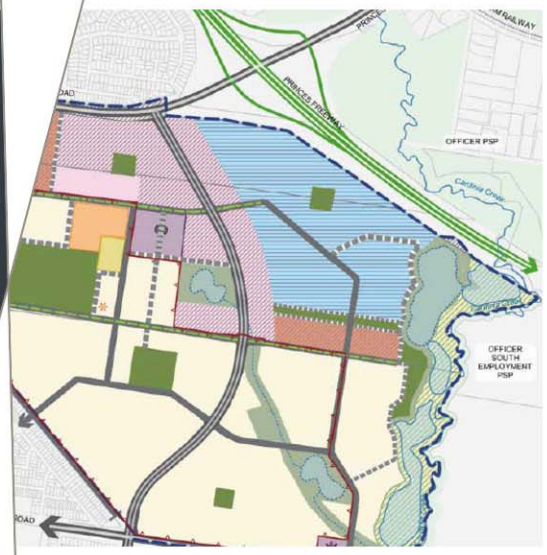
Expert Evidence Statement - Traffic and Transport by Christopher James Butler of Cardno

Minta Farm PSP - Amendment C228 to the Casey Planning Scheme

V171898



Instructed by

Harwood Andrews on behalf of the Victorian Planning Authority

6 April 2018

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Document Information

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F01	6 April 2018	Final	Chris Butler / Benjamin Mentha	Chris Butler

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1 Qualifications and Expertise

In accordance with the Guide to Expert Evidence prepared by Planning Panels Victoria, my qualifications and expertise to undertake this work are summarised below:-

Name:

Christopher James Butler

Address:

Cardno

Level 4, 501 Swanston Street

Melbourne Vic 3000

Professional Qualifications:

- Bachelor of Civil Engineering (Honours), University of Melbourne

Professional Experience:

- Cardno Victoria 2007 – Present
- Grogan Richards Pty Ltd 1988 – 2007
- Road Traffic Authority and RJ Nairn and Partners Pty Ltd 1985 - 1988

Areas of Expertise:

- Car parking, traffic and transportation.
- Traffic advice and assessment of land uses and development proposals in relation to shopping centre developments, both new and expansions, office developments, local government and government authorities, residential and recreational developments, hospitals, schools, retirement villages and aged care facilities.
- Preparation and presentation of evidence before VCAT and Planning Panels.

Expertise to Prepare this Report:

My training and experience including involvement with all forms of development over the past 31 years qualifies me to comment on the traffic implications of the proposal.

Instructions which Defined the Scope of this Report:

I have been instructed by Harwood Andrews on behalf of the Victorian Planning Authority to provide expert evidence at the Panel Hearing for Amendment C228 to the Casey Planning Scheme.

Facts, Matters and Assumptions Relied Upon:

- Casey Planning Scheme Amendment C228 documentation as exhibited, including:
  - Minta Farm Precinct Structure Plan.
  - Strategic Transport Modelling Assessment (Ultimate Scenario) – McPherson, Croskell and Minta Farm Precincts, prepared by Cardno, dated 31 August 2015.
  - Traffic Engineering Assessment – Additional Traffic Modelling at Minta Farm PSP 11, prepared by Traffix Group, dated 5 September 2017.
  - Minta Farm Precinct Structure Plan – Concept Road Design Report, prepared by Traffic Works, dated 5 October 2017.
  - Sect. 96A Traffic Impact Assessment, prepared by One Mile Grid,dated 4 October 2017.
- Traffic data collected by Traffix Group in March 2018.
- Traffic data collected by Data Audit Systems (on behalf of Casey City Council) in February 2018.

- South-East Growth Corridor Plan, prepared by Growth Areas Authority, dated 2011.
- Victorian Government Media Release regarding the Stage 2 Monash Freeway Upgrade, dated 18 March 2018.
- Berwick South Development Plan.
- Clyde North PSP, Thompsons Road PSP & Clyde Creek PSP.
- Clyde North DCP & Clyde DCP.
- Clyde North DCP Staging Plan, prepared by Casey City Council, dated August 2017.
- Clyde DCP Staging Plan, prepared by Casey City Council, dated March 2018.
- Expert evidence statement prepared by Mr Will de Waard.
- Review of relevant correspondence and other documents.

Identity of Persons Undertaking the Work:

Chris Butler, assisted by Benjamin Mentha (Senior Engineer) of Cardno Victoria.

'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 Panel.'

Chris Butler

Senior Principal

for **Cardno**

2 Introduction

I have been instructed by Harwood Andrews on behalf of the Victorian Planning Authority (VPA) to provide my opinion on the proposed Minta Farm PSP as exhibited as part of Amendment C228 to the Casey Planning Scheme.

The scope of my engagement provided by the VPA is as follows:

- Consider key background materials, including:
  - Draft Precinct Structure Plan (relating to land use and transport planning);
  - Supporting transport technical reports, including:
    - Additional Traffic Modelling at Minta Farm PSP 11 (Traffix Group) Sep 2017;
    - PSP 1051 Croskell and Minta Farm – Strategic Transport Modelling (Cardno) 2015; and
    - Minta Farm – Traffic Works Concept Designs (Traffic Works) 5 October 2017;
    - Thompsons Road PSP and Strategic Modelling and Traffic Assessments (Cardno)
    - Clyde North PSP, Strategic Modelling and Traffic Assessments (GTA)
    - Clyde North Development Profile (City of Casey).
  - City of Casey's Peer Review of the Minta Farm Traffic Assessment and development scenarios (yet to be received); and
  - Directions from key submissions made on the draft Plan for transport. These should be addressed contextually in the Statement.
- Provide recommendations on the prioritisation of road network improvements for the precinct and surrounding area to give direction to Council and agency Transport infrastructure providers to manage the potential for traffic impacts and support growth.
- Evaluate the Expert Witness Statement prepared by Mr Will de Waard of Traffix Group and make recommendations.

The following sets out my opinions with respect to these matters.

3 Amendment C228 to the Casey Planning Scheme

Amendment C228 has been prepared by the VPA and applies to land included in the Minta Farm Precinct Structure Plan (PSP).

The Amendment seeks to introduce Schedule 14 to the Urban Growth Zone (UGZ14) into the Casey Planning Scheme, which will require that land use and development within the Minta Farm Precinct to be generally in accordance with the Minta Farm PSP.

The Amendment also seeks to incorporate the Minta Farm PSP as an Incorporated Document under the Casey Planning Scheme.

The Minta Farm Infrastructure Contributions Plan (ICP) is proposed to be incorporated into the Casey Planning Scheme via a separate Planning Scheme Amendment.

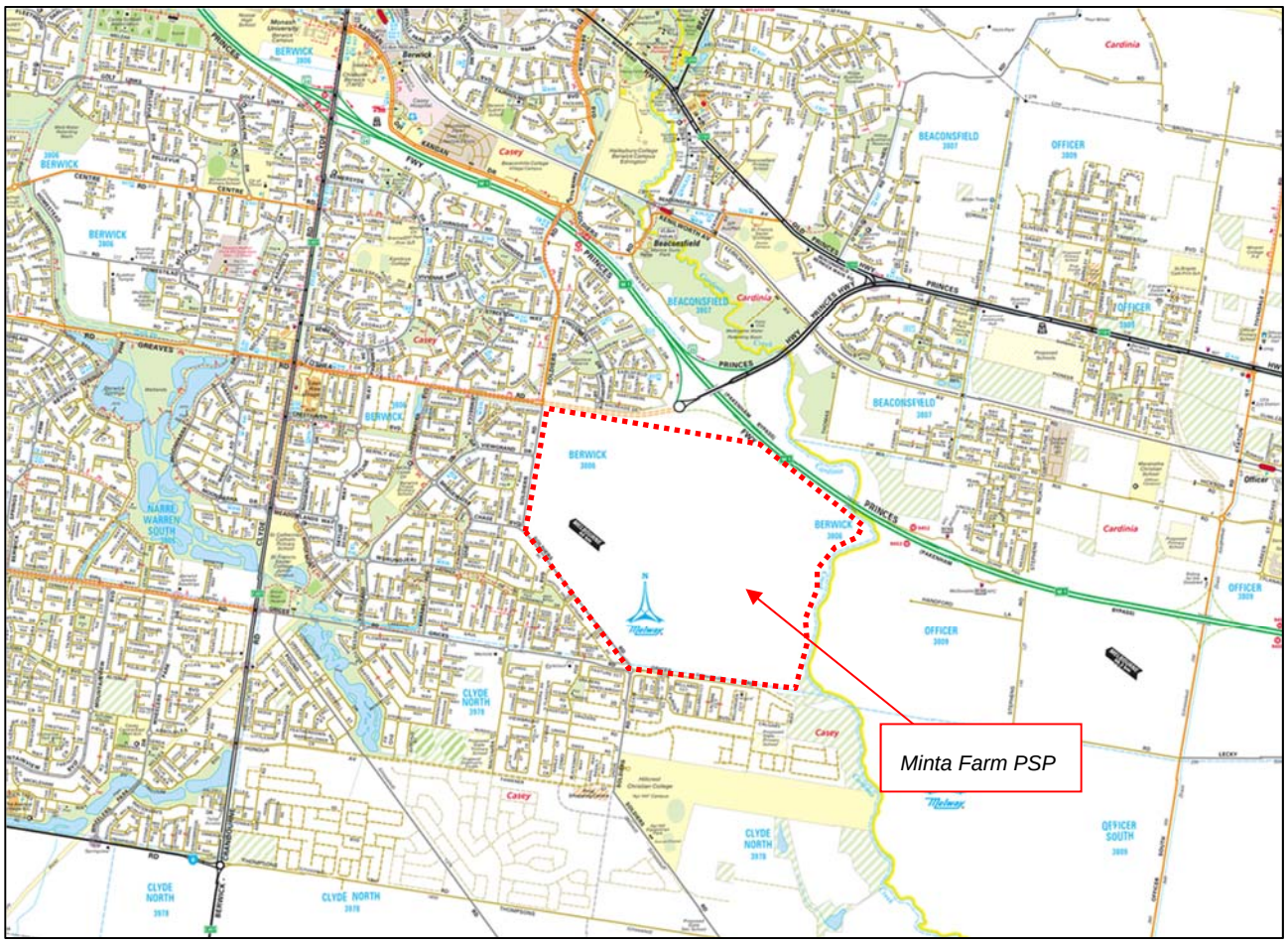
As part of the Amendment, a concurrent Sect. 96A planning permit application (PlnA00384/17) for a residential subdivision is proposed at Part of 2-106 Soldiers Road, Berwick.

4 Existing Conditions

4.1 Locality

The Minta Farm PSP area is located in the South-East Growth Corridor within the City of Casey. A locality plan of the Minta Farm PSP area in the context of the existing road network is presented in Figure 4-1.

Figure 4-1 Locality Plan



4.2 Road Network

4.2.1 Soldiers Road

Soldiers Road is a local road managed by Casey City Council. Along the Minta Farm PSP frontage (south of O'Shea Road) is defined as a 'collector' under Council's Register of Public Roads, while the section to the north of O'Shea Road is categorised as a 'secondary arterial'.

Along the Minta Farm PSP frontage, it is constructed with a single carriageway (approx. 6.0m – 6.5m wide) providing a traffic lane in each direction with an indented parking lane along the west / south-west side within a 20.0m road reserve.

A 1.5m wide footpath is provided along the west side between O'Shea Road and Chase Boulevard, while a 2.5m wide shared path is provided on the south-west side between Chase Boulevard and Grices Road.

4.2.2 O'Shea Road

O'Shea Road is a local road managed by Casey City Council and is defined as a 'secondary arterial' under Council's Register of Public Roads.

In the vicinity of the Minta Farm PSP, it is constructed with a single carriageway (approx. 8.0m) providing a traffic lane in each direction within a 45.5m (approx.) road reserve. Residential properties are prevented from taking direct access to O'Shea Road.

Shared paths (approx. 2.5m wide) are provided along both sides of O'Shea Road.

4.2.3 Grices Road

Grices Road is a local road managed by Casey City Council and is defined as a 'collector' under Council's Register of Public Roads.

To the west of Soldiers Road, it is constructed with a single carriageway (approx. 8.0m) providing a traffic lane.

Along the Minta Farm PSP frontage, Grices Road is currently constructed up to Glenrose Boulevard (approximately 250m east of the Soldiers Road roundabout), with the remaining section further east currently an unsealed gravel formation.

Shared paths (approx. 2.5m – 3.0m wide) are provided along both sides of Grices Road.

It is expected that Grices Road will eventually become a secondary arterial road, with land set aside for this purpose under the Clyde North DCP. Residential properties are prevented from taking direct access to Grices Road.

4.2.4 Clyde Road

Clyde Road (Berwick-Cranbourne Road) is a declared arterial road managed by VicRoads.

Clyde Road is constructed was a divided cross-section, with three lanes provided in each direction from the Princes Freeway Interchange to the south side of the Meadowlands Way signals, with two lanes provided in each direction south of this transition.

4.3 Traffic Volumes

I have been provided with recent traffic volumes by the VPA that were collected by Traffix Group (on behalf of the VPA) and Data Audit Systems (on behalf of Casey City Council).

I note that the Clyde Road Interchange was in the process of being upgraded at the time the surveys were undertaken. Traffic is likely to have redistributed across the network given the reduced capacity of the interchange (as well as the inability to turn right onto the Melbourne-bound on-ramp). Accordingly, the recorded traffic volumes may not represent typical conditions on the network.

4.3.1 Daily Volumes

The tube counts undertaken by Traffix Group are summarised in Table 4-1.

