPOSED PSP: TRAFFIC DISTRIBUTION

3.4.1 STATUS: TRAFFIC DISTRIBUTION

1. The "Craigieburn West Precinct Structure Plan Transport Impact Assessment" (dated 9 November 2020) uses a directional distribution for traffic associated with the Craigieburn West PSP. Locations to the east of the PSP are nominated as the dominant daily source of trip origins/destinations. The relevant extract (section 4.7.2) from the Transport Impact Assessment report is shown in Figure 5.

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

Figure 5: Directional Traffic Distribution Adopted in Transport Impact Assessment Report

3.4.2 RELEVANT MATTERS FOR CONSIDERATION

1. The derivation of the directional traffic distribution adopted in the "Craigieburn West Precinct Structure Plan Transport Impact Assessment" report is unclear. The report makes a generic reference to the location of the proposed Craigieburn West PSP in relation to surrounding public transport facilities, schools, recreation and retail and employment precincts. No other details are provided.
2. It is noted that the dominant origin/destination has been nominated as the 'east', namely Craigieburn Town Centre, Train Station, Employment Area, etc.
3. Guidance on current directional traffic distribution is available, at municipal level, from VISTA. Figure 6 shows the directional distribution for all trips originating in the City of Hume and destined outside of the City of Hume.

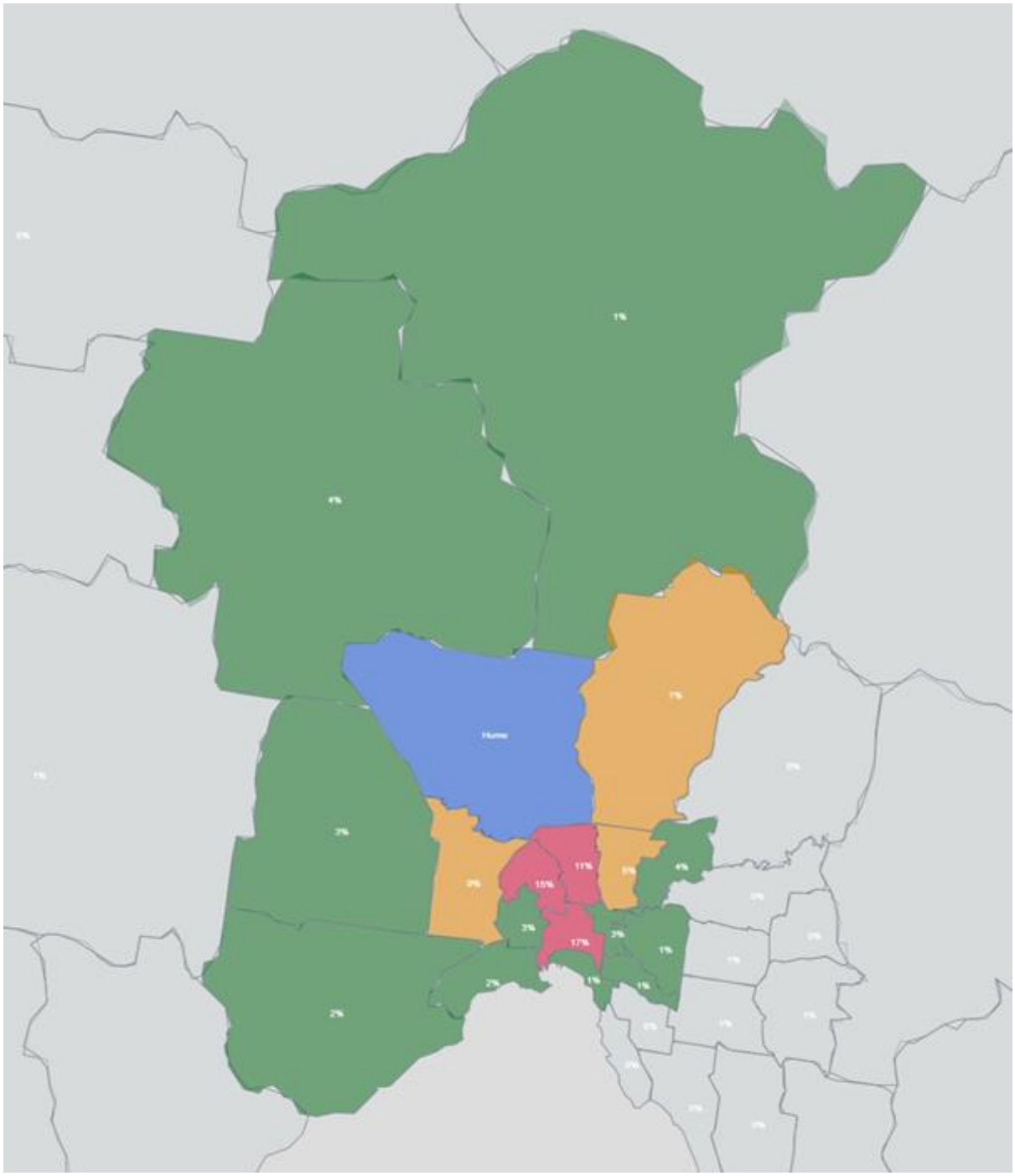

Figure 6: Directional Traffic Distribution – Trips External to the City of Hume

4. The traffic distribution shown in Figure 6 is summarised in Table 3. The table below shows the proportion of all weekday trips (for all trip purposes and on all travel modes) that originate in the City of Hume during and have a destination outside the municipality. The table only shows those Local Government Areas (LGAs) that capture 1% or more of the trips originating in Hume.

5. The top five LGA destinations (Melbourne, Moonee Valley, Moreland, Brimbank and Whittlesea) represent 59% of all trips that start in Hume and end outside the municipal limits. The top 4 LGA destinations are located south of the Craigieburn West PSP and represent 52% of trips destined outside the City of Hume.

Table 3: Destinations for Trips Starting in Hume and Destined Outside the Municipality

Local Government Area (LGA)	Proportion of Trips Destined to LGAs outside of City of Hume
Melbourne	17%
Moonee Valley	15%
Moreland	11%
Brimbank	9%
Whittlesea	7%
Darebin	5%
Macedon Ranges	4%
Banyule	4%
Yarra	3%
Maribyrnong	3%
Melton	3%
Wyndham	2%
Hobsons Bay	2%
Mitchell	1%
Port Phillip	1%
Boroondara	1%
Bass Coast	1%
Stonnington	1%
Monash	1%
Moorabool	1%
Whitehorse	1%
Casey	1%
Knox	1%

3.4.3 CONCLUSION

1. The traffic distribution adopted in the "Transport Impact Assessment" is heavily allocated to the east, thus reducing pressure on Mickleham Road.
2. Analysis of VISTA data for the City of Hume indicates that trips external to the municipality are predominantly bound for LGAs to the south.

3.5. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: DATA AND ASSUMPTIONS USED IN THE TRANSPORT MODELLING

3.5.1 STATUS: KEY ISSUES

1. I am instructed that Council has identified a number of significant concerns in the data and assumptions used by onemilegrid in the modelling presented in the "Transport Impact Assessment" report dated 9 November 2020. Council has advised VPA of its concerns and noted that in many cases there is a lack of detail to allow for a comprehensive assessment and provide confidence in the proposed road network.

3.5.2 RELEVANT MATTERS FOR CONSIDERATION

1. My review of the modelling process and the data and assumptions used by onemilegrid in their "Transport Impact Assessment" report dated 9 November 2020 is presented in sections 3.1 to 3.4 of this report.

3.5.3 CONCLUSION

1. I consider that there are several parameters and assumptions used in the modelling process for the Craigieburn West PSP that likely underestimate the volume of traffic that will be generated by the Craigieburn West PSP.
2. Furthermore, the assumptions used for the intensity of traffic loads onto the road network (directional split) and traffic distribution of the forecast peak hour traffic are inconsistent with indications of the likely traffic intensity and distribution applicable to the City of Hume (as derived from Census and VISTA data). The inconsistencies between the assumptions used and the behaviour patterns revealed by the Census and VISTA data are likely to unrealistically moderate the forecast impact on the transport network leading to underestimates of road capacity required to accommodate traffic associated with the Craigieburn West PSP.

3.6. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: FINDINGS MADE IN THE GTA MEMORANDUM

3.6.1 STATUS: KEY ISSUES

1. GTA Consultants were engaged by City of Hume to prepare a memorandum titled "Peer Review of Transport Impact Assessment" (the GTA memorandum) dated 18 December 2020. The GTA memorandum provided a peer review the "Craigieburn West Precinct Structure Plan Transport Impact Assessment" report prepared by onemilegrid for the proposed Craigieburn West PSP.

3.6.2 RELEVANT MATTERS FOR CONSIDERATION

1. The GTA memorandum raises a number of aspects with respect to the modelling presented in the "Transport Impact Assessment" report dated 9 November 2020. More specifically, the GTA memorandum questions the use of a spreadsheet model and queries the source / justification of the assumptions used for key modelling parameters. The GTA memorandum suggests that clarification is required on the rationale used for the modelling assumptions in the "Transport Impact Assessment".
2. The GTA memorandum also questions the Transport Impact Assessment's adopted average lot size, the associated total number of dwellings and the development yields.
3. My view on the modelling aspects (highlighted in the GTA memorandum) is presented in sections 3.1 to 3.4 of this report.
4. Page 7 of the GTA memorandum makes a number of suggestions for the Transport Network Plan. The suggestions include: (i) Consideration to be given to upgrading intersections at critical locations near schools and the town centre from roundabouts to signalised intersections; (ii) Additional access links to Craigieburn Road in the form of left-in/ left-out intersections; (iii) Upgrading Vantage Boulevard from Access Street to Boulevard Connector Road; (iv) Use of roundabouts is not ideal for pedestrians and cyclists; (v) There is little mention of the impacts from high traffic volumes on pedestrians and cyclists.
5. The VPA, in its Craigieburn West PSP Part A Submission dated April 2021, has stated that it has reviewed the Traffic Impact Assessment prepared by onemilegrid and agreed with the submission from Council that the yields used as the basis of the assessment were too low. Accordingly, the VPA requested onemilegrid revise the modelling and prepare an addendum to the traffic report. This addendum titled "Craigieburn West Precinct PSP Transport Impact Assessment – Addendum 1" is dated 26 March 2021. The addendum:
    a. explains the changes to the yield, which has increased from 6,153 lots to 8,230 lots;
    b. updates traffic volumes based on the increased lot yield;
    c. makes recommendations to address the increase in vehicle movements, including increasing the capacity of some roads;
6. The revised modelling indicates that certain connector roads shown on the exhibited PSP exceed their theoretical capacity, and as such should be upgraded to boulevard connectors. The VPA proposes changes to the status of these roads in line with the onemilegrid addendum; however, these changes are not shown graphically in the Part A 'Tracked Changes PSP'.

7. The VPA's proposed revisions to the Transport Network Plan are as follows:
    a. Upgrade E/W connector road 1 (parcels 6 and 7) to a boulevard connector.
    b. Upgrade Vantage Boulevard – north of Fairways Boulevard (parcel 35) to a boulevard connector.
    c. Upgrade Fairways Boulevard – west of Vantage Boulevard (parcel 35) to a boulevard connector.
    d. Upgrade Elevation Boulevard – west of N/S connector road 1 (parcel 31) to a boulevard connector.
    e. Downgrade N/S connector road 1 – south of Craigieburn Road (parcels 29, 30 and 31) to a connector street.
    f. Downgrade N/S connector boulevard 2 – south of Dunhelen Lane (parcel 38) to a connector street.
8. The VPA considers that the proposed changes outlined above address both the concerns regarding the traffic modelling and the need to amend the street network to ensure roads are operating within theoretical capacity.

3.6.3 CONCLUSION

1. I consider that there are several parameters and assumptions used in the modelling process for the Craigieburn West PSP that likely underestimate the volume of traffic that will be generated by the Craigieburn West PSP. These modelling parameters and assumptions have not changed in the addendum titled "Craigieburn West Precinct PSP Transport Impact Assessment – Addendum 1" (dated 26 March 2021)
2. Despite the VPA's adoption of changes to the Transport Network Plan, I remain concerned at the adequacy of the proposed road network, as the modelling may be forecasting lower traffic volumes that are inconsistent with travel behaviour of existing Hume residents revealed by Census and VISTA data.
3. I concur with the suggestions made in the GTA memorandum with respect to the Transport Network Plan.

3.7. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: CHANGES TO CRAIGIEBURN WEST PSP TRANSPORT NETWORK PLAN – OVERVIEW

1. Council's view, as outlined in its submission to VPA, is that:
    a. The proposed road network will not support the dwelling yield anticipated and land uses proposed within the PSP.
    b. The impacts of land fragmentation and sequencing cannot be appropriately understood through the traffic modelling that was conducted and consequently are not appropriately addressed or managed through the PSP.
    c. The need for potential signalised intersections on connector streets were not appropriately considered, particularly around schools, community centres and the town centre.
2. Council has proposed a Transport Network Plan that is designed to address these issues. Council's solutions are based on the following principles:
    d. Creating movement choices and connecting neighbourhoods
    e. Managing sequencing
    f. Creating a safe and equitable movement network for all
    g. Responding to features in the urban structure
3. Council has proposed changes to the Craigieburn West PSP Proposed Transport Network Plan to address the matters outlined above. I am instructed that the changes are designed to provide better integration of proposed road network and land use, the designation of lower order roads and left in/left out intersections to arterial roads, as appropriate, to deal with orderly implementation of the PSP (in light of fragmented ownership) and optimise options for delivery of bus services across the PSP.
4. The Council's revised Transport Network Plan is shown in Figure 7.
5. Sections 3.8 to 3.11 of this report discuss key elements of the revised Transport Network Plan.

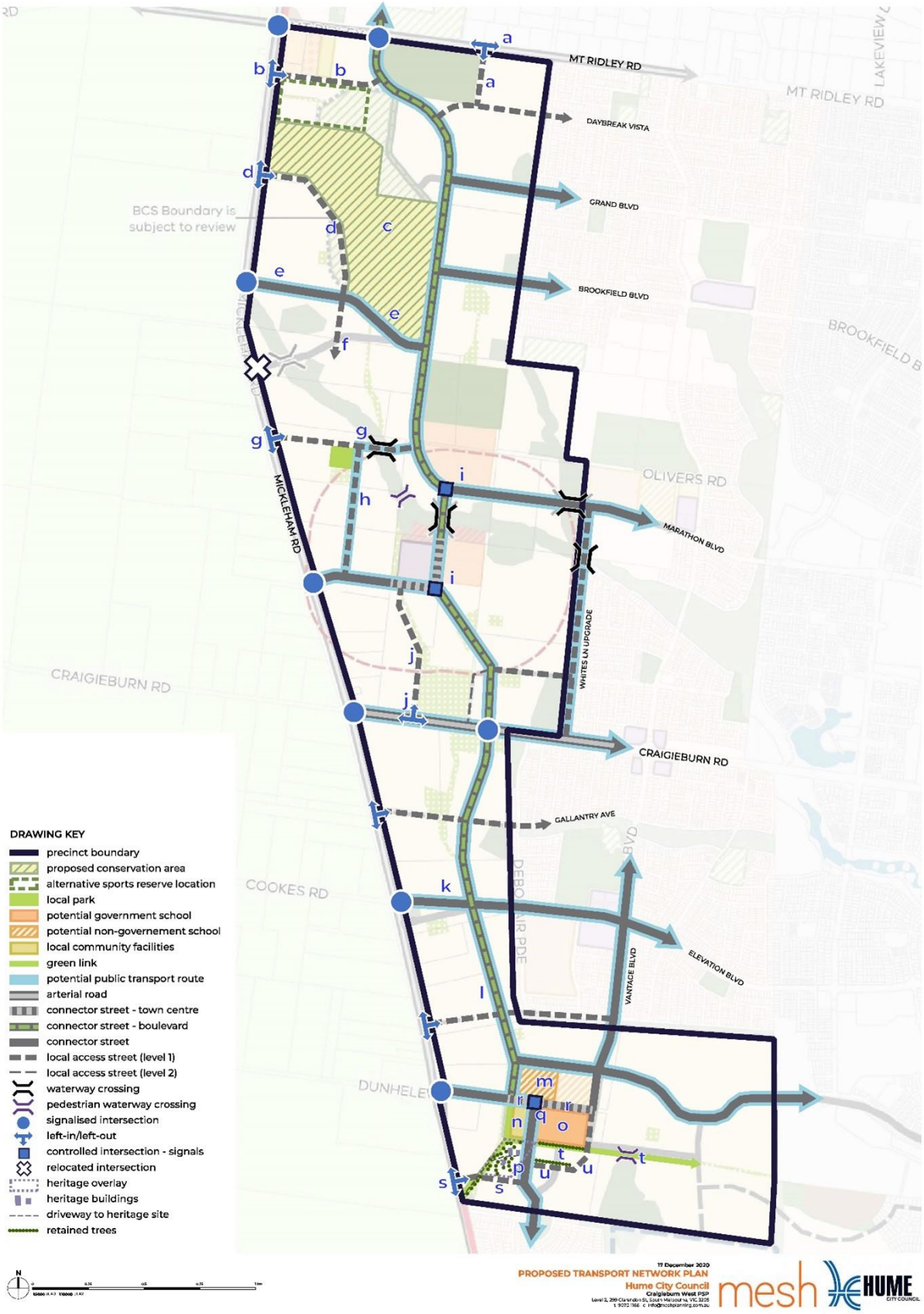

Figure 7: City of Hume Proposed Transport Network Plan for Craigieburn West PSP

3.8. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: CHANGES TO CRAIGIEBURN WEST PSP TRANSPORT NETWORK PLAN LEFT-IN / LEFT-OUT INTERSECTIONS ONTO ARTERIAL ROADS

3.8.1 STATUS: LEFT-IN / LEFT-OUT CONTROLS

1. There are two locations proposed with left-in / left-out access points onto Mickleham Road in the current PSP Transport Network Plan. Both are located south of Craigieburn Road, as shown in Figure 8.

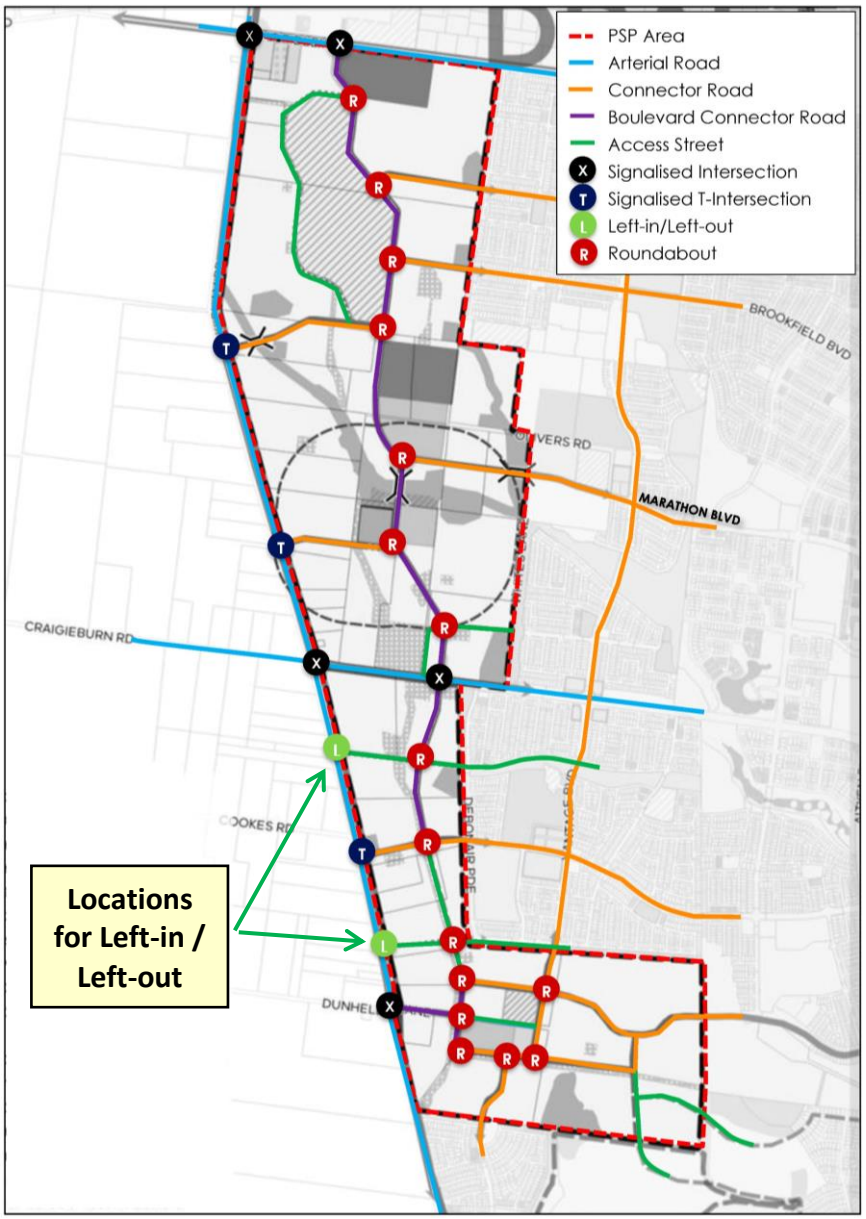

Figure 8: Craigieburn West Road Network and Intersections
(extract from Transport Impact Assessment report by onemilegrid – page 24)

3.8.2 RELEVANT MATTERS FOR CONSIDERATION

1. Council anticipates that the connector road network will exceed capacity within the Craigieburn West PSP. In response, the Council has developed a revised Transport Network Plan which features a local road network that allows additional access to arterial roads and movement between neighbourhoods.
2. The Council's revised Transport Network Plan provides greater network permeability between the internal roads in the Craigieburn West PSP area and the intersecting arterials by increasing the number of left-in / left-out access points from 2 to 8. This will be achieved by expanding the number of left-in / left-out access points onto Mickleham Road (up from 2 to 6) and providing one new left-in / left-out access point onto each of Craigieburn Road and Mount Ridley Road.
3. The Council's view is that resolution of the road network at PSP stage will provide certainty, enable efficient permit approval processes and minimise speculative proposals for arterial road access.
4. The use of left-in / left-out access points helps to disperse traffic entering and existing the Craigieburn West neighbourhoods reducing traffic demand at the major interfaces between the PSP area and the arterials roads that service it: Mickleham Road, Craigieburn Road and Mount Ridley Road.
5. The adoption of new left-in / left-out access points is accompanied by Council's proposal to enhance the Craigieburn West internal road network by provision of a well distributed network of local access streets. These local streets will provide some movement opportunities for local residents away from the connector road network and encourage movement along the arterial road network.