Table 4-1 Updated Traffic Volumes – Soldiers Road and Chase Boulevard

Location	Survey Dates	Weekday Average Volume	7-day Average
Soldiers Road, between O'Shea Road and Viewgrand Drive	Wednesday 14 March to Tuesday 20 March 2018	9,844 vpd	8,862 vpd
Soldiers Road, between Viewgrand Drive and Chase Boulevard	Wednesday 14 March to Tuesday 20 March 2018	8,635 vpd	7,761 vpd
Soldiers Road, between Chase Boulevard Wurundjeri Boulevard*	Sunday 11 March to Saturday 17 March 2018	7,873 vpd	7,032 vpd
Soldiers Road, between Ramisco Way and Grices Road	Wednesday 14 March to Tuesday 20 March 2018	5,829 vpd	5,101 vpd
Chase Boulevard, between O'Connell Street and Soldiers Road*	Saturday 10 March to Friday 16 March 2018	1,953 vpd	1,688 vpd

** The counts on Soldiers Road (between Chase Boulevard and Wurundjeri Boulevard) and Chase Boulevard (between O'Connell Street and Soldiers Road) include the Labour Day Public Holiday. The public holiday has been omitted from the results shown above.*

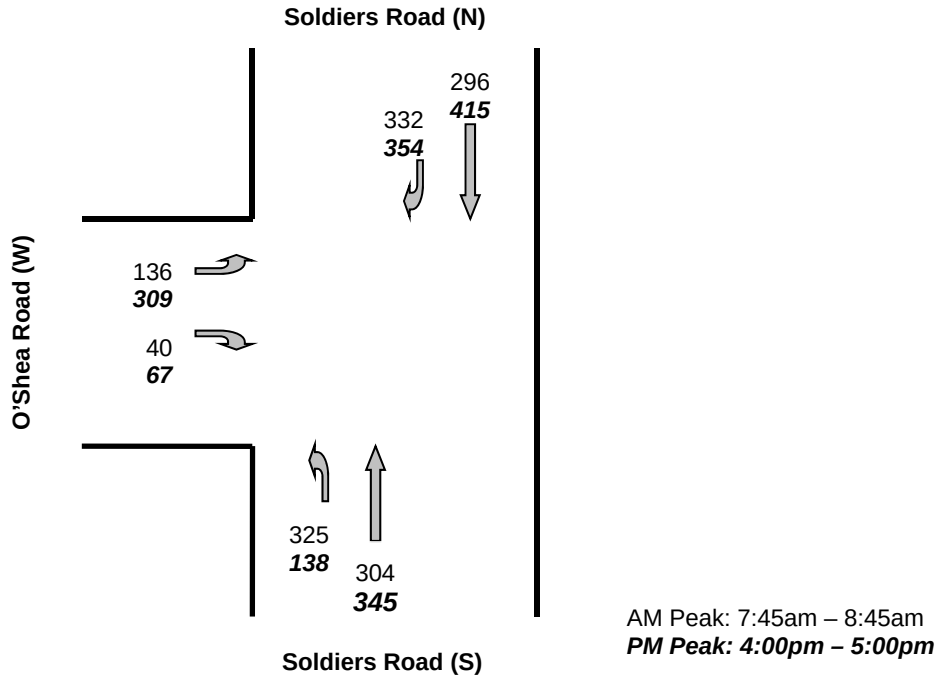
4.3.2 Peak Hour Volumes

Data Audit Systems recorded peak hour turning movement volumes at key intersections along on Soldiers Road and Clyde Road. The survey was undertaken on Thursday 15 February, 2018, from 7am to 9am and 4pm to 6pm at the following intersections:

- Soldiers Road / O'Shea Road;
- Soldiers Road / Chase Boulevard;
- Soldiers Road / Grices Road;
- Clyde Road / O'Shea Road; and
- Clyde Road / Grices Road.

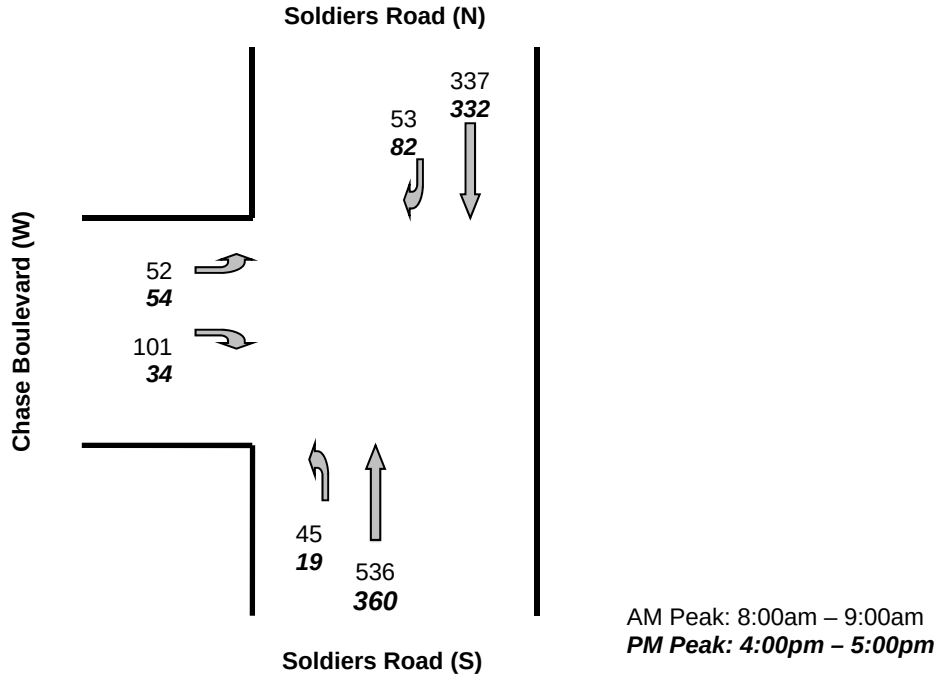
The peak hour volumes at the Soldiers Road / O'Shea Road intersection are presented in Figure 4-2.

Figure 4-2 Peak Hour Volumes – Soldiers Road / O'Shea Road



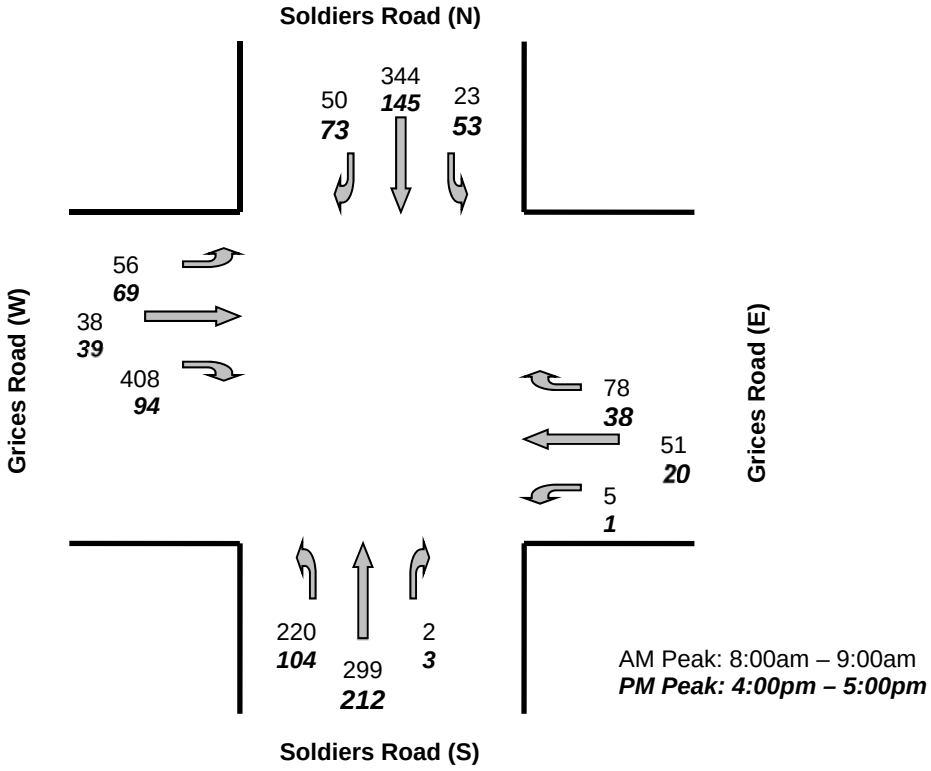
The peak hour volumes at the Soldiers Road / Chase Boulevard intersection are presented in Figure 4-3.

Figure 4-3 Peak Hour Volumes – Soldiers Road / Chase Boulevard



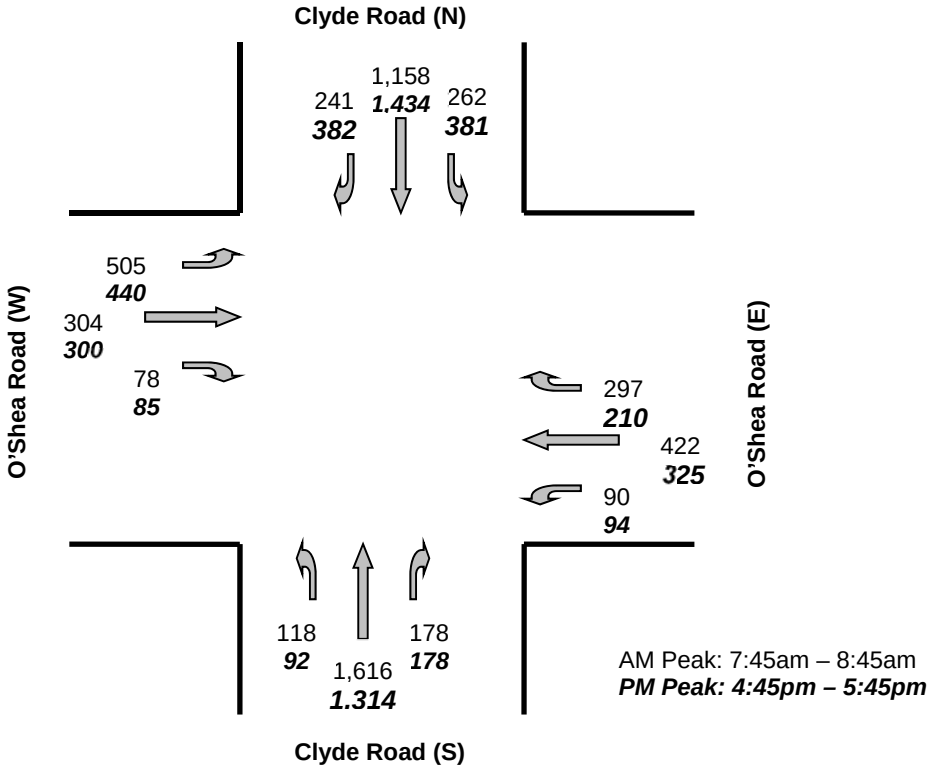
The peak hour volumes at the Soldiers Road / Grices Road intersection are presented in Figure 4-4.

Figure 4-4 Peak Hour Volumes –Soldiers Road / Grices Road



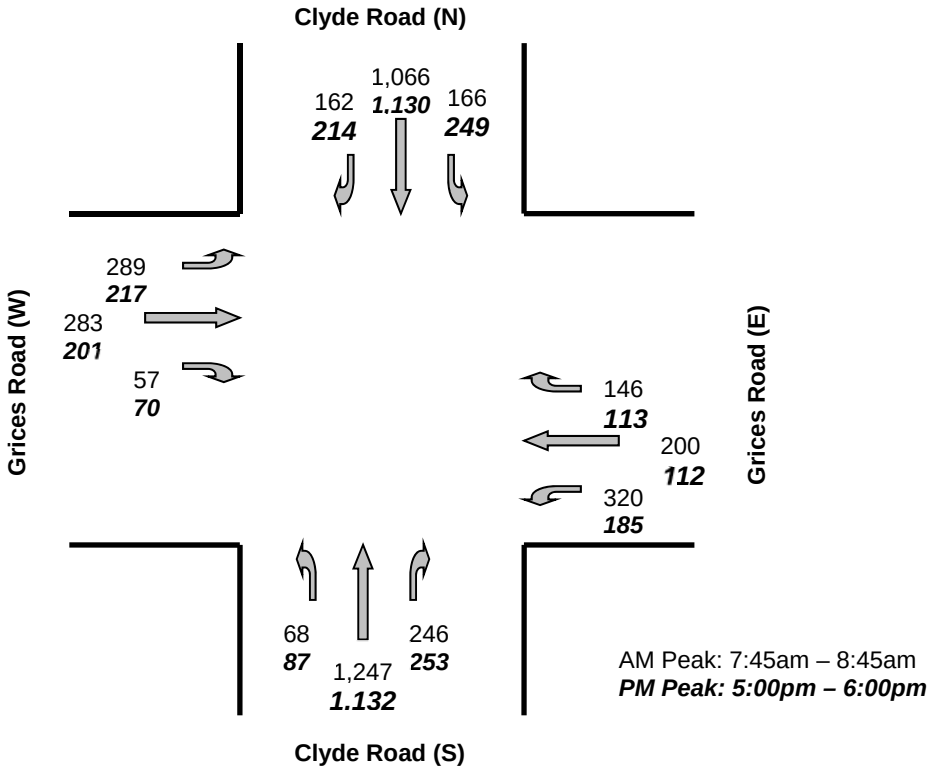
The peak hour volumes at the Clyde Road / O'Shea Road intersection are presented in Figure 4-5.

Figure 4-5 Peak Hour Volumes – Clyde Road / O'Shea Road



The peak hour volumes at the Clyde Road / Grices Road intersection are presented in Figure 4-6.

Figure 4-6 Peak Hour Volumes – Clyde Road / Grices Road



4.4 Public Transport Network

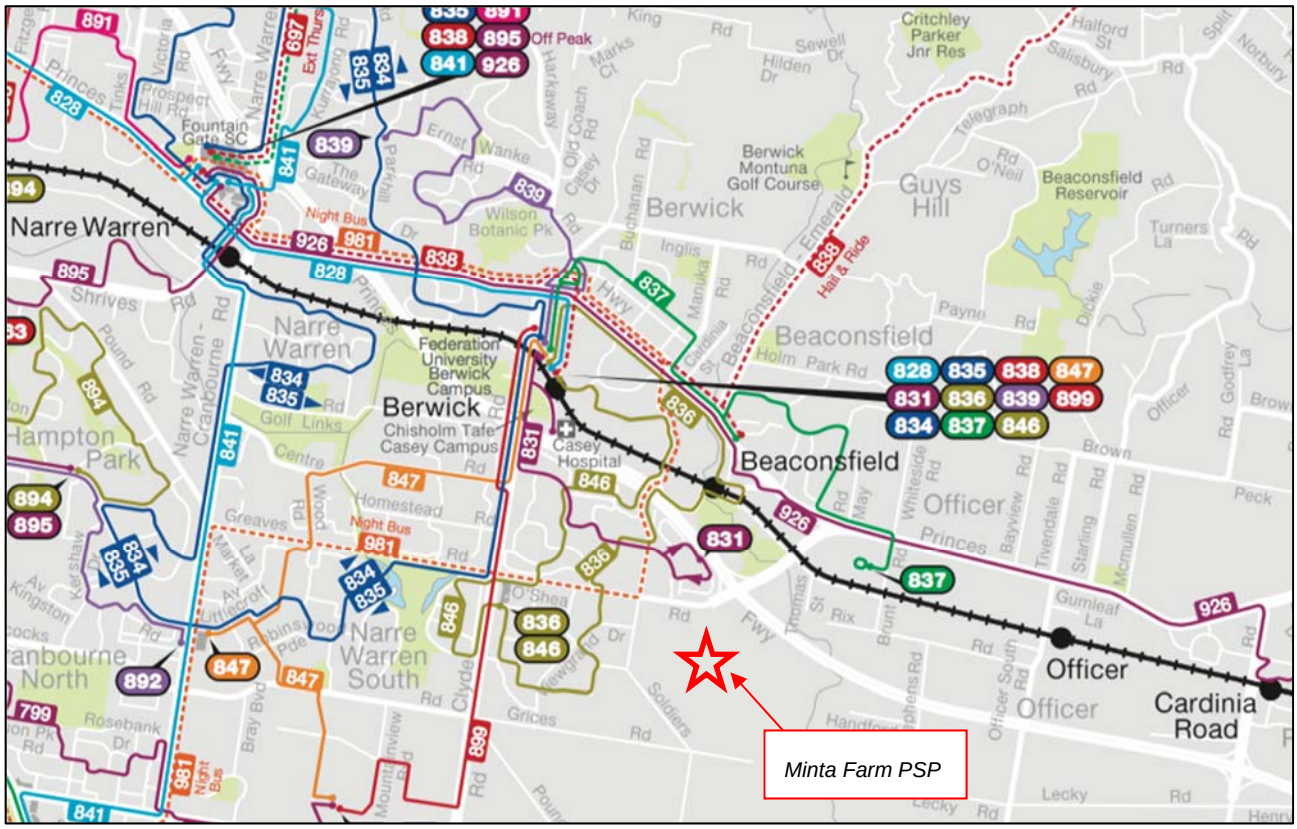
Beaconsfield Railway Station is located to the north of the Minta Farm PSP area, providing access to train services on the Pakenham railway line.

Bus Route 831 provides a service between Berwick Railway Station and Kingsmere Estate, with the route servicing the residential area that abuts the north of the Minta Farm PSP.

Bus Routes 836 & 846 provide services between Berwick Railway Station and Eden Rise Shopping Centre, with the route servicing the residential area that abuts the west of the Minta Farm PSP area.

The existing public transport network in the vicinity of the Minta Farm PSP area is presented in Figure 4-7.

Figure 4-7 Existing Public Transport Network

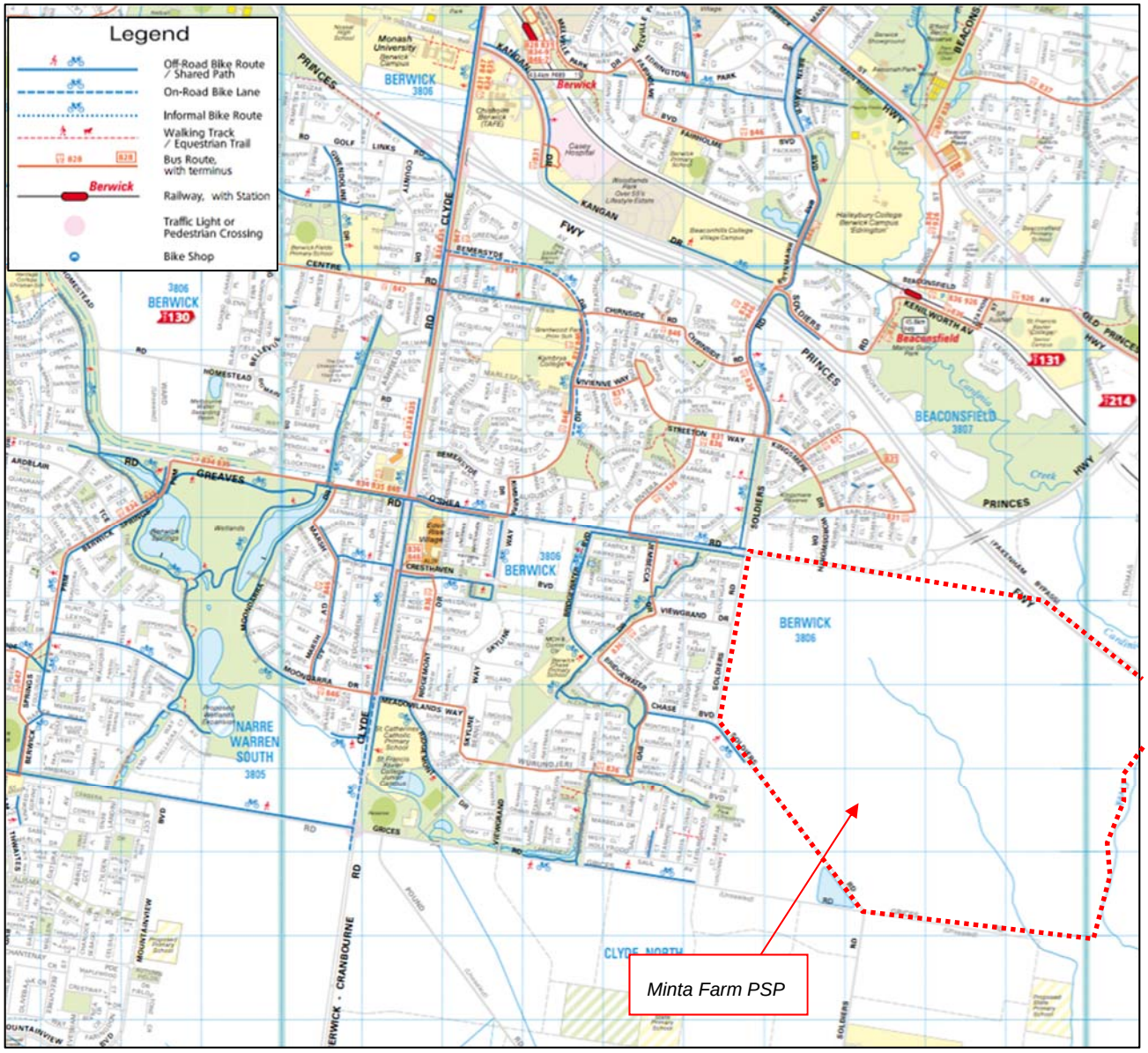


4.5 Bicycle and Pedestrian Path Network

A number of off-road shared path links are provided through the residential area located to the west of the Minta Farm PSP area, including along O'Shea Road and Grices Road. Off-road shared paths are also provided along Soldiers Road providing a north-south link to land (including education and health institutions) located on the north side of the Princes Freeway.

An except from City of Casey's TravelSmart Map is presented in Figure 4-8, noting that the map was published in September 2011 and consequently recently constructed paths are not shown.

Figure 4-8 Existing Bicycle Path Network



5 Exhibited Minta Farm PSP

The Minta Farm PSP area is approximately 285 ha in size and generally bound by the Princes Freeway to the northeast, Cardinia Creek to the east, Grices Road to the south and Soldiers Road to the west.

The precinct has a Net Developable Area (NDA) of approximately 210 ha, inclusive of 141.8 ha for residential, town centres and mixed use areas and 68.8 ha for employment land.

5.1 Future Urban Structure

The exhibited PSP includes a mix of residential, retail and employment land uses. The expected yields for each of these land uses is summarised below.

5.1.1 Residential

A yield of approximately 2,853 dwellings and 7,988 residents is estimated based on an average of 20.1 dwellings per net developable hectare and 2.8 persons per dwelling.

5.1.2 Retail

The exhibited PSP includes a Local Town Centre and a smaller Local Convenience Centre, with the following floor areas expected:

- Local Town Centre: 13,000 sq m retail floor area and 2,600 sq m commercial floor area
- Local Convenience Centre: 1,500 sq m retail floor area and 300 sq m commercial floor area

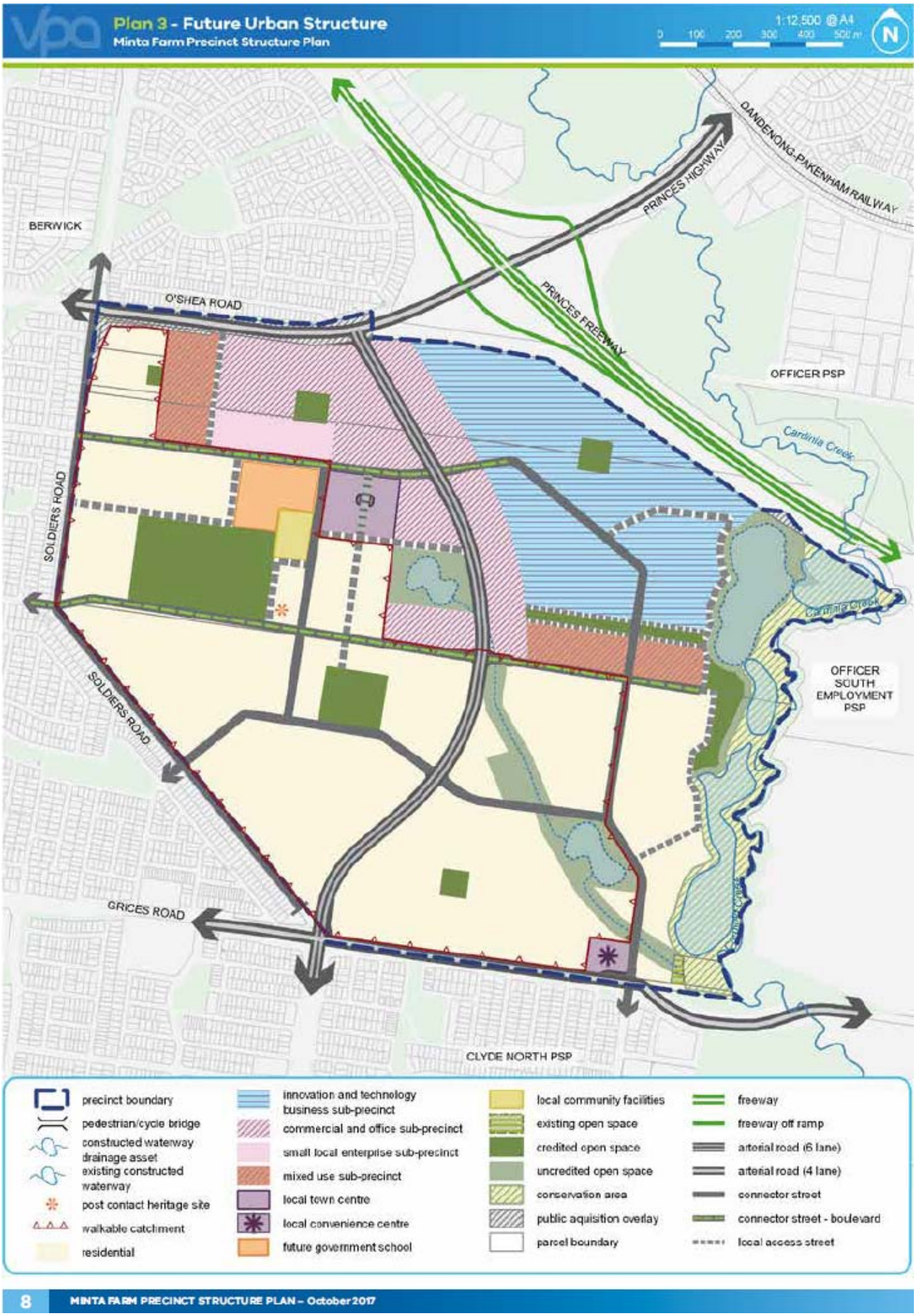
5.1.3 Employment

The exhibited PSP estimates that 11,258 jobs will be created within the Minta Farm PSP area, inclusive of the following:

- Innovation and Technology Business Sub-Precinct: 2,199 jobs
- Commercial and Office Sub-Precinct: 7,322 jobs
- Small Local Enterprise Sub-Precinct: 536 jobs
- Mixed-Use Sub-Precinct: 582 jobs
- Local Town Centre: 314 jobs
- Local Convenience Centre: 87 jobs

The Future Urban Structure Plan outlined in the exhibited PSP is reproduced in Figure 5-1.