3.8.3 CONCLUSION

1. It is my opinion that the Council's proposed addition of six new left-in / left-out access points, as part of the Craigieburn West PSP Transport Network Plan, enables a finer distribution of traffic movements generated by the Craigieburn West PSP. Left-in / left-out intersection controls provide a safe and effective mechanism to spread traffic more widely and reduce traffic demands on the Craigieburn West internal road network and, simultaneously, reduce traffic demands at the other critical signalised interface locations between the PSP and the arterial roads that service it.

3.9. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: CHANGES TO CRAIGIEBURN WEST PSP TRANSPORT NETWORK PLAN INTERNAL CONNECTIONS ACROSS PROPERTIES IN DIFFERENT OWNERSHIP

3.9.1 STATUS: INTERNAL CONNECTIONS

1. There current PSP Transport Network Plan provides limited connectivity across properties in different ownership.
2. Council has noted that the Craigieburn West PSP has not included a sequencing plan to manage coordination of road and community infrastructure.

3.9.2 RELEVANT MATTERS FOR CONSIDERATION

1. The Council's revised Transport Network Plan, proposes greater connectivity in the Craigieburn West road network through an enhanced local road network.
2. Council has submitted that the structure of the local street network is important to ensure development is coordinated across parcels in separate ownership and to create efficient and convenient access between local neighbourhoods. Council has highlighted that its proposed local road network provides for efficient and convenient access between local neighbourhoods regardless of the timing of individual development parcels.
3. Council's concern with the ad hoc sequencing of development is that it requires Council, road and public transport authorities and other servicing agencies to respond to multiple development fronts without any means to forecast development rollout and consequent servicing needs of population growth. Council is concerned that these issues are especially critical for a large, linear precinct like Craigieburn West where ad-hoc sequencing of development has a high chance of isolating communities from one another, as well as from community and retail services for many years. With multiple landowners responsible for development within the precinct, delivery of key land uses or public transport routes could be held up for years. Thus, it is Council's view that a sequencing plan is essential to maximise the opportunities for new residents to be able to efficiently move around in private vehicles, by foot or bicycle or on a public transport system as early as possible.

3.9.3 CONCLUSION

1. The Council's proposed Transport Network Plan provides improved movement choices and better connections between neighbourhoods in the Craigieburn West PSP.
2. I note that key additions to the local road network desirably address the fragmented ownership pattern (such as narrow lots fronting onto Mickleham Road) providing continuity of movement across properties in different ownership.

3.10. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: CHANGES TO CRAIGIEBURN WEST PSP TRANSPORT NETWORK PLAN SOUTHERN AREA ROAD NETWORK 'PINCH POINTS'

3.10.1 STATUS: SOUTHERN AREA NETWORK

1. The current PSP Transport Network Plan provides predominantly roundabouts in the southern precinct where school/s and a community centre are proposed. The area in question is shown in Figure 9.

Figure 9: Extract from Craigieburn West Road Network and Intersections Plan (Transport Impact Assessment report by onemilegrid – page 24)

2. The Council's proposal for the southern area is shown in Figure 10.

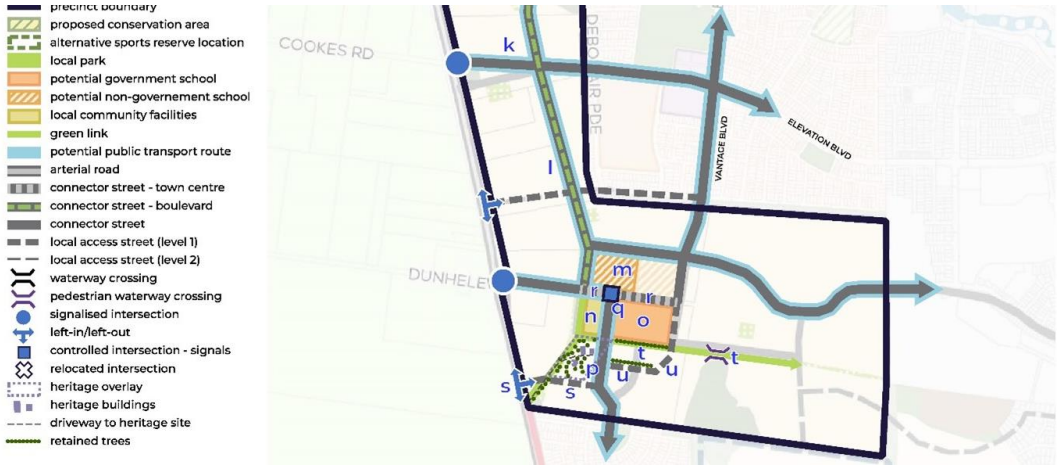

Figure 10: Extract from Council's Proposed Transport Network Plan for Craigieburn West

3.10.2 RELEVANT MATTERS FOR CONSIDERATION

1. The Council's revised Transport Network Plan in the southern section of the PSP incorporates several features, including traffic signals to provide safe crossing to the two schools and community facilities, a "tailored local access street" in the heart of the precinct (with a cross section designed to respond to the adjacent community and educational land uses, manage low speeds and include generous pedestrian and cyclist shared paths), provision of left-turn in / left-turn out arterial road access for the local community at the south-western edge of the PSP and replacement of an east-west road link with pedestrian-cycle link to creates safe active transport options to schools.
2. The VPA has also reviewed the Transport Network Plan in the southern section of the PSP and proposes a modified road hierarchy with a number of modifications aimed at addressing some of the issues identified by Council as well as highlighted by the new modelling undertaken by onemilegrid. The changes proposed by VPA are similar in intent, but different in nature, to those in the Council's revised Transport Network Plan.

3.10.3 CONCLUSION

1. It is my opinion that the Council's revised Transport Network Plan in the southern section of the PSP will help reduce traffic flows near the sensitive land uses (schools, community service land uses) provide safer road crossing opportunities and enhance active transport linkages into and out of the area.

3.11. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: CHANGES TO CRAIGIEBURN WEST PSP TRANSPORT NETWORK PLAN TRAFFIC SIGNALS TO REPLACE ROUNDABOUTS

3.11.1 STATUS: ROUNDABOUTS & TRAFFIC SIGNALS

1. The majority of internal intersection in the PSP Transport Network Plan have been nominated as roundabouts.

3.11.2 RELEVANT MATTERS FOR CONSIDERATION

1. The Council's revised Transport Network Plan, proposes use of signalised intersections instead of roundabouts in areas of high pedestrian activity (town centre and near schools).
2. Debate over the relative safety performance of roundabouts and traffic signals has been taking place for decades. In principle, when designed correctly, a roundabout has the potential to offer safe crossing opportunities at an intersection. For pedestrians, the level of safety is linked to features such as the 'low operating speed' that may be associated with single lane roundabouts, as well as the presence or lack of priority

crossing controls. Many single lane roundabouts are now designed with 'zebra crossings' on all approaches and it is common to see road agencies retrofit existing roundabouts with zebra crossings in areas of high pedestrian activity.

3. Multi-lane roundabouts are difficult to design as slow speed devices and are thus inherently more dangerous for pedestrians and cyclists alike.
4. Intersections controlled by traffic signals offer a form of control that is more predictable to use, often reducing stress on the user. Traffic signals are able to give pedestrians and cyclists specific priority (and can also allow specific priority to public transport vehicles which is much harder to achieve at a roundabout).
5. Traffic signals can be used to minimise delays for pedestrians and cyclists and 'force' longer delays for particular movements such as non-local through traffic – to discourage those specific movements. Those objectives are achieved through programming th traffic signals to operate in a particular manner at certain times.
6. Roundabouts cannot be used to minimise delays for pedestrians and cyclists, unless accompanied by specific design features (such as zebra crossings or signalization of a roundabout approach/es).

3.11.3 CONCLUSION

1. It is my opinion that the use of signalised intersections instead of roundabouts will better accommodate for pedestrians and cyclists near the town centre and schools.

3.12. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: CHANGES TO CRAIGIEBURN WEST PSP TRANSPORT NETWORK PLAN BUS ROUTES

3.12.1 STATUS: BUS ROUTES

1. The current PSP Transport Network Plan provides multiple bus-capable roads across the Craigieburn West PSP. The number of bus-capable roads that has been identified provides flexibility for potential public transport routes.
2. However, the linear nature of the Craigieburn West PSP, its relatively large size and the fragmented land ownership across much of the PSP, could pose considerable challenges in designing a cohesive public transport network.
3. Council has proposed a number of enhancements to the PSP Transport Network Plan, such as the upgrade to Whites Lane, to further boost the bus-capable network.

3.12.2 RELEVANT MATTERS FOR CONSIDERATION

1. Council is concerned with achieving bus capability, including for local access streets, and providing a bus capable network to encourage alternative travel options to private vehicles – particularly to reduce reliance on private vehicles and their impact on traffic volumes on the connector and local road network.
2. The Craigieburn West PSP area is currently poorly serviced by public transport. The bus services near the PSP are shown in Figure 11.