Figure 5-1 Exhibited PSP – Future Urban Structure Plan



5.2 Future Street Network

The exhibited street network features a north-south primary arterial and two east-west secondary arterials along the northern and southern boundaries of the PSP area respectively. The arterial road network is supported by a network of connector streets and level 2 local access streets that facilitate access to the residential, retail and employment land uses within the precinct.

The key roads are described below.

5.2.1 North-South Arterial

The proposed North-South Arterial will extend south from the O'Shea Road extension to Grices Road, where it will continue south to Bells Road through the Clyde North PSP, Thompsons Road PSP and Clyde Creek PSP areas.

The exhibited Street Network Plan allows for the North-South Arterial to ultimately be a primary arterial carrying three lanes in each direction separated by a median with a 41m reservation. Dedicated off-road bicycle lanes will be provided along both sides.

The Precinct Infrastructure Plan (PIP) sets out that Casey City Council will be the lead agency for the delivery of the North-South Arterial, with the ultimate land (41m reserve) and interim construction (two-lane carriageway) included in the exhibited PSP.

Requirement R96 of the exhibited PSP sets out the following requirement for the delivery of the North-South Arterial:

> ***"The north-south arterial road as funded by the Minta Farm ICP must be delivered prior to the subdivision of the 1,001st aggregate residential lot unless otherwise agreed in writing by the relevant road management authority."***

5.2.2 O'Shea Road

The exhibited PSP shows the extension of O'Shea Road from Soldiers Road to the Beaconsfield Interchange will ultimately be a secondary arterial road.

The PSP cross-section for a secondary arterial road provides two traffic lanes, plus on-road bicycle lane in each direction separated by a median within a 34m reservation. Off-road shared paths will also be provided on each side.

As discussed in my review of exhibited Strategic Transport Modelling Assessment (see Section 6.1.3), O'Shea Road was modelled as a six-lane arterial under ultimate conditions with the ultimate volumes (49,500 vpd) supporting this classification. Accordingly, I am of the opinion that consideration should be given to amending the exhibited Street Network Plan to show O'Shea Road as a primary arterial.

An existing Public Acquisition Overlay (PAO) is included within the Casey Planning Scheme for the extension of O'Shea Road to the Beaconsfield Interchange[1]. As part of the proposed Amendment, it is proposed to increase the extent of the PAO to allow for the ultimate O'Shea Road / Soldiers Road intersection.

The PIP sets out that VicRoads will be the lead agency for the delivery of the O'Shea Road extension (four-lane arterial), with the land and construction not included within the future ICP.

I understand that the duplication of O'Shea Road, extension of O'Shea Road to the Princes Freeway and upgraded of the Beaconsfield Interchange will be included in the recently announced Monash Freeway Upgrade Stage 2, with the works expected to the completed by 2022[2].

5.2.3 Grices Road

The exhibited PSP shows Grices Road as a secondary arterial road extending along the southern boundary of the precinct. The future extension of Grices Road to the east into the future Officer South Employment PSP is also shown.

[1] The existing PAO is approximately 40m wide adjacent to Soldiers Road and progressively widens on the approach to the Beaconsfield Interchange.
[2] Based on information provided in a Victorian Government Media Release dated 18 March 2018 and confirmed by TfV.

The PIP sets out that Casey City Council will be the lead agency for the delivery of Grices Road, with the land (34m reserve) and interim construction (two-lane carriageway) costs included within the adjacent Clyde North DCP.

The exhibited secondary arterial road cross-section set out in the Minta Farm PSP is generally consistent with the cross-section set out in the adjacent Clyde North PSP, however, the exhibited cross-section includes off-road shared paths on both sides, as well as modified on-road bicycle lanes.

It is noted that the interim construction set out in the Clyde North DCP only extends to the eastern connector road identified in both the Minta Farm and Clyde North PSPs. As such, the interim construction of the Grices Road / Eastern Connector intersection (IN-06) could be an unsignalised T-intersection, rather than the cross-intersection described in the PIP, as there is no need to provide the east leg as part of the interim works associated with the PSP.

5.2.4 Soldiers Road

The exhibited Street Network Plan does not identify the future hierarchy of Soldiers Road, nor is a specific cross-section provided for Soldiers Road in the appendices of the exhibited PSP. In contrast, the exhibited Future Urban Structure Plan shows Soldiers Road as a collector street.

It is noted that Soldiers Road south of O'Shea Road is categorised as a 'collector' under Council's Road Register, however, the current cross-section will require modification to at the least provide a parking lane and footpath along the Minta Farm PSP frontage.

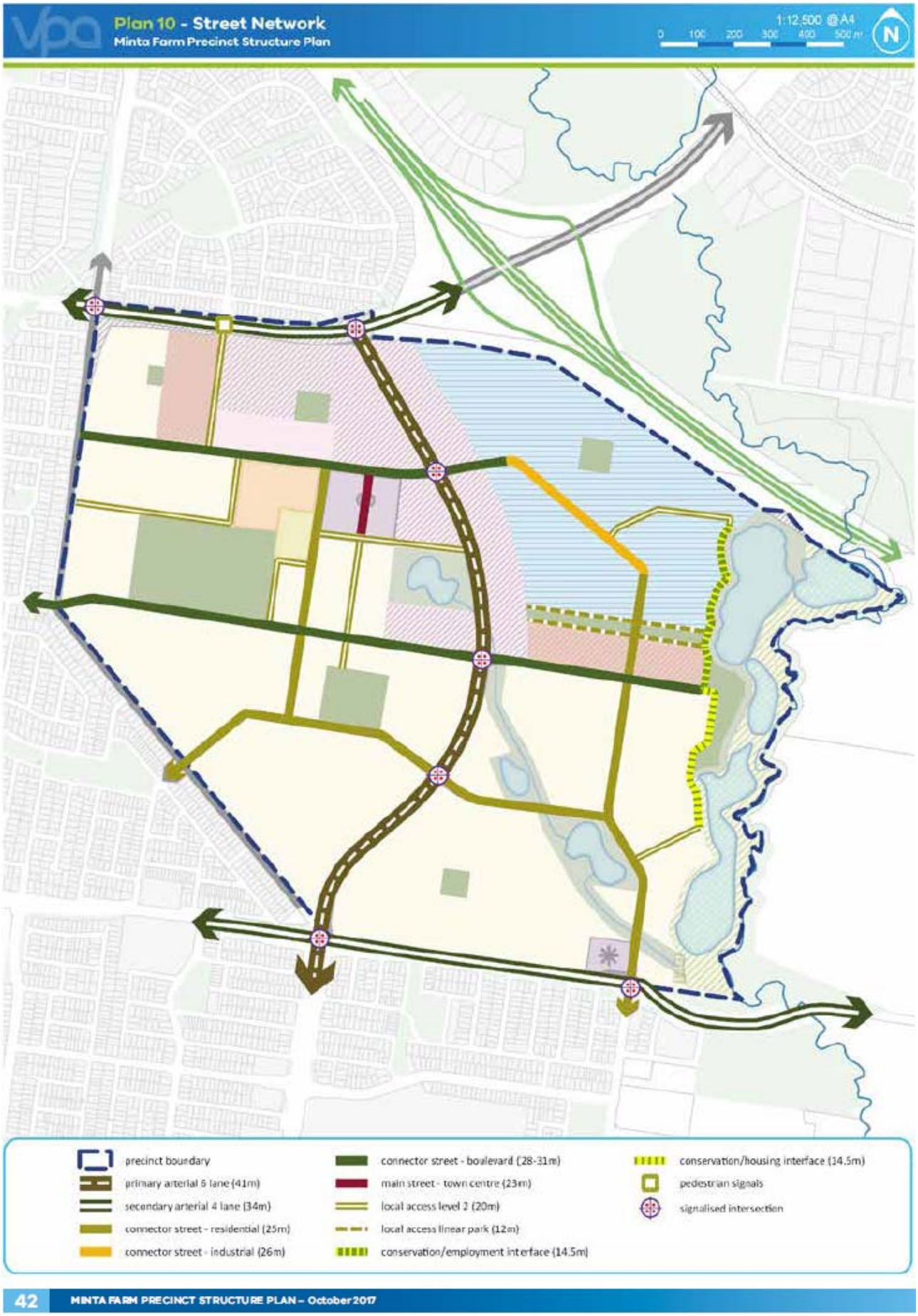
Soldiers Road is also nominated as a 'bus capable' route between O'Shea Road and Chase Boulevard. Bus capable streets typically have 3.5m wide travel lanes, which is wider than the existing construction of Soldiers Road along this section.

I am of the opinion that it would be preferable to nominate cross-section(s) for Soldiers Road within the PSP. The cross-section set out in the exhibited One Mile Grid Traffic Impact Assessment that accompanies the proposed Sect. 96A application would be suitable for inclusion in the PSP, noting that the 3.5m travel lanes would satisfy the dimensional requirements for the section north of Chase Boulevard to be 'bus capable'.

The PIP sets out that the southern end of Soldiers Road will be truncated as part of the construction of the North-South Arterial / Grices Road intersection (IN-05).

The Future Street Network Plan outlined in the exhibited PSP is reproduced in Figure 5-2.

Figure 5-2 Exhibited PSP – Future Street Network Plan



5.3 Future Public Transport and Path Networks

5.3.1 Public Transport Network

The exhibited PSP identifies the arterial and connector streets as bus capable roads.

Soldiers Road is also identified as a bus capable road between O'Shea Road and Chase Boulevard despite a cross-section not being set out in the exhibited PSP.

I also note that VicRoads Smart Roads framework map shows Soldiers Road as a future bus priority route down to Chase Boulevard.

5.3.2 Path Network

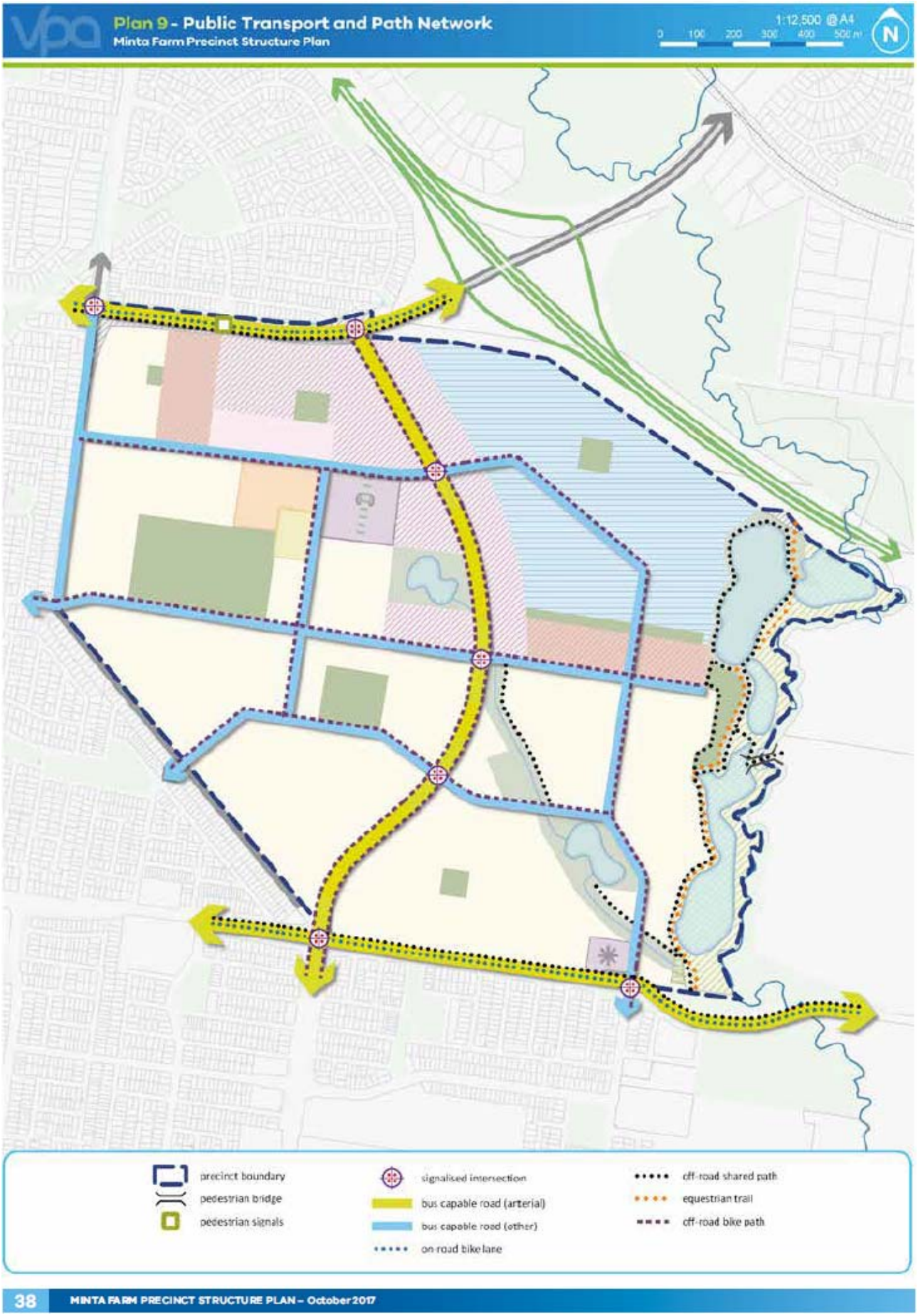
The exhibited PSP identifies the following bicycle and shared path infrastructure:

- North-South Arterial – Off-road bicycle paths are shown on both sides of the North-South Arterial as per the exhibited primary arterial cross-section.
- O'Shea Road – On-road bicycle lanes and an off-road shared path along the southern side (PSP frontage) are shown along the extension of O'Shea Road. It is noted that the shared path on the northern side (adjacent existing development) is not identified on the exhibited Public Transport and Path Network Plan.
- Grices Road – On-road bicycle lanes and an off-road shared path along the northern side (PSP frontage) are shown along Grices Road. It is noted that the shared path on the southern side (adjacent existing development) is not identified on the exhibited Public Transport and Path Network Plan.
- Connector Streets – Off-road bicycle paths are identified along the connector streets (one side only);
- Waterways – Off-road shared paths are identified along the constructed waterways adjacent to Cardinia Creek, with an equestrian trail also identified. A shared path bridge crossing of Cardinia Creek into the future Officer South Employment PSP is also identified mid-way along the eastern boundary of the precinct.