Figure 11: Bus Network Near Craigieburn West PSP (Source: Public Transport Victoria)

3. Figure 11 shows that there are currently three bus services close to the Craigieburn West PSP:
   a. Bus Route 525 (Donnybrook Station to Craigieburn Station via Mickleham)
   b. Bus Route 528 (Craigieburn Central Shopping Centre to Craigieburn Station)
   c. Bus Route 537 (Craigieburn West to Craigieburn Station)

4. The closest existing bus stop, on route 525, to the Craigieburn West PSP is on Mount Ridley Road at Trillium Boulevard. Travel time from this bus stop to Craigieburn Station is around 25-30 minutes.
5. The closest existing bus stops, on routes 528 and 537, to the Craigieburn West PSP are located on Waterview Boulevard and on Vantage Boulevard respectively (in both instances just south of Craigieburn Road). Travel time to Craigieburn Station (from these two bus stops) is around 20-25 minutes.
6. In addition, travel time by train from Craigieburn Station to stations in central Melbourne varies between 40-45 minutes depending on the time of day. Total travel time by public transport is therefore substantial for those trips leaving Craigieburn West PSP and bound for central Melbourne.
7. Extensions of any of the three existing bus routes into the Craigieburn West PSP will undoubtedly increase travel times to/from Craigieburn Station, making public transport into the central city an even less attractive option for future residents of the Craigieburn West PSP.
8. Section 3.4 of this report identified that the top four LGA destinations outside of Hume (Melbourne, Moonee Valley, Moreland and Brimbank) represent 52% of all trips that start in Hume and end outside the municipal limits. Each of the four municipalities is located south of the Craigieburn West PSP. Many of the destinations within those municipalities could be serviced by public transport via Craigieburn Station. Therefore, the ability for residents of Craigieburn West to reach Craigieburn Station quickly is imperative, in the context of those external trips.
9. In the above context, future bus services for Craigieburn West should ideally focus on servicing the PSP's schools and town centre, whilst providing the necessary fast and direct linkages to the main regional Craigieburn Central shopping centre as well as Craigieburn Station. The alternate focus of providing buses as an extension of existing routes (which would follow long circuitous paths through adjacent neighbourhoods before reaching Craigieburn Station) may result in prohibitively long bus journeys to the Station and act as a disincentive to public transport use for the large proportion of trips (52% of all trips that start in Hume and end outside the municipal limits) which could be serviced by trains emanating from Craigieburn Station.
10. The Craigieburn West PSP area covers a total area of 562 hectares and will accommodate around 8,234 lots. In the adjacent locality of Craigieburn, the 2016 Census revealed that the average household size was 3.29 persons. Thus, using the Craigieburn household size as a guide for Craigieburn West, the estimated future population in Craigieburn West is likely to be around 27,090 people and the density (conservatively using the full PSP area) will be 48 people per hectare.

11. There is limited published guidance with respect to 'population densities/levels' needed to support public transport services. However, in Victoria, the Public Transport Users Association has indicated that 13.5 people per hectare are sufficient to support a 10-minute bus service route in both directions. The density of the proposed Craigieburn West PSP is likely to be 48 people per hectare – over three and a half times the minimum population density level suggested by the Public Transport Users Association.
12. On the basis of the forecast population, there is an opportunity to possibly establish two bus routes (one servicing the Craigieburn West PSP area to the north and one servicing the PSP area to the south of Craigieburn Road). Such services could utilise Craigieburn Road (east of the Craigieburn West PSP) to provide convenient, fast and direct access to Craigieburn Central shopping centre and the Craigieburn Railway Station. The use of Craigieburn Road avoids time-consuming travel into existing adjacent neighbourhoods.

3.12.3 CONCLUSION

1. The Council's proposed Transport Network Plan provides the basis for establishing two new bus routes to service the key internal destinations within the Craigieburn West PSP and then connecting, in 'express service' fashion, to the key external destinations (Craigieburn Central shopping centre and Craigieburn Station) via Craigieburn Road.

3.13. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: DUPLICATION OF MICKLEHAM RD

3.13.1 STATUS: KEY ISSUES

1. I am instructed that it is Council's view that there has been significant traffic growth and unsustainable impacts on Mickleham Road and the wider Hume Growth Corridor, driven by development associated with numerous PSPs along the Corridor, north of Somerton Road.
2. Council does not support approval of the Craigieburn West PSP until the State Government makes a budgeted commitment for the design and delivery for the duplication of Mickleham Road from Donnybrook Road to Somerton Road.

3.13.2 RELEVANT MATTERS FOR CONSIDERATION

1. Council has noted that in the six years between 2013 and 2019 traffic volumes on Mickleham Road have increased significantly from 15,313 vehicles per day (vpd) in 2013 to 28,590 vpd in 2019.
2. The Craigieburn West PSP will allow more than 8,234 additional dwellings along the Hume Growth Corridor. Based on the likely high traffic generation rates discussed in this report (as high as 1.58 car trips per household in the AM peak hour), the Craigieburn

West PSP could add a further 13,000 vehicles per hour in the morning peak (between 8-9am) which would be distributed on the road network servicing the PSP.

3. The onemilegrid "Transport Impact Assessment" report dated 9 November 2020 suggests that major improvements to the external road network will have a significant impact on traffic volumes in the vicinity of the Craigieburn West PSP area are expected to significantly reduce the through traffic volumes along Mickleham Road. The improvements include the following:
    a. 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;
    b. Extension of Aitken Boulevard from Somerton Road to the Western Ring Road;
    c. Construction of the Outer Metropolitan Ring Road (understood to be accessed via interchanges at Craigieburn Road and Donnybrook Road further north); and
    d. Construction of the Melbourne Airport Link to connect the Outer Metropolitan Ring Road with Sunbury Road (Tullamarine Freeway).
4. Delivery timeframes for these projects is uncertain and it is unclear whether they will effectively assist in reducing the pressure on Mickleham Road, in the vicinity of the Craigieburn West PSP, given the modelling limitations discussed in this report.
5. The VPA, in its Craigieburn West PSP Part A Submission dated April 2021 (the VPA Part A Submission), has commented that current traffic volumes experienced on Mickleham Rd are not unusual for similar roads in other growth areas and would be the expected "normal" within Inner and Middle Melbourne. The VPA has indicated that, currently, delays are only experienced during peak periods and traffic volumes are relatively low during the remainder of the day.
6. The VPA Part A Submission also indicates that:
"Delaying the approval of Craigieburn West because of traffic congestion on Mickleham Road will not solve the core problem, and traffic congestion on Mickleham Road will continue to build due to existing approvals and development already occurring. Delaying the approval, however, will delay the completion of the connector road network – resulting in an extended period of sub-optimal network performance while preventing the delivery of well-located residential development."

3.13.3 CONCLUSION

1. It is my view that development of the Craigieburn West PSP will generate significant traffic volume in peak hours and will exacerbate congestion on the Mickleham Road corridor.

2. It is also my view that it is reasonable for Council to seek a budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the PSP.

3.14. ISSUES RAISED IN COUNCIL'S SUBMISSION TO THE VPA: WHITES LANE

3.14.1 STATUS: KEY ISSUES

1. Whites Lane forms the boundary between the Craigieburn R2 PSP precinct and the Craigieburn West precinct with the boundary effectively running down the centre of the existing road reserve. The Craigieburn R2 PSP was silent on the role and cross section design of Whites Lane.

3.14.2 RELEVANT MATTERS FOR CONSIDERATION

1. Council has proposed a new cross section for Whites Lane. This is shown in Figure 12.

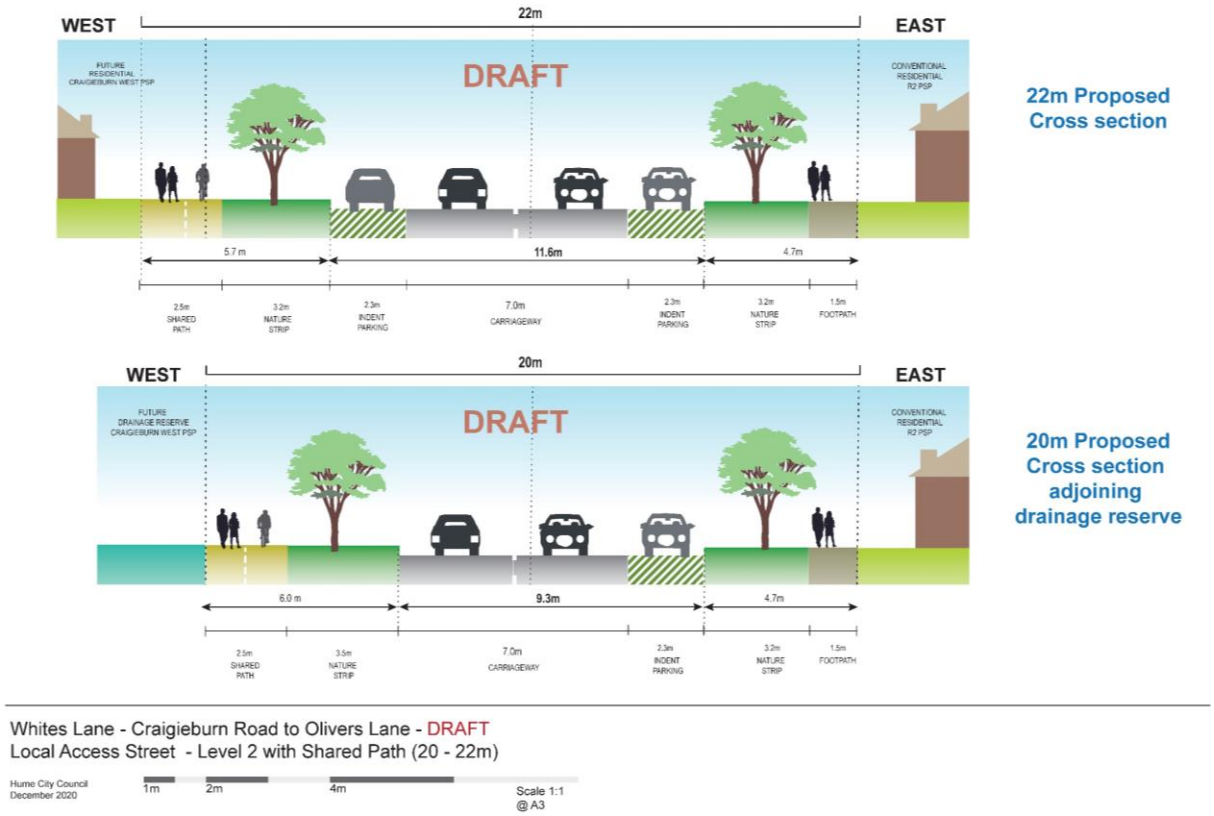

Figure 12: Whites Lane Proposed Cross Section

2. Council has worked with the VPA to resolve the status of Whites Lane through the inclusion of a cross section for Whites Lane in the Craigieburn West PSP and an amended Craigieburn R2 PSP. Council views Whites Lane as a key road connection for the Craigieburn West and Craigieburn R2 communities.

3. Council has concerns regarding the capacity of the road network servicing Craigieburn West PSP, as outlined in previous sections of this report. Council's view is that the inclusion of Whites Lane will help relieve the network pressure across the PSP by contributing a valuable north-south link to the network.
4. The proposed Whites Lane cross section is designed to support both active and public transport by:
    a. Updating the western pedestrian path to be a 2.5 m shared path
    b. Upgrading Whites Lane to an access street level 2 that is bus capable and includes a creek crossing where the road reserve crosses Aitken Creek

3.14.3 CONCLUSION

1. It is my view that the proposed Whites Lane cross section will provide effective relief to transport network pressure across the Craigieburn West PSP.
2. The VPA, in its Craigieburn West PSP Part A Submission dated April 2021, has agreed to update the Whites Lane cross-section.

3.15. VPA'S RESPONSE TO SUBMISSIONS

3.15.1 STATUS: VPA RESPONSE TO SUBMISSIONS

1. The VPA has considered all submissions received on the draft Craigieburn West PSP and tabulated its findings.
2. VPA is working with Council to resolve traffic matters, but a number of traffic aspects remain unresolved.

3.15.2 RELEVANT MATTERS FOR CONSIDERATION

1. Table 4 summarises the submissions received on the draft Craigieburn West PSP that raised traffic / transport issues. I have provided comment and the noted position of VPA and the City of Hume where relevant. The submission numbers used in Table 4 follow the same sequence used by VPA in its tabulation.

Table 4: Comments on Submissions Related to Traffic

Submission No. & Topic	Submission	Comment / Expert Opinion
1 **Community member** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to duplicate Mickleham Road (2 lanes in each direction).	Council has sought a budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the PSP. Details of the Council's position and my view on the duplication are discussed in section 3.13 of this report.
2 **Community member** **Traffic**	Objection to Craigieburn West PSP approval until Craigieburn Road West, Somerton Road, Mickleham Road and Aitken Boulevard have been duplicated.	Refer to response to Submission No. 1 for Mickleham Road. The context for the potential duplication of other roads should be subject to further investigation.
5 **Community member** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to duplicate Mickleham Road (2 lanes in each direction).	Refer to response to Submission No. 1.
7 **Community member** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to widen Mickleham Road. Concern over through traffic in Aspect Estate; submitter requests that no connection with Horizon Boulevard is provided.	Refer to response to Submission No. 1 for Mickleham Road. In my opinion, the connection to Horizon Boulevard is appropriate as it provides 'connector road level' integration between the Craigieburn West PSP area and existing neighbourhoods to the south.
8 **Community member** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to duplicate Mickleham Road (2 lanes in each direction).	Refer to response to Submission No. 1.

Submission No. & Topic	Submission	Comment / Expert Opinion
9 **Community member** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to duplicate Mickleham Road (2 lanes in each direction).	Refer to response to Submission No. 1.
10 **Community member** **Active transport**	Concern over the adequacy of walking and cycling infrastructure and destinations to support active transport.	The Craigieburn West PSP and Transport Network Plan provide a sound basis for delivery of a comprehensive walking and cycling network. In my opinion, the key to ensuring that the proposed facilities are used is ensuring that sufficient local trip purposes can be satisfied by these active transport networks. Once the PSP is approved, the subsequent detailed planning and delivery of land use and transport components should incorporate an appropriate mix of land uses (consistent with the desired PSP objectives) to ensure residents have a reason to walk and cycle, and support the mix of uses with comprehensive walking and cycling network,thereby providing convenient and safe active transport access for residents, workers and visitors.
11 **Aitken College** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to duplicate Mickleham Road (2 lanes in each direction).	Refer to response to Submission No. 1.
12 **Community member** **Public transport**	Concern over the need to expand public transport to satisfy the demand for the area.	Council has proposed amendments to the Transport Network Plan to optimise public transport use. Details of the Council's position and my view on public transport services are discussed in section 3.12 of this report.
14 **Community member** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to duplicate Mickleham Road (2 lanes in each direction).	Refer to response to Submission No. 1.

Submission No. & Topic	Submission	Comment / Expert Opinion
16 **Stockland** **Traffic**	Suggestion to provide left-in/left-out intersections on Mickleham Road.	Council has proposed a revised Transport Network Plan that recognises and acknowledges the need to have regular left-in / left-out intersections to Mickleham Road. The revised Transport Network Plan features an increase in left-in / left-out intersections from two to six.
17 **Hume City Council** **Traffic**	Concerns regarding traffic modelling assumptions and data. Concern over existing and future traffic levels on Mickleham Road. Suggestion to duplicate Mickleham Road (2 lanes in each direction). Suggestions for consideration of specific road treatments and operational arrangements.	My review of the traffic modelling and the data and assumptions used by One Mile Grid in their November 2020 Traffic Impact Assessment is presented in Sections 3.1-3.4 of this report. Refer to response to Submission No. 1 regarding the upgrade of Mickleham Road. Council's other suggestions for specific road network treatments and arrangements, are included in its revised Transport Network Plan and submission to the VPA. I have offered my opinion on the revised Transport Network Plan and Council's submission to the VPA in sections 3.7 to 3.14.
18 **Pask Group** **Traffic**	Concern over the impact associated with the location of the schools, community uses and associated east west movement within the road network in the southern part of the PSP.	Council has proposed a number of refinements to the road network in the southern portion of the PSP. Details of the Council proposals and my view on the changes are discussed in section 3.10 of this report.
20 **Community member** **Traffic**	Concern over the impact associated with the location of the schools, community uses and associated east west movement within the road network in the southern part of the PSP.	Council has proposed a number of refinements to the road network in the southern portion of the PSP. Details of the Council proposals and my view on the changes are discussed in section 3.10 of this report.

Submission No. & Topic	Submission	Comment / Expert Opinion
21 **Greenvale Residents Association** **Traffic**	Concern over existing and future traffic levels on Mickleham Road. Suggestion to upgrade Mickleham Road and other roads.	Council has sought a budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the PSP. Details of the Council's position and my view on the duplication are discussed in section 3.13 of this report.
26 **Property Council of Australia** **Public transport**	Request to ensure that the North-South connector be a designated bus route and bus capable.	This matter has been considered and resolved by VPA.
28 **Deague Group** **Traffic**	Concern over road geometries, timing of infrastructure delivery and functional arrangements.	The matters raised are under consideration by VPA. No additional aspects are included in the submission that are relevant to the matters that I have been instructed to consider in this report.
29 **PEET** **Traffic**	Comments regarding road alignments, geometries and functional arrangements.	The matters raised are under consideration by VPA. No additional aspects are included in the submission that are relevant to the matters that I have been instructed to consider in this report.
34 **Universal Syrian Orthodox Church** **Traffic**	Comments regarding road alignments, geometries and functional arrangements.	The matters raised are under consideration by VPA. No additional aspects are included in the submission that are relevant to the matters that I have been instructed to consider in this report.

Submission No. & Topic	Submission	Comment / Expert Opinion
41 **DOT** **Traffic, public transport and active transport**	Comments regarding the proposed transport network and concept design elements. Concern regarding traffic on Mickleham Road, particularly around Mickleham Primary School.	The transport network and concept design matters raised have been noted by VPA. The amended Transport Network Plan prepared by Council has addressed the Mickleham primary school issues by including a local access street along the southern boundary of the school that intersects the north-south connector boulevard. In my opinion, the local access street proposed would enable drop-off and pick-up activities to occur without requiring motorists to use the arterial road network, thereby alleviating the traffic concerns raised by DOT. In its Craigieburn West PSP Part A submission (dated April 2021), VPA has agreed, in principle, to the provision of a left-in left-out access point south of the existing Mickleham Primary School.

3.15.3 CONCLUSION

1. VPA in its summary of submissions has noted that a number of areas remain under consideration by VPA and relevant stakeholders.
2. The City of Hume's key areas of concern are largely captured in Council's amended Craigieburn West Transport Network Plan – which has not been fully endorsed by VPA at this stage. Council also seeks a budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the Craigieburn West PSP.
3. In my opinion the Council's amended Craigieburn West Transport Network Plan addresses many of the key issues raised by the submissions and offers improved outcomes for the Craigieburn West PSP.

4. MY OPINION

It is my opinion that there are several traffic and transport related matters that are not appropriately addressed in the Craigieburn West PSP. Having reviewed all relevant documentation, I have formed the views outlined below:

4.1. TRAFFIC RELATED WORK UNDERPINNING THE DRAFT AMENDMENT AND PROPOSED PSP

1. The nature of the transport modelling approach used for the Craigieburn West PSP is unknown. However, it is likely that the modelling was spreadsheet based, in which case it is unlikely to possesses the complexity and analytical breadth of models such as VITM (or other strategic models that have been developed by private agencies in Victoria). It is my view that outputs from the Craigieburn West PSP transport modelling cannot be relied upon with a high degree of confidence.
2. Furthermore, there are several parameters and assumptions used in the modelling that are inconsistent with the traffic behaviour and patterns revealed by an examination of transport-related data from the Australian Bureau of Statistics Census of Population and Housing (the Census data) as well as data from the Victorian Integrated Survey of Travel and Activity (VISTA).
3. The use of 0.9 and 0.7 trips per dwelling for peak hours (as adopted in the "Craigieburn West Precinct Structure Plan Transport Impact Assessment", for standard and medium density lots respectively) may not accurately reflect future traffic generation in Craigieburn West. Use of Census and VISTA data for the entire Hume municipality suggests that the trips per dwelling rate may be as high as 1.58 car trips per household in the AM peak hour.
4. Additionally, examination of the 'journey to work' statistics for different localities in Hume suggest that the presence of a comparatively higher proportion of 'medium' and 'high density' housing is not always reflected in lower car utilisation for the journey to work.
5. It is my opinion that these modelling inconsistencies have likely given rise to underestimates in the volume of traffic that will be generated by the Craigieburn West PSP. In turn, the use of lower traffic volume forecasts, arising from the modelling, is likely to unrealistically moderate the transport network impacts leading to underestimates of the road capacity required to accommodate traffic associated with the Craigieburn West PSP.

4.2. MATTERS RAISED IN COUNCIL'S SUBMISSION TO THE VPA

1. The VPA has requested onemilegrid to undertake new modelling, in response to concerns expressed by Council. However, the new modelling has primarily been based on changes to the PSP development yield, which has increased from 6,153 lots to 8,230 lots. The new modelling has provided justification for the adoption of changes to the road network. Despite the VPA's adoption of changes to the PSP Transport Network Plan, I remain concerned at the adequacy of the proposed road network, as the modelling may be forecasting lower traffic volumes that are inconsistent with travel behaviour of existing Hume residents revealed by Census and VISTA data.
2. In view of the above, it is my opinion that the existing and proposed road network require capacity enhancements to support the proposed delivery of the Craigieburn West PSP. These should be based on new traffic forecasts that utilise more realistic modelling parameters and assumptions. Additionally, it is my opinion that various revisions should be adopted to the Transport Network Plan (as proposed by Council):
    a. Six new left-in / left-out access points. These will enable a finer distribution of traffic movements generated by the Craigieburn West PSP. The left-in / left-out intersection controls provide a safe and effective mechanism to spread traffic more widely and reduce traffic demands on the Craigieburn West internal road network and, simultaneously, reduce traffic demands at the other critical signalised interface locations between the PSP and the arterial roads that service it.
    b. Additions to the local road network designed to address the fragmented ownership pattern in the PSP area. The Council's proposed Transport Network Plan helps to address the fragmented ownership pattern by providing improved movement choices and better connections between neighbourhoods in the Craigieburn West PSP.
    c. Revisions to the Transport Network Plan in the southern section of the PSP. The Council's proposals for the southern area will help reduce traffic flows near the sensitive land uses (schools, community service land uses) provide safer road crossing opportunities and enhance active transport linkages into and out of the southern PSP area.
    d. The use of signalised intersections instead of roundabouts to better accommodate for pedestrians and cyclists near the town centre and schools.
    e. The establishment of two new bus routes to service the key internal destinations within the Craigieburn West PSP and then connecting, in 'express service' fashion, to the key external destinations (Craigieburn Central shopping centre and Craigieburn Station) via Craigieburn Road.