If the classification of O'Shea Road were to be amended to be a primary arterial as discussed in Section 5.2.2, the exhibited Public Transport and Path Network Plan would need to be amended to show off-road bicycle paths on both sides as per the exhibited primary arterial cross-section.

The Future Public Transport and Path Network Plan outlined in the exhibited PSP is reproduced in Figure 5-3.

Figure 5-3 Exhibited PSP – Public Transport and Path Network Plan



5.4 Precinct Infrastructure Plan – Transport Projects

The exhibited PSP includes the following transport projects in the PIP that will be funded by the Minta Farm ICP.

5.4.1 North-South Arterial (RD-01, RD-02, RD-03 & RD-04)

- *Purchase of land for a 6-lane arterial 41m wide road reserve (ultimate treatment); and*
- *Construction of 2-lane carriageway for 194m (interim treatment).*

5.4.2 North-South Arterial / O'Shea Road (IN-01)

- *Option 1: Purchase of land (ultimate treatment) and construction of a primary-to-primary signalised T-intersection (interim treatment)[3]; or*
- *Option 2: Purchase of land (ultimate treatment) and construction of a primary connection to the Beaconsfield Interchange (interim treatment)[4].*

Based on the information provided in a Victorian Government Media Release dated 18 March 2018, the extension of O'Shea Road and upgrade of the Beaconsfield Interchange should be completed by 2022. Accordingly, Option 1 would seem the more likely outcome based on the exhibited 1,000 lot cap for the delivery of the North-South Arterial.

5.4.3 North-South Arterial / East-West Connector (North) (IN-02)

- *Purchase of land (ultimate treatment); and*
- *Construction of an arterial to connector signalised 4-way intersection (interim treatment).*

5.4.4 North-South Arterial / East-West Connector (Central) (IN-03)

- *Purchase of land (ultimate treatment); and*
- *Construction of an arterial to connector signalised 4-way intersection (interim treatment).*

5.4.5 North-South Arterial / East-West Connector (South) (IN-04)

- *Purchase of land (ultimate treatment); and*
- *Construction of an arterial to connector signalised 4-way intersection (interim treatment).*

5.4.6 North-South Arterial / Grices Road (IN-05)

- *Purchase of land (ultimate treatment); and*
- *Construction of a modification to an existing intersection, including truncation of Soldiers Road and addition of new northern leg (interim treatment), to connect to the north-south arterial road.*

The PIP notes that the interim construction will be a roundabout that is apportioned 50% to Minta Farm PSP and 50% to Clyde North PSP. The interim construction of a roundabout treatment is consistent with the Clyde North DCP.

5.4.7 Grices Road / North-South Connector (East) (IN-06)

- *Purchase of land (ultimate treatment); and*
- *Construction of an arterial to connector signalised 4-way intersection (interim treatment).*

It is noted that the interim construction of Grices Road covered by the Clyde North DCP only extends to the intersection. Accordingly, the interim construction of IN-06 could be an unsignalised T-intersection, rather than a signalised cross-intersection, as there is no need to provide the east leg as part of the interim works associated with the PSP.

[3] At the time of delivery of IN-01 under the ICP, Option 1 will be funded if O'Shea Road is funded for construction OR Option 2 will be funded if O'Shea Road is not funded for construction.
[4] Land area being 0.53 ha plus land required within the PAO up to 0.5 ha.

5.4.8 Cardinia Creek Shared Path Bridge (BR-01)

> *Construction of a shared pedestrian and cyclist bridge over Cardinia Creek.*

The PIP notes that BR-01 will be apportioned 50% to Minta Farm PSP and 50% to Officer South Employment PSP.

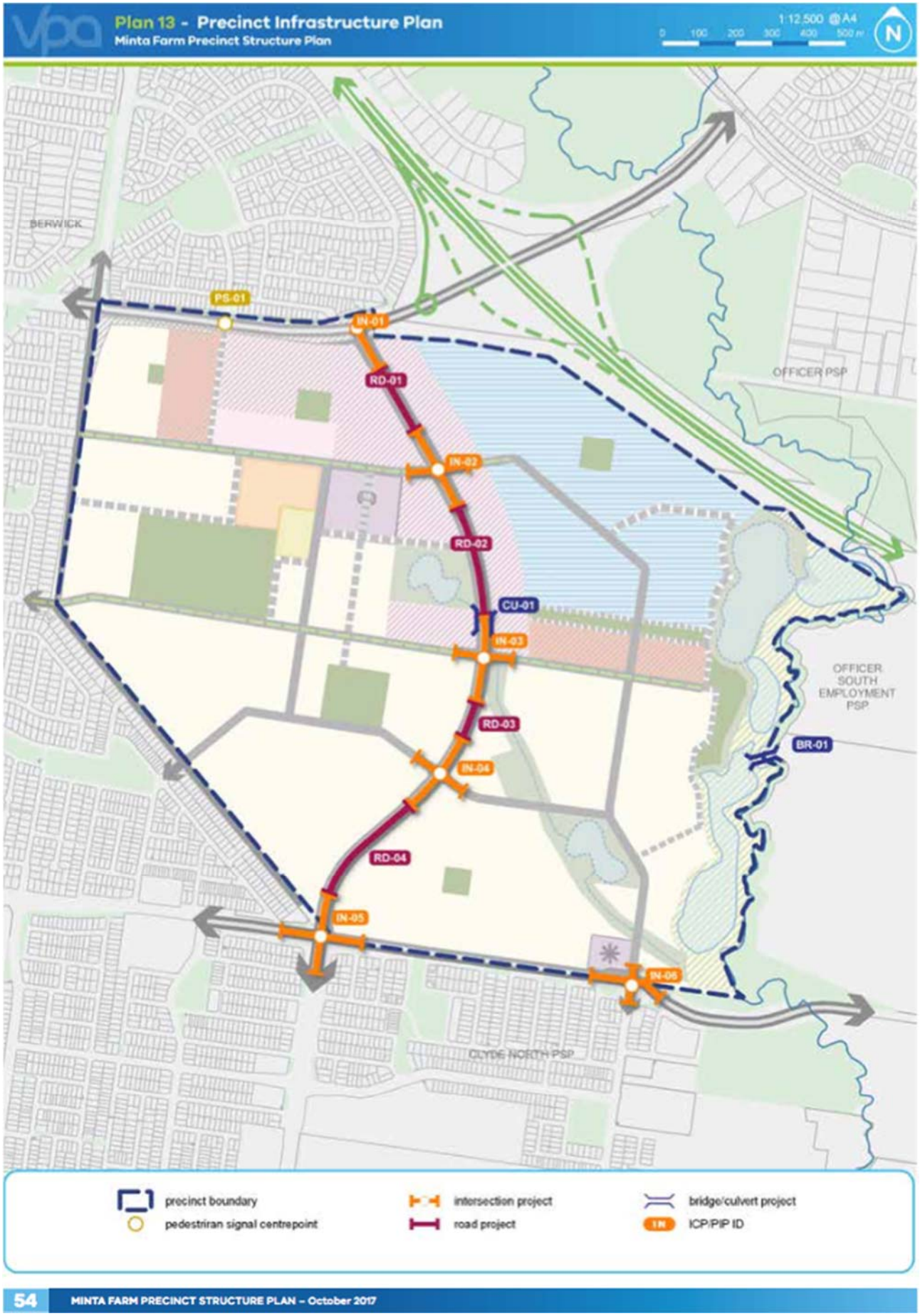
5.4.9 O'Shea Road Pedestrian Signals (PS-01)

> *Construction of pedestrian operated signals along O'Shea Road at Wordsworth Drive.*

The PIP notes that PS-01 will be apportioned 50% to Minta Farm PSP and 50% to Casey City Council.

The Precinct Infrastructure Plan outlined in the exhibited PSP is reproduced in Figure 5-4.

Figure 5-4 Exhibited PSP – Precinct Infrastructure Plan



5.5 Summary

The following sets out my recommendations regarding the exhibited Minta Farm PSP.

- Consideration should be given to amending the exhibited Street Network Plan set out in the PSP to show O'Shea Road as a six-lane primary arterial road rather than a secondary four-lane arterial road, with associated changes to the path network updated on the Public Transport and Path Network Plan.
- It would be preferable to show the classification of Soldiers Road on the Street Network Plan, with a 'bus capable' cross-section for Soldiers Road set out in the PSP.
- Consideration should be given to providing a left-in / left-out access to the North-South Arterial a short distance north of Grices Road to improve connectivity within the local network as an alternative to truncating Soldiers Road. This change could be resolved when the concept plans are updated for the Minta Farm ICP or alternatively during the subdivision design phase.
- Consideration should be given to amending the exhibited Land Use Budget and PIP to provide an unsignalised T-intersection at the Grices Road / Eastern Connector intersection (IN-06) given that the interim construction of Grices Road set out in the Clyde North DCP only extends to the eastern connector road and there is no need to provide the east leg as part of the interim works associated with the PSP.

6 Review of Exhibited Transport Documents

The following background transport documents were exhibited as part of Amendment C228 in relation to the Minta Farm PSP:

- Strategic Transport Modelling Assessment (Ultimate Scenario) – McPherson, Croskell and Minta Farm Precincts, prepared by Cardno, dated 31 August 2015[5].
- Traffic Engineering Assessment – Additional Traffic Modelling at Minta Farm PSP 11, prepared by Traffix Group, dated 5 September 2017.
- Minta Farm Precinct Structure Plan – Concept Road Design Report, prepared by Traffic Works, dated 5 October 2017.

My comments on the exhibited Cardno and Traffix Group assessments are set out below, with my comments on the ultimate concept plans prepared by Traffic Works detailed in Section 6.3.

6.1 Cardno Strategic Transport Modelling Assessment

The exhibited Cardno report includes an assessment of the volumes on the Minta Farm arterial and connector street network using the Victorian Integrated Transport Model (VITM) under ultimate development and road network conditions.

Whilst the preparation of interim modelling originally formed part of Cardno's brief, Section 6.2 of the report states that following consultation with VicRoads and Casey City Council it was decided that interim modelling was not required, with template intersection layouts to be adopted.

Interim and ultimate conditions for the South-East Growth Corridor were previously modelled by AECOM in July 2014 as part of the background studies undertaken for the Thompsons Road, Clyde Creek and Casey Fields South (Residential) PSPs.

The Cardno assessment refined the road network and zone structures of the Minta Farm PSP as well as the McPherson and Croskell PSPs. The Cardno assessment also updated the underlying population and employment forecasts for each precinct. Notable aspects of the Cardno and AECOM VITM models include:

- The AECOM interim model did not include the extension of O'Shea Road to the Beaconsfield Interchange (note: the Cardno report recommended that this be included in any updated interim model).
- The AECOM model adopted a population forecast of 4,823 residents (1,862 dwellings) for the Minta Farm Precinct compared to 8,067 residents (2,970 dwellings) adopted in the Cardno model (note: exhibited PSP states 7,988 residents and 2,853 dwellings).
- The AECOM model adopted an employment forecast of 11,569 jobs, including 442 retail jobs for the Minta Farm Precinct, compared to 10,229 jobs, including 1,124 retail jobs adopted in the Cardno model (note: exhibited PSP states 11,258 jobs, including 401 retail jobs).

While there are some relatively minor discrepancies between the Cardno ultimate model and the exhibited population and employment forecasts, I am of the opinion that the ultimate volumes provided by the model are suitable for determining ultimate road hierarchies and cross-sections.

6.1.1 O'Shea Road

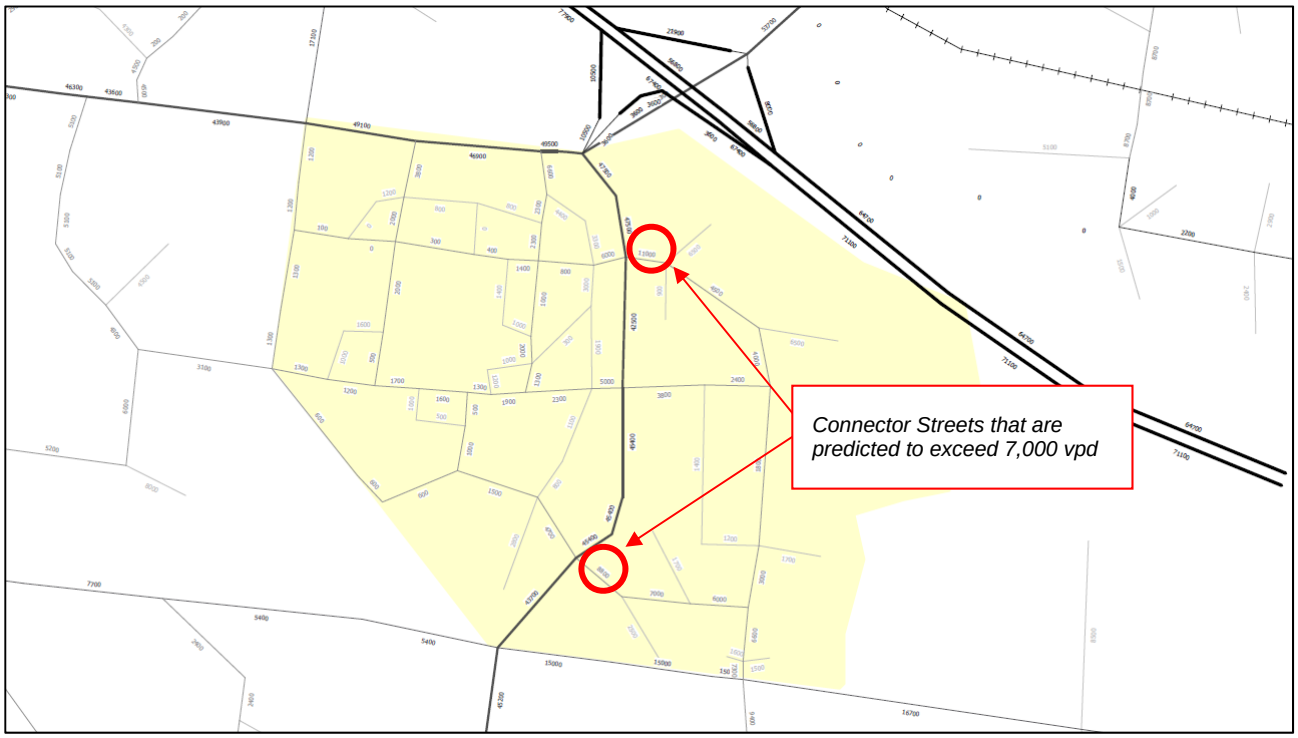
Ultimate volumes on the North-South Arterial and the O'Shea Road extension are comparable, with the roads predicted to carry 47,500 vpd and 49,500 vpd respectively in the vicinity of the Beaconsfield Interchange. Both roads were modelled as six-lane arterials (three-lanes in each direction) under ultimate conditions, however, it is noted that the PSP Street Network Plan nominates O'Shea Road as a four-lane secondary arterial[6].

[5] I was not involved in the preparation of the Strategic Transport Modelling Assessment for the McPherson, Croskell and Minta Farm Precincts.
[6] It is noted that the ultimate concept plans for the O'Shea Road / N-S Arterial intersection prepared by Traffic Works show a six-lane arterial cross-section along O'Shea Road.

6.1.2 Connector Streets

Volumes on connector streets within the Minta Farm Precinct are generally below the indicative environmental threshold for this class of road (i.e. 7,000 vpd), however, a couple of connector streets exceed the threshold for a short distance in the vicinity of their respective intersections with the North-South Arterial as shown in Figure 6-1. Subject to appropriate design of the ultimate intersections, I am satisfied that this will not affect the function or amenity of these streets.

Figure 6-1 Minta Farm PSP – Ultimate Volumes



6.1.3 Soldiers Road

Soldiers Road is predicted to carry 17,100 vehicles per day north of O'Shea Road, indicating that this section may need to be ultimately upgraded to a four-lane arterial road. Volumes on the section of Soldiers Road south of O'Shea Road are low (up to 1,300 vpd) following the truncation of Soldiers Road at Grices Road, indicating that this section of road will effectively become a local street, with the current connector street cross-section being underutilised.

In my opinion, Soldiers Road provides a strategic local connection across the Princes Freeway (via an overpass) to a number of health and education institutions, as well as the Berwick and Beaconsfield townships and railway stations. It is reasonable to expect that some traffic to / from the PSP areas located to the south of Minta Farm would use Soldiers Road to travel to / from the north side of the Princes Freeway.

Accordingly, I am of the opinion that the inclusion of a left-in / left-out access to the North-South Arterial a short distance north of the future Grices Road signals would be an appropriate alternative to simply truncating Soldiers Road. This connection would improve connectivity within the local network and provide an alternative route to the North-South Arterial, however, I note that this connection is not necessary from a road capacity perspective for the North-South Arterial to function satisfactorily.

6.1.4 Summary

With regard to the exhibited Cardno Strategic Transport Modelling Assessment, I am of the opinion that:

- The Cardno ultimate traffic modelling is generally 'fit-for-purpose' for determining the adequacy of the exhibited road network and ultimate hierarchy and cross-sections, with the road network and cross-sections set out in the exhibited Minta Farm PSP generally in accordance with the traffic modelling.
- Consideration should be given to amending the exhibited Street Network Plan set out in the PSP to show O'Shea Road as a six-lane primary arterial road rather than a secondary four-lane arterial road.

> Consideration should be given to including a left-in / left-out connection to Soldiers Road just north of Grices Road (approximately 100m north to provide a deceleration lane under ultimate conditions) instead of truncating Soldiers Road.

6.2 Traffix Group Traffic Impact Assessment

The exhibited Traffix Group assessment (dated 5 September 2017) aims to determine the level of development possible prior to the construction of the North-South Arterial.

The assessment did not take account of traffic growth on the surrounding road network, nor did it consider traffic generated by the approved Clyde Creek, Thompsons Road and Clyde North PSPs located to the south where development has already commenced.

Based on discussions with the VPA, I understand that the assessment omitted future traffic growth from the PSP areas to the south based on the assumptions agreed between the VPA and Council during the development of the Clyde North DCP that traffic would be distributed along Grices Road towards Clyde Road given the intention to truncate Soliders Road in the future.

Further, I understand that the intention of assessing Minta Farm Precinct in 'isolation' was to determine an equitable amount of traffic generation from the precinct based on pre-development of Clyde North PSP conditions.

The assessment also assumed that O'Shea Road will be duplicated between Clyde Road and Soldiers Road with signalised intersections at Clyde Road (upgraded), Skyline Way, Bridgewater Boulevard and Soldiers Road. The assessment did not consider the extension of O'Shea Road to the Beaconsfield Interchange.

I understand that the upgrade and extension of O'Shea Road and the upgrade of the Beaconsfield Interchange will be completed by 2022 as part of the Monash Freeway Upgrade Stage 2 works.

The following sets out my opinions regarding the assessment.

6.2.1 Soldiers Road

The key trigger identified in the assessment (and Casey City Council's submission) for the construction of the North-South Arterial is when volumes on Soldiers Road exceed 7,000 vpd[7]. It is noted that this daily volume does not reflect the actual capacity of the road, but instead reflects an indicative volume considered acceptable for amenity reasons for a collector street.

Traffic data relied upon for the assessment (recorded by Casey City Council between 2014 and 2016) indicated that Soldiers Road previously carried approximately 4,850 vpd north of Chase Boulevard. Updated traffic counts recorded by Traffix Group in March 2018 found that weekday traffic volumes have increased to 8,635 vpd along the same section of Soldiers Road[8].

Given that traffic volumes on Soldiers Road have already exceeded 7,000 vpd under existing conditions (i.e. without any development of the Minta Farm PSP) and are likely to continue to increase as development to the south continues, I consider that a lot cap derived from the notional threshold for a collector street to be simplistic and unrealistic for this PSP, particularly as the congestion that will be experienced along the Soldiers Road corridor will only be for a relatively short term.

6.2.2 Chase Boulevard

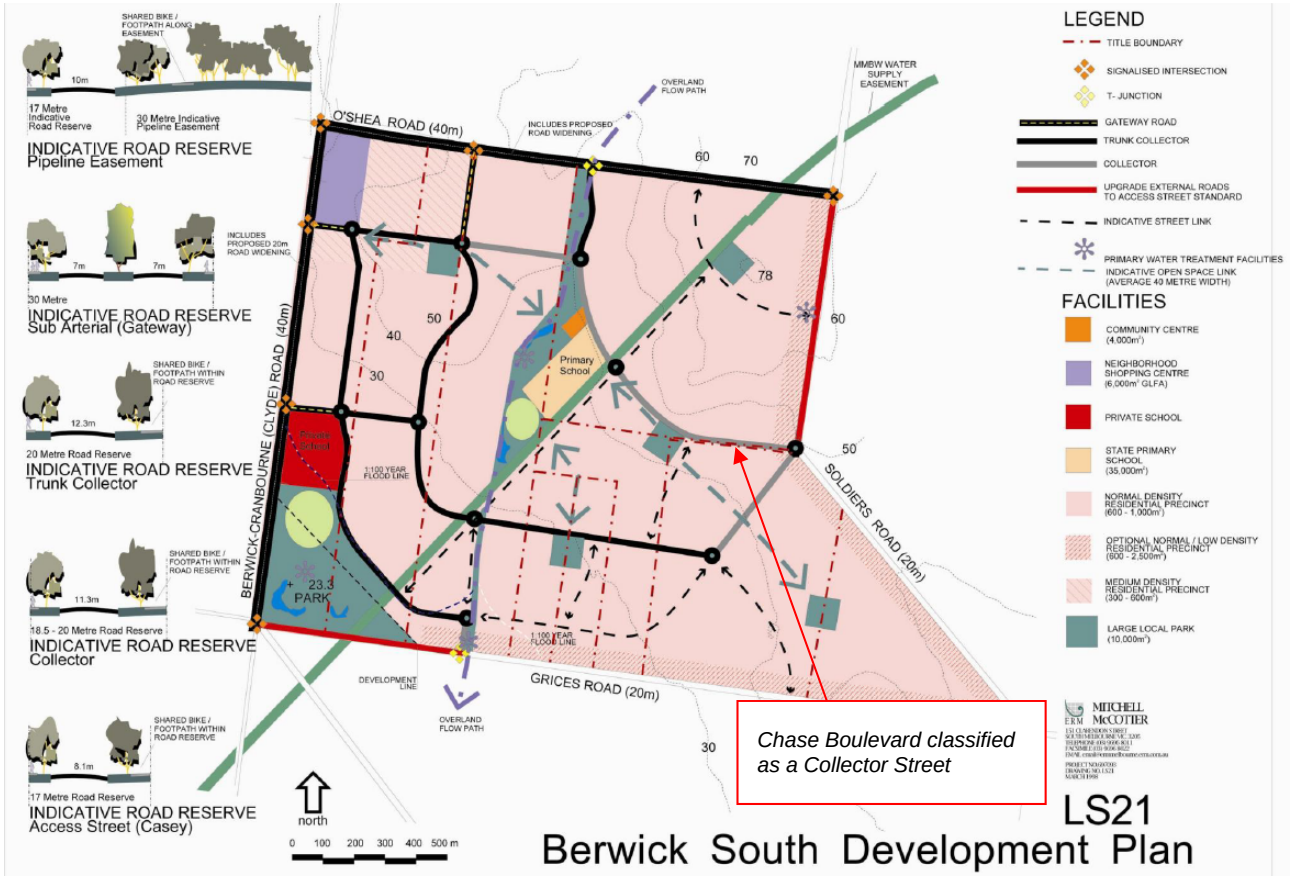
Chase Boulevard is categorised as a local street in Casey City Council's Road Register, however, as noted in the Traffix Group report the cross-section and role of Chase Boulevard within the local road network is more consistent with a connector street than a local street classification.

The Berwick South Development Plan that facilitated development of the land to the west of Soldiers Road (bound by O'Shea Road, Soldiers Road, Grices Road and Clyde Road) identifies Chase Boulevard as a collector street as shown in Figure 6-2.

Accordingly, I am satisfied that it would appropriate for volumes on Chase Boulevard to exceed 3,000 vpd.

7 Soldiers Road is categorised as a 'collector' street under Casey City Council's Road Register. Clause 56.06 of the Planning Scheme identifies a target volume of up to 7,000 vpd for a collector street, however, it is noted that this is not the actual capacity of the road.
8 Recent traffic volumes along Soldiers Road may have been affected by the upgrade works at the Clyde Road Interchange.

Figure 6-2 Berwick South Development Plan – Chase Boulevard Hierarchy



6.2.3 Traffic Generation

The traffic assessment adopted a daily traffic generation rate of 7.5 trips per lot.

This rate was adopted based on the 'first principles' assessment set out in the exhibited Cardno Strategic Transport Modelling Assessment, which set out a daily traffic generation rate of 10 trips per lot based on VISTA 09 data for the Casey LGA. A reduction factor of 25% was applied to reflect internal trips undertaken within the Minta Farm Precinct (i.e. to internal retail, schools and employment).

It is noted that the VISTA 09 traffic generation rate for the City of Casey is higher than other empirical data sources that Cardno and other consultants have recorded for outer metropolitan residential areas, which generally have a daily generation rate in the order of 7-9 vehicles per dwelling.

I have reviewed updated VISTA data from the 2012-2013 survey and believe that the rate obtained from the previous VISTA 09 survey for the City of Casey to be an anomaly (most likely due to a small sample size).

A traffic generation rate of 8 trips per lot would be consistent with recent assessments undertaken by Cardno for a number of projects, including assessments undertaken for the recent Planning Panel that considered Sunbury South and Lancefield Road PSPs.

6.2.4 Global Traffic Distribution

The traffic assessment distributes traffic based on 'Journey to Work' data recorded during the 2011 ABS Census.

It is noted that work related trips only comprise a proportion of daily residential trips, with residents also undertaking trips to shops, schools and other destinations. The distribution of these non-work trips is likely to be different to the 'Journey to Work' data used to derive the global traffic distribution and as such the traffic assessment probably overestimates the proportion of daily traffic to / from the North-West.

None-the-less, 'Journey to Work' data provides a reasonable basis to assess the distribution of traffic during the critical peak hours, with the peak hour volumes being more relevant when considering the actual capacity of Soldiers Road.