3. I note that the VPA, in its Craigieburn West PSP Part A Submission dated April 2021, has agreed to update the Whites Lane cross-section as proposed by Council.
4. It is my opinion that the PSP should also be supported by budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the PSP.

4.3. VPA'S RESPONSE TO SUBMISSIONS

1. VPA in its summary of submissions has noted that a number of areas remain under consideration by VPA and relevant stakeholders.
2. The City of Hume's key areas of concern are largely captured in Council's amended Craigieburn West Transport Network Plan – which has not been fully endorsed by VPA at this stage. Council also seeks a budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the Craigieburn West PSP.
3. In my opinion the Council's amended Craigieburn West Transport Network Plan addresses many of the key issues raised by the submissions and offers improved outcomes for the Craigieburn West PSP.

5. DECLARATION

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

Signed

Date: 19 April 2021

6. APPENDIX A – MATTERS RAISED BY PPV GUIDE TO EXPERT EVIDENCE

In accordance with Planning Panels Victoria (PPV) guidance for the preparation of expert evidence the following details are provided:

(a) the expert's name and address;

Stephen Pelosi, Ground Floor Unit 10, 243 Flemington Road, North Melbourne.

(b) the expert's qualifications, experience and area of expertise;

I am a director of *movendo Pty Ltd* and I have 35 years of experience in transport planning and traffic engineering in Australia, New Zealand, the Middle East, Asia, Latin America and the US. My full CV is attached as Appendix B. I completed a Bachelor of Engineering (Civil) at RMIT University in 1985. I have held senior executive positions in government and consulting firms and in these roles I have been responsible for the delivery of major transport projects and for the provision of strategic and business advice to governments, infrastructure providers and developers on land use/transport studies, multi-modal transport assessments, masterplanning new communities, detailed transport systems analysis, road safety assessments, transport demand forecasting, route planning, public transport studies and bicycle & pedestrian strategies.

Of particular relevance to Craigieburn West PSP, I have been involved with numerous transport and traffic assessments in support of urban design frameworks and structure plans for communities in the Cities of Melton, Maribyrnong, Moonee Valley, Ballarat, Colac Otway, Melbourne, Hume, Shepparton, Glenferrie, Knox, Warrnambool, Kilmore, Surf Coast, Banyule, Mitchell, Nillumbik, Bendigo, Yarra, Mildura, Glen Eira and Bayside. I have also undertaken numerous traffic studies for private clients ranging from detailed facility design to analysis of infrastructure requirements for large development proposals in Australia, China and the Middle East.

(c) a statement identifying the expert's area of expertise to make the report;

My training and experience, as highlighted in my CV, including involvement with many major transport infrastructure and masterplanning projects in Victoria, Australia and internationally – qualifies me to comment on the traffic matters outlined in this report.

Through my career, I have had considerable involvement in transport infrastructure planning and design, including various public transport and rail projects (Craigieburn Rail Electrification, South Morang Rail Extension project, City Circle Tram, Box Hill tram extension in Melbourne), several road projects (West Gate Tunnel, Peninsula Link, Western Distributor, East West Link, Calder Freeway, Geelong Bypass in Victoria and the Western Sydney Orbital in New South Wales).

I have also appeared, as expert traffic and transport witness, at numerous tribunal and panel hearings, EES/EIS hearings and planning scheme amendment hearings. In particular, I have appeared as witness for the Peninsula Link Freeway and East West Link projects in Melbourne, Bass Gas, Otway Gas, Calder Freeway and Geelong Bypass projects in Victoria and also prepared an Expert Witness Statement for the Victorian Desalination Plant EES.

(d) details of any other significant contributors to the statement (if there are any), and their expertise;

Not Applicable

(e) all instructions that define the scope of the statement (original and supplementary and whether in writing or verbal);

1. I have been requested by Hume City Council to express my expert opinion as to the traffic and transport implications of various aspects associated with the Proposed PSP and to prepare an Traffic related work underpinning the Draft Amendment and Proposed PSP.
2. Matters raised in the Council's submission including:
    a. the methodology and findings made in the GTA Memorandum;
    b. the merits of adopting changes to the Craigieburn West PSP Proposed Transport Network Plan; to provide better integration of proposed road network and land use and designation of lower order roads and left in/left out intersections to arterial roads, as appropriate, to deal with orderly implementation of the PSP (in light of fragmented ownership) and options for delivery of bus services across the PSP
3. Priority delivery of the duplication of Mickleham Road.
4. The status and role of Whites Lane.
5. The VPA's response to the Council's submission and consideration of any other submissions insofar as they relate to my area of expertise, as relevant to Council's submission.
6. Possible solutions to manage traffic volumes in the Craigieburn West PSP including variations to the Transport Network Plan and ensuring capacity on the road network for public transport routes.

(f) details and qualifications of any person who carried out any tests or experiments upon which the expert has relied in preparing the statement;

Not Applicable

(g) the facts, matters and assumptions on which the expert relies in preparing the statement;

My report is based on a review of the draft Craigieburn West PSP and associated documents.

(h) reference to documents and materials the expert has used in preparing the statement;

My report is based on several documents and other materials that I have been instructed to consider or take into account in preparing the report, as well as other documents that I have referenced in forming my opinions as outlined in the report.

Craigieburn West PSP related documents

1. PSP 1068 – Craigieburn West Precinct Structure Plan Draft for Public Consultation; November 2020 (prepared by Victorian Planning Authority)
2. Craigieburn West PSP Part A Submission; April 2021 (prepared by Victorian Planning Authority)
3. Craigieburn West Precinct Structure Plan Existing Conditions Assessment; 18 February 2020 (prepared by onemilegrid)
4. Craigieburn West Precinct Structure Plan Transport Impact Assessment; 9 November 2020 (prepared by onemilegrid)
5. Craigieburn West Precinct PSP Transport Impact Assessment – Addendum 1; 26 March 2021 (prepared by onemilegrid)
6. Council submission on Craigieburn West PSP; December 2020 (prepared by Hume City Council)

Other documents / data sources

7. Australian Bureau of Statistics, Census of Population and Housing 2016
8. Victorian Integrated Survey of Travel and Activity (VISTA)

(i) a summary of the expert's opinion(s), including provisional opinions;

It is my opinion that there are several traffic matters that are not appropriately addressed in the Craigieburn West PSP document. Having reviewed all relevant documentation, I have formed the views outlined below:

TRAFFIC RELATED WORK UNDERPINNING THE DRAFT AMENDMENT AND PROPOSED PSP

1. The nature of the transport modelling approach used for the Craigieburn West PSP is unknown. However, it is likely that the modelling was spreadsheet based, in which case it is unlikely to possesses the complexity and analytical breadth of models such as VITM (or other strategic models that have been developed by private agencies in Victoria). It is my view that outputs from the Craigieburn West PSP transport modelling cannot be relied upon with a high degree of confidence.
2. Furthermore, there are several parameters and assumptions used in the modelling that are inconsistent with the traffic behaviour and patterns revealed by an examination of transport-related data from the Australian Bureau of Statistics Census of Population and Housing (the Census data) as well as data from the Victorian Integrated Survey of Travel and Activity (VISTA).
3. The use of 0.9 and 0.7 trips per dwelling for peak hours (as adopted in the "Craigieburn West Precinct Structure Plan Transport Impact Assessment", for standard and medium density lots respectively) may not accurately reflect future traffic generation in Craigieburn West. Use of Census and VISTA data for the entire Hume municipality suggests that the trips per dwelling rate may be as high as 1.58 car trips per household in the AM peak hour.
4. Additionally, examination of the 'journey to work' statistics for different localities in Hume suggest that the presence of a comparatively higher proportion of 'medium' and 'high density' housing is not always reflected in lower car utilisation for the journey to work.
5. It is my opinion that these modelling inconsistencies have likely given rise to underestimates in the volume of traffic that will be generated by the Craigieburn West PSP. In turn, the use of lower traffic volume forecasts, arising from the modelling, is likely to unrealistically moderate the transport network impacts leading to underestimates of the road capacity required to accommodate traffic associated with the Craigieburn West PSP.

MATTERS RAISED IN COUNCIL'S SUBMISSION TO THE VPA

1. The VPA has requested onemilegrid to undertake new modelling, in response to concerns expressed by Council. However, the new modelling has primarily been based on changes to the PSP development yield, which has increased from 6,153 lots to 8,230 lots. The new modelling has provided justification for the adoption of changes to the road network.

2. Despite the VPA's adoption of changes to the PSP Transport Network Plan, I remain concerned at the adequacy of the proposed road network, as the modelling may be forecasting lower traffic volumes that are inconsistent with travel behaviour of existing Hume residents revealed by Census and VISTA data.

3. In view of the above, it is my opinion that the existing and proposed road network require capacity enhancements to support the proposed delivery of the Craigieburn West PSP. These should be based on new traffic forecasts that utilise more realistic modelling parameters and assumptions. Additionally, it is my opinion that various revisions should be adopted to the Transport Network Plan (as proposed by Council):

    a. Six new left-in / left-out access points. These will enable a finer distribution of traffic movements generated by the Craigieburn West PSP. The left-in / left-out intersection controls provide a safe and effective mechanism to spread traffic more widely and reduce traffic demands on the Craigieburn West internal road network and, simultaneously, reduce traffic demands at the other critical signalised interface locations between the PSP and the arterial roads that service it.

    b. Additions to the local road network designed to address the fragmented ownership pattern in the PSP area. The Council's proposed Transport Network Plan helps to address the fragmented ownership pattern by providing improved movement choices and better connections between neighbourhoods in the Craigieburn West PSP.

    c. Revisions to the Transport Network Plan in the southern section of the PSP. The Council's proposals for the southern area will help reduce traffic flows near the sensitive land uses (schools, community service land uses) provide safer road crossing opportunities and enhance active transport linkages into and out of the southern PSP area.

    d. The use of signalised intersections instead of roundabouts to better accommodate for pedestrians and cyclists near the town centre and schools.

    e. The establishment of two new bus routes to service the key internal destinations within the Craigieburn West PSP and then connecting, in 'express service' fashion, to the key external destinations (Craigieburn Central shopping centre and Craigieburn Station) via Craigieburn Road.