6.2.5 Localised Route Selection

The traffic assessment adopted three access points onto Soldiers Road, with different routes adopted for each access point. Access 1 is located adjacent to the Soldiers Road / Chase Boulevard roundabout. The exhibited PSP shows this connector street link being located on the north side of Stockland's boundary within land owned by The Minta Group. As such, it is unlikely that the initial development will take access via Access 1.

The 'sensitivity testing' set out at Section 4.5 of the Traffix Group report considered an alternative access scenario (Option 3) that did not include Access 1. The results of this scenario indicated that the increase in traffic volumes on Soldiers Road would be less than the original scenario that included Access 1 (7,247 vpd compared to 8,084 vpd). Volumes on Chase Boulevard would also be less than the original scenario (2,822 vpd compared to 2,990 vpd).

The assessment also did not distribute traffic to Chresthaven Boulevard as there was a missing link between Skyline Way and Bridgewater Boulevard at the time the report was prepared. This link has recently been constructed and is expected to be fully operational by the time initial development within the Minta Farm PSP commences. The distribution of traffic onto Chresthaven Boulevard has been addressed in the updated assessment included in Mr Will de Waard's evidence statement.

In my opinion, the non-distribution of traffic to the Chresthaven Boulevard signals results in an over-distribution to the Meadowland Way signals, with the SIDRA assessment likely overestimating the future DOS at the Meadowland Way signals. Overall, I would expect that traffic will distribute between the Clyde Road intersections based on the operating conditions (i.e. queues and delays) at each intersection.

6.2.6 Summary

With regard to the exhibited Traffix Group Traffic Impact Assessment, I am of the opinion that:

- The underlying basis of the assessment (i.e. to derive a lot cap from the notional threshold for Soldiers Road) is flawed as traffic volumes on Soldiers Road have already exceeded 7,000 vpd and will continue to increase regardless of the development of Minta Farm PSP.
- It would be reasonable to classify Chase Boulevard as a connector street and allow volumes to exceed 3,000 vpd.
- A traffic generation rate of 8 trips per lot would be more appropriate to assess the initial development of Minta Farm PSP (compared to the 7.5 trips per lot rate that was adopted in the Traffix Group report).
- The local traffic distribution is more likely to be consistent with Option 3 of the 'Sensitivity Testing' set out at Section 4.5 of the Traffix Group report, which identified a lesser increase in volumes on Soldiers Road.
- Adoption of a traffic generation rate of 8 trips per day in combination with the 'Option 3' local traffic distribution would result in the initial 1,000 lots generating an increase of approximately 2,550 vpd on Soldiers Road north of Chase Boulevard.
- It would be reasonable to distribute some traffic to the Cresthaven Boulevard signals, which would lessen the impact at the Meadowland Way signals.
- Traffic at the Clyde Road intersections is likely to distribute relatively evenly based on the operating conditions (i.e. queues and delays) at each intersection.

The items identified above have been addressed in the updated traffic assessment set out in the expert evidence statement prepared by Mr Will de Waard of Traffix Group.

6.3 Concept Intersection Designs

The exhibited PSP includes concept layout plans for ultimate treatments at the six intersections outlined in the PIP that will be included in the future Minta Farm ICP.

The ultimate concept plans were prepared by Traffic Works, with the plans and associated covering report (Concept Road Design Report, dated 5 October 2017) exhibited as part of the background studies for Amendment C228.

I understand that Traffix Group is currently undertaking additional analysis to refine the ultimate layouts for the Minta Farm ICP.

7 Sect. 96A Application

A Sect. 96A application for the subdivision of 231 residential lots has been made by Stockland.

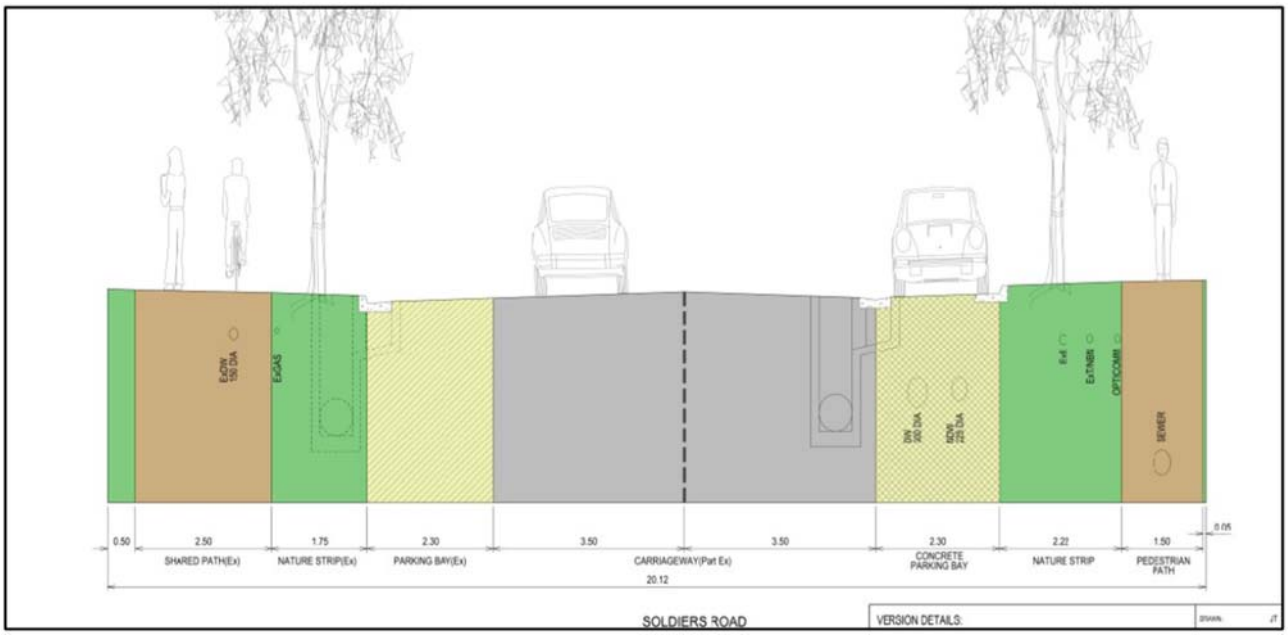
The proposed subdivision is located on the north-east side of Soldiers Road (between Grices Road and Chase Boulevard, with access to an internal street network proposed via a roundabout and collector street (identified in the exhibited PSP) located opposite Hazelnut Boulevard. The application also includes 38 lots that front and take direct access to Soldiers Road.

The application was accompanied by a Traffic Impact Assessment prepared by One Mile Grid (dated 4 October 2017) that was exhibited as part of Amendment C228. My opinions regarding the traffic engineering aspects of the Sect. 96A application are set out below.

7.1 Soldiers Road Upgrade

The traffic assessment indicates that Soldiers Road will be upgraded along the proposed subdivision's frontage by providing a parallel parking lane on the north-east side of the existing carriageway, with a footpath also provided along the frontage. The cross-section presented in the report (reproduced in Figure 7-1) also shows a 7.0m carriageway between parking lanes, representing a widening of the existing carriageway.

Figure 7-1 Proposed Soldiers Road Cross-Section



In my view, this cross-section would be suitable to adopt for length of Soldiers Road south of O'Shea Road.

7.2 Direct Frontage Lots

The updated traffic counts undertaken by Traffix Group indicate that Soldiers Road currently has a weekday volume of 7,873 vpd to the north and 5,829 vpd to the south of the proposed subdivision.

Given that volumes on Soldiers Road are likely to continue to increase due to the development of land located to the south of the Minta Farm PSP, I am of the opinion that it would be preferable to withhold lots directly fronting Soldiers Road until after the North-South Arterial has been constructed and Soldiers Road has been truncated (i.e. lots would only be accessed via internal streets during initial development).

This would reduce side friction and increase the capacity of Soldiers Road during the period of initial development. If deemed necessary, planning approval for the Sect. 96A application (and any other subdivisions that abut Soldiers Road) could include a condition to this effect.

It would also allow an interim cross-section to be implemented along Soldiers Road that uses the parking lane along the Minta Farm frontage as the through lane, enabling a painted median to be provided for vehicles accessing existing properties along the west / south-west side of Soldiers Road. If an interim cross-

section were implemented in this manner it would improve safety and traffic flow along Soldiers Road during the development of the initial 1,000 lots prior to the construction of the North-South Arterial.

7.3 Traffic Impact

If a traffic generation rate of 8 trips per dwelling was adopted, the proposed subdivision would generate in the order of 1,850 vpd onto Soldiers Road (assuming that no traffic is distributed into the adjacent residential street network via Hazelnut Boulevard).

These additional trips will be split between the north and south of the proposed site access meaning that the increase on any one point along Soldiers Road will be less.

I am satisfied that traffic generated by the proposed subdivision can be accommodated onto Soldiers Road, however, the application sets the starting point for future development to follow up to the 1,000 lot cap prior to the construction of the North-South Arterial.

7.4 Summary

With regard to the proposed Sect. 96A application, I am of the opinion that:

- The Soldiers Road cross-section set out in the One Mile Grid report would be suitable to adopt for the length of Soldiers Road south of O'Shea Road.
- It would be preferable to withhold lots directly fronting Soldiers Road until after the North-South Arterial has been constructed and Soldiers Road has been truncated (i.e. lots would only be accessed via internal streets during initial development).
- An interim cross-section could be implemented along Soldiers Road that uses the parking lane along the Minta Farm frontage as the through lane, enabling a painted median to be provided for vehicles accessing existing properties along the west / south-west side of Soldiers Road thus improving safety and traffic flow prior to the construction of the North-South Arterial.
- Traffic generated by the proposed subdivision can be accommodated onto Soldiers Road.

8 Regional Development Context

8.1 Future Transport Network

The South-East Growth Corridor Plan was published in 2011 by the Growth Areas Authority. It provides an integrated high level plan of the future land use and transport strategy for the south-east growth corridor.

The Growth Corridor Plan indicates that Soldiers Road was intended to be an arterial from the freeway overpass to Chase Boulevard, with a new east-west arterial connecting to the North-South Arterial. This route was also identified as being part of the future Principle Public Transport Network facilitating access from the North-South Arterial to the north side of the Princes Freeway.

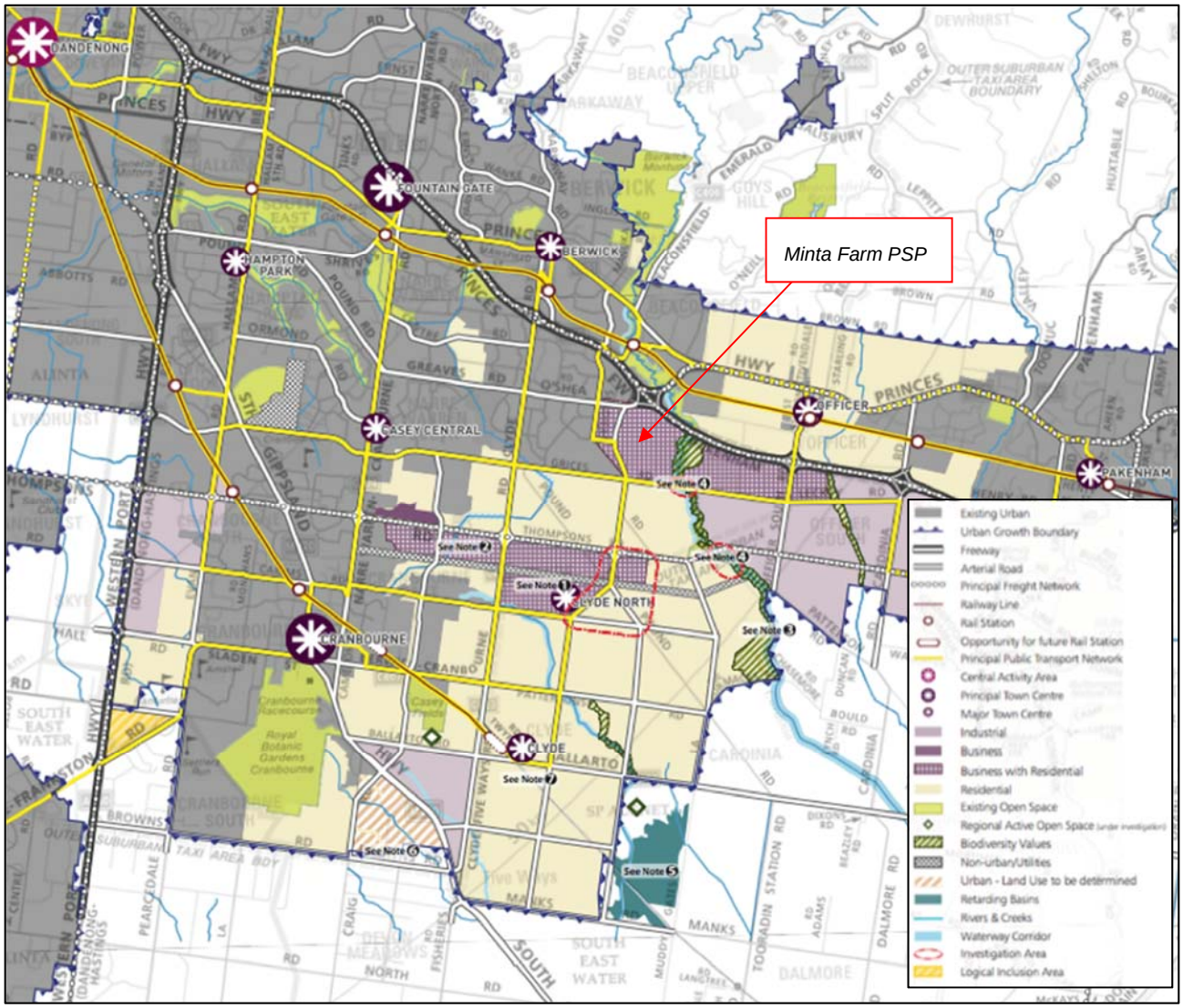
It is noted that the exhibited Street Network Plan does not classify Soldiers Road, however, the exhibited Public Transport and Path Network Plan identifies the section of Soldiers Road between O'Shea Road and Chase Boulevard as a bus capable road.