4. I note that the VPA, in its Craigieburn West PSP Part A Submission dated April 2021, has agreed to update the Whites Lane cross-section as proposed by Council.

5. It is my opinion that the PSP should also be supported by budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the PSP.

VPA'S RESPONSE TO SUBMISSIONS

1. VPA in its summary of submissions has noted that a number of areas remain under consideration by VPA and relevant stakeholders.
2. The City of Hume's key areas of concern are largely captured in Council's amended Craigieburn West Transport Network Plan – which has not been fully endorsed by VPA at this stage. Council also seeks a budgeted commitment for the duplication of Mickleham Road (and associated construction of six signalised intersections to access Mickleham Road) prior to approval of the Craigieburn West PSP.
3. In my opinion the Council's amended Craigieburn West Transport Network Plan addresses many of the key issues raised by the submissions and offers improved outcomes for the Craigieburn West PSP.

(j) a statement identifying any provisional opinions that are not been fully researched for any reason (identifying the reason why such opinions have not been or cannot be fully researched);

Not Applicable

(k) a statement setting out any questions falling outside the expert's expertise and whether the report is incomplete or inaccurate in any respect.

In the process of preparing this report, I have not identified any questions outside of my area of expertise in traffic engineering and transport planning. I have visited the site, undertaken observations and reviewed relevant documentation assigned to me. I have also drawn on my 35 years of experience in traffic and transport planning. As a result of my deliberations, I have formed the views outlined in this report with respect to the traffic and transport implications of various aspects associated with the Craigieburn West PSP.

7. APPENDIX B – CURRICULUM VITAE

STEPHEN *Pelosi*

EMPLOYMENT HISTORY

Current	Director, movendo
2001 . 2011	Technical Director, AECOM
1997 . 2001	Senior Associate, Traffic & Transport Leader, Connell Wagner (now Aurecon)
1986 . 1996	Team Leader Traffic Engineering & Transport Planning, City of Melbourne

CAREER HISTORY

Stephen has over 35 years of experience in transport planning and traffic engineering in Australia, the Middle East, Asia, the United States and Latin America. He has held senior executive positions in government and consulting firms and in these roles he has been responsible for the delivery of major transport projects and for the provision of strategic and business advice to governments, infrastructure providers and operators on traffic and parking, patronage, revenue potential, risk assessment and management strategies. His extensive project experience in delivering a wide variety of programs and projects in the traffic and transport sector has enabled him to develop excellent leadership capabilities, as well as appreciate the importance of undertaking effective consultation and negotiations with a wide range of community and stakeholder groups. Over nearly 3 decades, Stephen has established a strong reputation as a group facilitator working with communities, technical experts and policy makers to proactively engage communities in decision-making, support policy development and implementation and manage processes of change and conflict. His primary focus has been facilitating an integrated approach to the planning of transport infrastructure and systems – recognising, and having respect for, the cultural and social planning requirements as well as understanding the aspirations of communities.

Stephen has extensive experience in preparing expert witness testimony and appearing at Planning Panels, including most recently in 2016, several hearings for large-scale ammendments to the Melton Planning Scheme. His work across the world has included masterplanning projects, detailed transport systems analysis, land use/transport studies, multi-modal transport assessments, road safety plans, asset management studies, formulation and implementation of Intelligent Transport Systems, development of transport models, preparation of sustainable transport strategies, demand forecasting, route planning, public transport schemes and bicycle & pedestrian plans. He has also advised developers and government agencies on transport and infrastructure issues, with emphasis on economically viable, efficient, safe and sustainable transport systems. Stephen has led the transport analysis for, and appeared to provide expert testimony on, several major projects, including East West Link, Peninsula Link Freeway, Geelong Bypass, Calder Freeway, Victorian Desalination Plant, Channel Deepening Project in Port Phillip Bay and Bass Gas/Otway Gas projects.

Stephen has regularly taken the opportunity to share his considerable experience through preparation of technical papers and participation in conferences, including most recently various workshop sessions in support of the National Traffic and Transport Strategy for Kuwait, sponsored by the United Nations Development Programme and the government of Kuwait.

Qualifications

1985

RMIT University
Bachelor of Engineering (Civil)

Project Experience

East West Link Melbourne – Independent Traffic & Transport Assessment and Expert Witness Testimony

client || Linking Melbourne Authority *location* || Melbourne

year || 2013-2014

Stephen was commissioned to peer-review all Traffic Impact Assessment analyses undertaken for the East West Link project – an 18km cross-city road connection extending across Melbourne from the Eastern Freeway to the Western Ring Road (estimated cost of $16-$18 billion). Stephen provided an independent assessment of all traffic/transport planning matters associated with the project and its impact on the surrounding road network, including public transport and sustainable transport modes. Stephen also appeared, as the State Government's expert witness, at the Assessment Committee in early 2014, having reviewed in excess of 1,500 community submissions received – that were related to traffic and transport matters. The Committee considered the merits of the first stage of the East West Link, a 6km section connecting the Eastern Freeway with CityLink – together with a separate connection to the Port of Melbourne area.

Traffic and transport studies for the Melbourne CBD

client || City of Melbourne *location* || Melbourne *year* || 1986-2021

Over the past 35 years, Stephen has delivered numerous transport projects for the City of Melbourne covering a wide range ot topics. He worked continuously as an employee at the City of Melbourne for over 11 years and has continued providing ongoing advice to Council as an expert consultant since that time.

Noteworthy City of Melbourne projects which Stephen has either participated in or led include:

- Traffic engineering assessments for the Swanston Walk project
- Pedestrianisation of little streets and laneways
- Evaluation of 44 laneways for shared zone designation
- 40kph study for the Melbourne CBD (leading to its eventual introduction)
- Traffic signal operational review for the CBD
- Road safety plans
- Parking studies
- Motorcycle strategy
- Pedestrian and bicycle strategies
- Public transport projects, including the establishment of the City Circle tram
- Accident blackspot evaluations
- Local area traffic management schemes, including current schemes for North Melbourne, Kensington, SouthYarra, East Melbourne and West Melbourne
- St Kilda Road microsimulation to coordinate traffic signals and promote cycling priority
- Transport system review for City North and Arden Macaulay
- Transport efficiency study for the CBD's north edge
- Sustainable transport strategy for Southbank Structure Plan
- Traffic and parking studies for the Southbank Arts Precinct
- Traffic and parking analyses in support of Council's Urban Forest Strategy
- Represented Council on multiple major projects, including the Formula 1 Grand Prix, special events planning for the sports and entertainment precinct, inaugural White Night traffic engineering and 2006 Commonwealth Games
- Represented Council on the evaluation of impacts of major transport infrastructure and development projects, including CityLink, Crown Casino and initial development of Docklands
- Interim advisory truck route through North and West Melbourne
- Review of the municipal wide road hierarchy
- Microsimulation of King Street
- Major taxi strategy in collaboration with State government and taxi operators
- Worked with VicRoads on the central city emergency plans
- Facilitated implementation of the Night Rider bus services

Planning and Design Principles for Promoting Active Transport in the Northern and Western Geelong Growth Areas

client || City of Greater Geelong location | Victoria year || 2017

The Northern and Western Geelong Growth Areas is the largest urban growth project in regional Victoria with the potential to accommodate more than 100,000 new Geelong residents. The City of Greater Geelong is committed to the adoption of new infrastructure standards capable of supporting strong modal shift to active transport for all trip purposes. Council engaged movendo to assemble a comprehensive body of evidence that summarises the latest science, research findings and practical guidance for the design of the 'sustainable suburbs of the future', characterised by seamless active transport corridors, high levels of accessibility to a wide range of destinations, and streets as an integral part of the public realm (rather than simply roads and spaces for cars).

Stephen co-led this study, aimed at establishing aspirational principles / objectives / design outcomes in support of active transport (walking and cycling) and pedestrian amenity within Geelong's future suburbs. The City of Greater Geelong is seeking to leverage the study findings to present ideas that challenge current conceptions and road design norms.

As part of the study, movendo undertook:

- A comprehensive review of Australian & international literature, including peer reviewed papers, best practice urban design and traffic engineering guidance documents, and other technical reports of relevance.

- Direct engagement with internationally recognised experts in the fields of urban design, transport planning and behavioural science from leading academic institutions in Australia, the United States and Europe.

West Gate Tunnel Traffic Assessment

client || Transurban location || Melbourne year || 2017

Transurban engaged movendo to assist in the planning and assessment of the West Gate Tunnel – a major transport scheme in inner Melbourne. It has been recognised as a major opportunity to deliver real improvements to Melbourne's transport network by relieving pressure on the West Gate Bridge (a major transport link carrying around 140,000 per day and currently under significant pressure), reducing trucks on local roads, improving travel times and boosting safety and liveability for the community. It is also expected to provide an economic boost, with more reliable and shorter travel times and improved efficiencies for freight.
The West Gate Tunnel project will involve:
- A long road tunnel under the central city environs, releasing road capacity at ground level to enhance public transport operations on key corridors
- New bridges and an elevated road on the central city's western edge
- New Connections to the Port of Melbourne
- Enhanced connections and access to Melbourne's Central Business District and parking stations
- New cycling and walking paths

As the detailed "environmental effects work" progressed, in 2016-2017, Stephen provided an independent assessment of all traffic/transport assessment undertaken by other specialists and advised Transurban and the State Government on the project's likely impact on the surrounding road network, including public transport and sustainable transport modes.

State Netball and Hockey Centre - Traffic and Parking Analysis

client || Development Victoria location || Melbourne year || 2017

The $64.6 million State Netball and Hockey Centre (SNHC) redevelopment is the centrepiece of the Victorian Government's record investment in women's sport. Development Victoria commissioned movendo in August 2017 to undertake extensive traffic and parking field survey work and analyses to support and inform the development of scenarios at the SNHC in support of the business case for the redevelopment. movendo prepared a report that identifies and assesses parking and traffic options relating to the future design and operation of the expanded SNHC facility. The survey program helped to define the existing parking and traffic "problems" associated with activities at the SNHC. The report discusses traffic and parking implications of future netball and hockey events, high performance athletes and staff on a Tuesday and Saturday. The report documents both asset and operational approaches / solutions – based on the current "opportunities and constraints" framework.
Stephen led all project activities, including data collection and analysis and report preparation.

Docklands transport plan and model

client || Places Victoria *location* || Melbourne *year* || 2011-2012

In 2011-2012, Stephen led the preparation of a Transport Plan and Transport Model for Docklands. The Docklands area is located on the western edge of Melbourne's central business district and is an extension of the city's major employment hub. From one of Victoria's first ports to an industrial wasteland in the 1990s, Docklands is being transformed into a modern residential, commercial and visitor destination in the heart of Melbourne. The headquarters of some of the biggest businesses in Australia are now located in Docklands, along with a growing residential community. The study involved an extensive survey program with thousands of online and paper surveys undertaken with workers, residents, visitors and those attending events at Etihad Stadium, to understand travel behaviour of people moving to and from Docklands. The work included development of a Transport Model, which takes into account existing and future development and infrastructure proposals in and around Docklands to provide traffic predictions, forecasts of public transport usage and an analysis of pedestrian and cycling patterns at key stages of Docklands development. The Model forecasts traffic volumes when various assumptions are made regarding land use and development yield, infrastructure configuration and capacity, and travel mode split. The Docklands Transport Model was used as a key tool for testing and ultimately defining the preferred land use, transport infrastructure and travel behaviour outcomes for Docklands. The Transport Plan used Model outputs and other sources to examine the key issues and influences on access and mobility at Docklands, and identify the priority transport projects and initiatives required in Docklands over the next ten years and beyond, to ensure Docklands is well placed to cope with the substantial growth still to occur.

Congestion management strategy Kallang Paya Lebar expressway

client || Land Transport Authority *location* || Singapore *year* || 2007-2008

While at AECOM, Stephen project managed this commission from the Singapore Land Transport Authority (LTA) to develop a congestion management strategy for the 8.5 kilometre KPE Tunnel (built at a cost of around U$1 billion and the longest subterranean road tunnel in southeast Asia and the world's 6th longest underground road project - at its time of construction). The study examined both weekday commuter peak period demands, as well as emergencies and other specific incidents within the tunnel. Central to development of the congestion management strategy was the use of a large-scale VISSIM traffic micro-simulation model. As a result of the approach adopted, critical improvements to the initially proposed road-layout designs were identified in advance of tunnel opening and a number of ITS options were proposed and tested in VISSIM, including the first potential implementation of ramp metering on the island of Singapore. Phase 1 of the KPE, a 3km limited-movement section of tunnel, opened in October 2007 incorporating designs developed directly from the VISSIM modeling. Study recommendations for the fully-open tunnel, incorporating further geometric refinements, were prepared in advance of full scheme opening in 2008.

CityScope Analysis with the Massachusetts Institute of Technology

client || MIT *location* || Boston *year* || 2013-current

Stephen, in collaboration with the Changing Places Research Group of the Massachusetts Institute of Technology (MIT) Media Lab, is using CityScope to inform the planning process for a new community of 50,000 people in Queensland. CityScope is a modelling tool developed by MIT scientists to create a tangible, interactive, real-time data observatory and urban intervention simulator. The system consists of physical scale models (built of LEGO bricks), 3D projection mapping (using Rhino, Illustrator and Photoshop) and 3D parametric modelling (using Grasshopper) to prototype the design of communities by quantifying system-level effects of planning decisions on travel behaviour, energy consumption, food production and emissions (greenhouse gases and air pollutants). CityScope is designed to help people understand complex inter-relationships, and to make informed decisions about urban design, public policy, planning and the introduction of new urban systems and technology.

Moonee Valley walking and cycling strategy

client || City of Moonee Valley *location* || Melbourne *year* || 2010-2012

Between 2010 and 2012, Stephen led the preparation of a walking and cycling strategy for the inner-city municipality of Moonee Valley in inner Melbourne. Moonee Valley, located a short distance north of the Melbourne CBD, has a population of around 120,000 people. The city's strategic goals include providing smart, sustainable and accessible transport that connects its people and communities to achieve a healthy environment and sustainable future. The project involved walking and cycling audits, safety reviews, evaluation of intersection improvements, network development, as well as the preparation, conduct and analysis of pedestrian and cyclist surveys. The study also involved input from key stakeholders and community groups. The site work and consultative activities, including numerous focus groups, were informed by an extensive literature review of previous studies and best international practices in terms of safety and infrastructure provision for pedestrians and cyclists. The strategy developed a comprehensive set of recommendations for infrastructure improvement actions, policy and planning changes and associated travel behaviour programs.

Peninsula Link Route Selection, Concept Design Development and Expert Traffic & Economics Witness

client || Linking Melbourne Authority *location* || Melbourne *year* || 2007-2009

While at AECOM, Stephen was the technical transport director for a planning feasibility study of a new freeway extending for over 20 kilometres on Melbourne's south-eastern fringe. Originally known as the Frankston Bypass, the roadway is nearing completion and is now known as Peninsula Link. The study, conducted in 2008/09, involved preparation of preliminary road designs (tested with modelling and microsimulation) and also included a full environmental assessment of various road options. In his role as technical transport director, Stephen provided traffic safety and traffic engineering advice to test different road options. He also provided expert witness evidence to a Panel hearing covering all modelling aspects (including the development/validation of a sub area traffic model - extracted from the metropolitan wide model - for the base and future year forecasts).

Maribyrnong integrated transport strategy

client || City of Maribyrnong *location* || Melbourne *year* || 2011-2012

Stephen was technical leader in the delivery of an Integrated Transport Strategy for the inner city municipality of Maribyrnong in Melbourne. The study included a review of existing transport development plans and policies and the collection of demographic and transport data for Maribyrnong and surrounding areas. The analysis considered conditions not only in the City of Maribyrnong, but also in surrounding areas in order to understand the influence of other municipal, regional and state transport issues and activities upon Maribyrnong. Significant consultation and engagement with relevant authorities and stakeholders were undertaken. The main outcome of the project was the identification and prioritisation of actions, through an Implementation Plan, with respect to transport access and mobility elements that emphasise sustainable transport solutions and will guide transport planning within Maribyrnong over the next ten years. The transport strategy policies and actions aim to make Maribyrnong a city where it is possible for people to walk and cycle more often, and catch public transport with ease, thus relieving congestion on the road network, and reducing the City of Maribyrnong's contribution to transport related greenhouse gas emissions.

WestLink Planning and Consultation Study

client || Linking Melbourne Authority *location* || Melbourne *year* || 2009-2010

While at AECOM, Stephen was one of the principal traffic and transport analysts for this study, which included a review and assessment of a variety of infrastructure options to help inform selection of a preferred design solution. The eventual evaluation of a number of shortlisted options included alignment and arrangements for connections to the Western Ring Road and alignments for connection with Dynon and Footscray Roads taking into account transport modelling forecasts and induced demand factors. The traffic engineering investigations also comprised review of required upgrades to existing roads and intersections with consideration for future road widenings and land acquisition.

2006 Commonwealth Games - Public Transport Model

client || Department of Infrastructure *location* || Melbourne
year || 2005-2006

While at AECOM, Stephen was responsible for the development of a public transport model to obtain estimates of the likely impact of the transport task for the Melbourne Commonwealth Games on the normal base load flows on the transport system. This two-year project included forecasting impacts on and utilisation of all forms of public transport as well as private vehicles on the road network. As part of this study, solutions were developed that involved: intersection analysis and design, traffic signal coordination strategies, traffic operations and staging during events, and special pedestrian management in the vicinity of the Sports Stadia.

Tram Infrastructure Improvement Program

client || Yarra Trams *location* || Melbourne *year* || 2014-2015

Yarra Trams manages the world's largest tram network with 26 tram routes across 250km of double track. Throughout 2014 and 2015, Stephen provided project management services as well as design and strategic advice to Yarra Trams in the concept development, approvals procurement and delivery stages of a multi-million dollar tram facility upgrade program consisting of multiple system-wide improvement projects across central Melbourne. In developing designs, Stephen considered a wide range of aspects, including cost, safety improvement potential, congestion benefits and impacts, and 'ease of implementation' based on both government and public perspectives. The infrastructure improvement projects include:

- Route extensions through construction of new tram tracks on strategic corridors;
- New terminus facilities critical to significantly enhance intermodal connectivity enabling improved service design, decongestion of the associated tram corridors and ability to maximise efficient use of high-capacity vehicles where they are most needed;
- Implementation of tram platform stops to enable single-level boarding in compliance with disability access legislation;
- Design of a major new tram/train interchange in central Melbourne, along Wellington Parade at Jolimont Station – servicing the Melbourne Cricket Ground (MCG) Melbourne's and Australia's premium
- Sporting venue to facilitate crowd and traffic management after events;
- Tram stop optimisation across several inner Melbourne tram routes and the establishment of the first ever tram platforms suitable for joint bus/tram usage in Melbourne on Queens Bridge Street; and provision of improved tram priority measures on busy routes.

Western Sydney orbital – traffic study

client || Road Transport Authority *location* ||Sydney *year* || 2003-2004

While at AECOM, Stephen coordinated the preparation of traffic management plans for the Western Sydney Orbital (WSO) – the major circumferential freeway through Sydney's north western suburbs; a 40 km motorway linking three other key motorways and saving motorists significant amounts of time. The project included regional modeling and detailed traffic engineering design for:

- 17 interchanges along the motorway to provide access to adjoining communities and improve transport options to these areas.
- 38 underpasses and overpasses to maintain local access for pedestrians, cyclists and motorists along the full length of the motorway
- 40 km off-road shared cycle / pedestrian pathway traverses the motorway and connects with the Sydney Cycleway network

As a result of the implementation of the WSO, motorists travelling on the road can avoid up to 48 sets of traffic lights on the overall trip. The study also included the use of ITS to provide:

- Intelligent vehicle speed detection and operate at variable speeds up to 100 km/h.
- A cashless, free-flow electronic tollway with no toll booths and no slowing or stopping.

Selected Publications and Presentations

March & November 2012	'National Traffic and Transport Sector Strategy for Kuwait 2010-2020', Towards Sustainable and Safe Transport for Current and Future Generations Kuwait
June 2010	'Sustainable Transport: Integration of Land Use and Transport' at the 2010 Australasian Centre for the Governance and Management of Urban Transport (GAMUT) Conference on Sustainable Transport Melbourne, Australia
June 2010	'Transporte Sostenible: Integración de Plancación Urbana y Transporte' in REvive Monterrey Fórum 2010 Monterrey, México
May 2010	'Integration of Land Use and Transport' in World Metro Rail Summit Shanghai, China
April 2009	'Singapore Kallang-Paya Lebar Expressway - Developing a Tunnel Congestion Management Strategy Using Micro-Simulation' in Traffic Engineering and Singapore
August 2008	'Singapore Kallang-Paya Lebar Expressway - Tunnel Congestion Management Strategy Developed with VISSIM and Accident Incident Management/ Road Safety Plan' at the 8th International Symposium on Transport Simulation Surfers Paradise, Australia
2001-2011	Guest Lecturer in Transport Planning and Traffic Engineering at the University of Melbourne Faculty of Architecture, Building and Planning Melbourne, Australia