My understanding is that Soldiers Road (south of O'Shea Road) will remain a local road under the control of Council. This is supported by the Strategic Transport Modelling undertaken by Cardno, which found volumes on Soldiers Road were equivalent to a local access street (less than 1,300 vpd).

The Growth Corridor Plan also shows the North-South Arterial splitting into two separate arterials south of Thompsons Road, whereas the gazetted Thompsons Road and Clyde Creek PSPs have the North-South Arterial continuing into Bells Road.

An excerpt of the South-East Growth Corridor Plan is presented in Figure 8-1.

Figure 8-1 South-East Growth Corridor Plan



8.2 Approved PSPs

The Minta Farm PSP is located within the South-East Growth Corridor.

A number of approved PSPs are located to the south of Minta Farm, including the following:

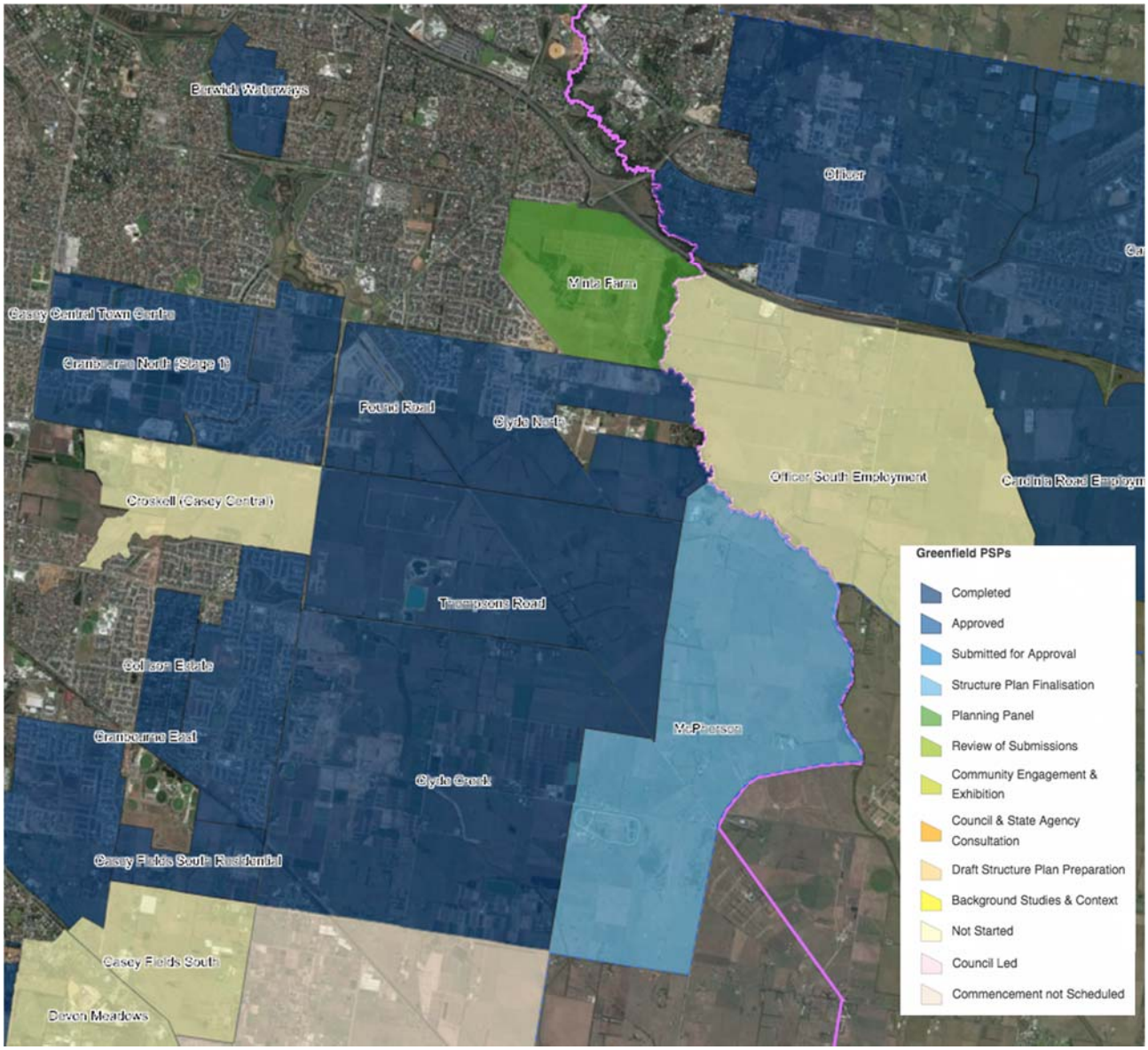
- Clyde North PSP – gazetted November 2011
- Thompsons Road – gazetted November 2014
- Clyde Creek PSP – gazetted November 2014

The McPherson PSP located to the south-east is also currently being finalised, with the Panel Report published in December 2017.

Planning work for the Officer South Employment PSP (located to the east) and the Clyde South PSP (located further south) have not yet commenced.

The current status of PSPs in the vicinity of the Minta Farm PSP (shown in green) is presented in Figure 8-2.

Figure 8-2 PSP Status Map



8.3 Road Upgrades

8.3.1 Clyde Road Interchange and Monash Freeway Upgrade

Upgrade works (including associated traffic management measures) commenced in September 2017 at the Clyde Road Interchange, with completion expected in April 2018.

Post-completion of the upgrade works, double left and double right turn lanes will be provided onto the Melbourne-bound freeway ramp, with four lanes provided on the approach to the ramp-metering stop line and two merge lanes provided onto the freeway.

The Monash Freeway Stage 1 Upgrade also includes an additional traffic lane in each direction along the Princes Freeway (from two to three lanes).

The additional capacity at the Clyde Road interchange, in combination with the added lanes on the Monash Freeway, is likely to result in traffic flows re-calibrating following the completion of works, potentially resulting in reduced volumes on Soldiers Road.

8.3.2 O'Shea Road Extension & Beaconsfield Intersection Upgrade

Stage 2 of the Monash Freeway upgrade was announced by the Victorian Government in March 2018.

The Media Release (dated 18 March 2018) that accompanied the announcement indicates that the extension of O'Shea Road and upgrade of the Beaconsfield Interchange will be upgraded as part of the package of works with completion expected by 2022.

8.3.3 Glasscocks Road Extension

Glasscocks Road currently has a number of unfinished sections, including the western end of the section between Clyde Road and Narre Warren – Cranbourne Road.

The lack of east-west connectivity provided by Glassocks Road, as well as the current unsealed condition of Thompsons Road east of Clyde Road, would seem to be concentrating east-west traffic on O'Shea Road (i.e. away from Grices Road) and consequently drawing more traffic up Soldiers Road. This is evidenced by a higher proportion of left turn movements into O'Shea Road from Soldiers Road during the AM peak hour, as well as the relativity high proportion of east-west through movements from O'Shea Road to Greaves Road at the Clyde Road intersection.

A Public Acquisition Overlay is in place for the missing section, however, information provided by Casey City Council to the VPA indicates that there is currently no time frame for the delivery of the missing section of Glasscocks Road between The Promenade and Narre Warren – Cranbourne Road.

In contrast, construction on the section between Sherwood Road and South Gippsland Highway is likely to commence next financial year.

In my opinion, the completion of Glasscocks Road between Clyde Road and Narre Warren – Cranbourne Road should be a priority to improve east-west connectivity in the sub-regional road network and to reduce flows on Soldiers Road and O'Shea Road.

8.4 Indicative Development and Infrastructure Timelines

To understand the timeframes for future development and transport infrastructure located to the south of the Minta Farm PSP, I have been provided with Staging Plans prepared by Casey City Council for the Clyde North DCP and Clyde DCP areas.

The staging plans set out Council's expectations on short (1-3 years), medium (4-5 years) and long term (6+ years) development and infrastructure projects.

The staging plans identify the extension of the North-South Arterial down to Hardys Road as being a short-term project.

Hardys Road (between Tuckers Road and the North-South Arterial), as well as Tuckers Road are identified as short-term projects. The section of Hardys Road connecting to Berwick – Cranbourne Road (Clyde Road) is identified as having funding secured, however, it is not clear whether this implies it is also a short-term project.

If the section of Hardys Road between Berwick – Cranbourne Road and Hardys Road were not a prioritised as a short-term project, it could potentially result in a higher proportion of traffic flowing from Tuckers Road into the North-South Arterial and then onto Soldiers Road in the short-term.

I note that Thompsons Road is shown as a long-term project on the Clyde North DCP Staging Plan. The Clyde North DCP includes the interim construction (two-lane carriageway) of Thompsons Road between Berwick-Cranbourne Road and Soldiers Road, with the DCP identifying the construction of the North-South Arterial as the indicative trigger for the interim upgrade.

In contrast to the DCP Staging Plan, Thompsons Road is currently constructed with a sealed carriageway for approximately 2.5km east of Berwick-Cranbourne Road to the future alignment of the North-South Arterial. The current construction would seem to satisfy the DCP works for Thompsons Road.

VicRoads have recently announced upgrade works to Thompsons Road to duplicate the route between the Mornington Peninsula Freeway and Berwick-Cranbourne Road. Consequently, it is assumed that the long-term project identified in Council's DCP Staging Plan may be the future duplication by VicRoads of the route to the North-South Arterial.

As a general principle, the east-west links and associated intersections on Clyde Road and Berwick – Cranbourne Road should be upgraded prior to or at the same time as the new sections of the North-South Arterial are constructed to ensure that traffic is directed towards Clyde Road as much as possible in the short-term prior to the connection of the North-South Arterial to O'Shea Road extension and the Beaconsfield Interchange.

A potential measure to control the increase in traffic volumes on Soldiers Road in the short-term would be to not connect (or provide traffic management measures to restrict) the north leg of the North-South Arterial at the intersection with Thompsons Road.

The Staging Plans for Clyde North DCP (dated August 2017) and Clyde DCP (dated March 2018) are reproduced in Figure 8-3 and Figure 8-4.

Figure 8-3 Clyde North DCP Staging Plan

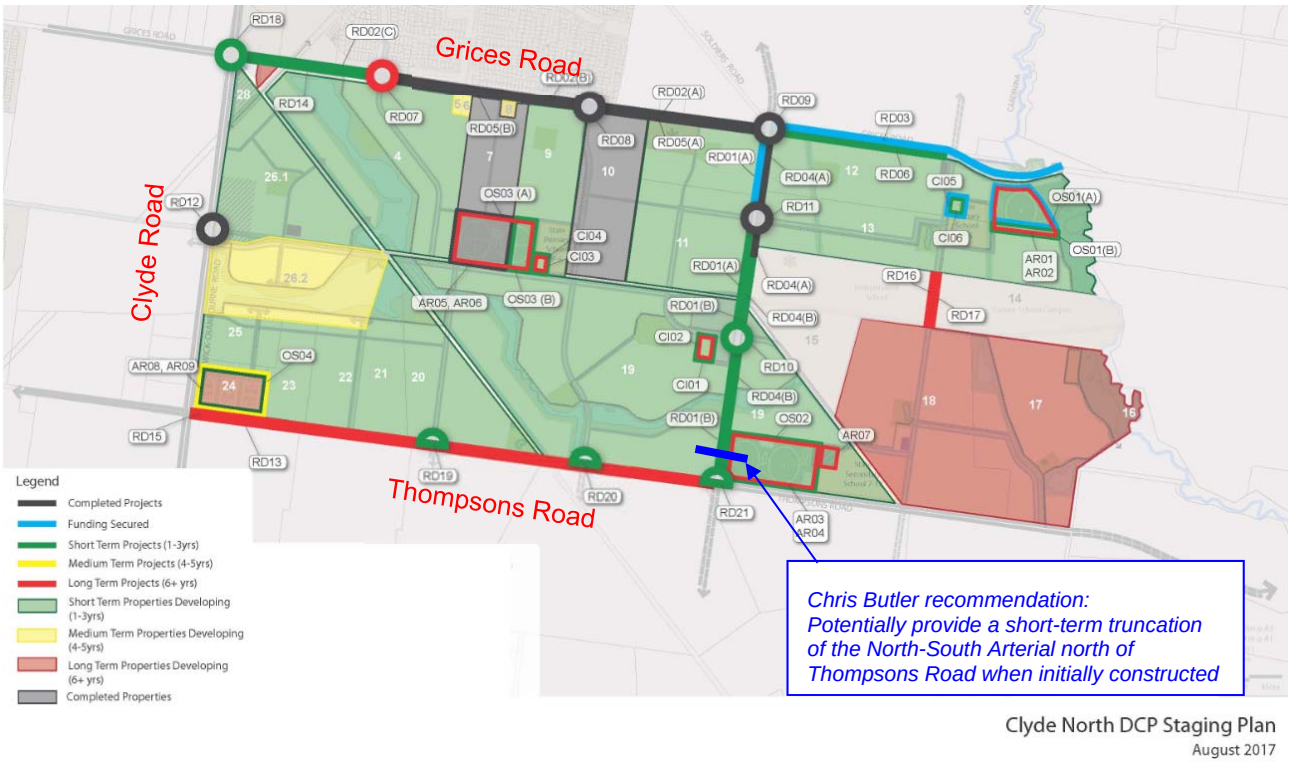
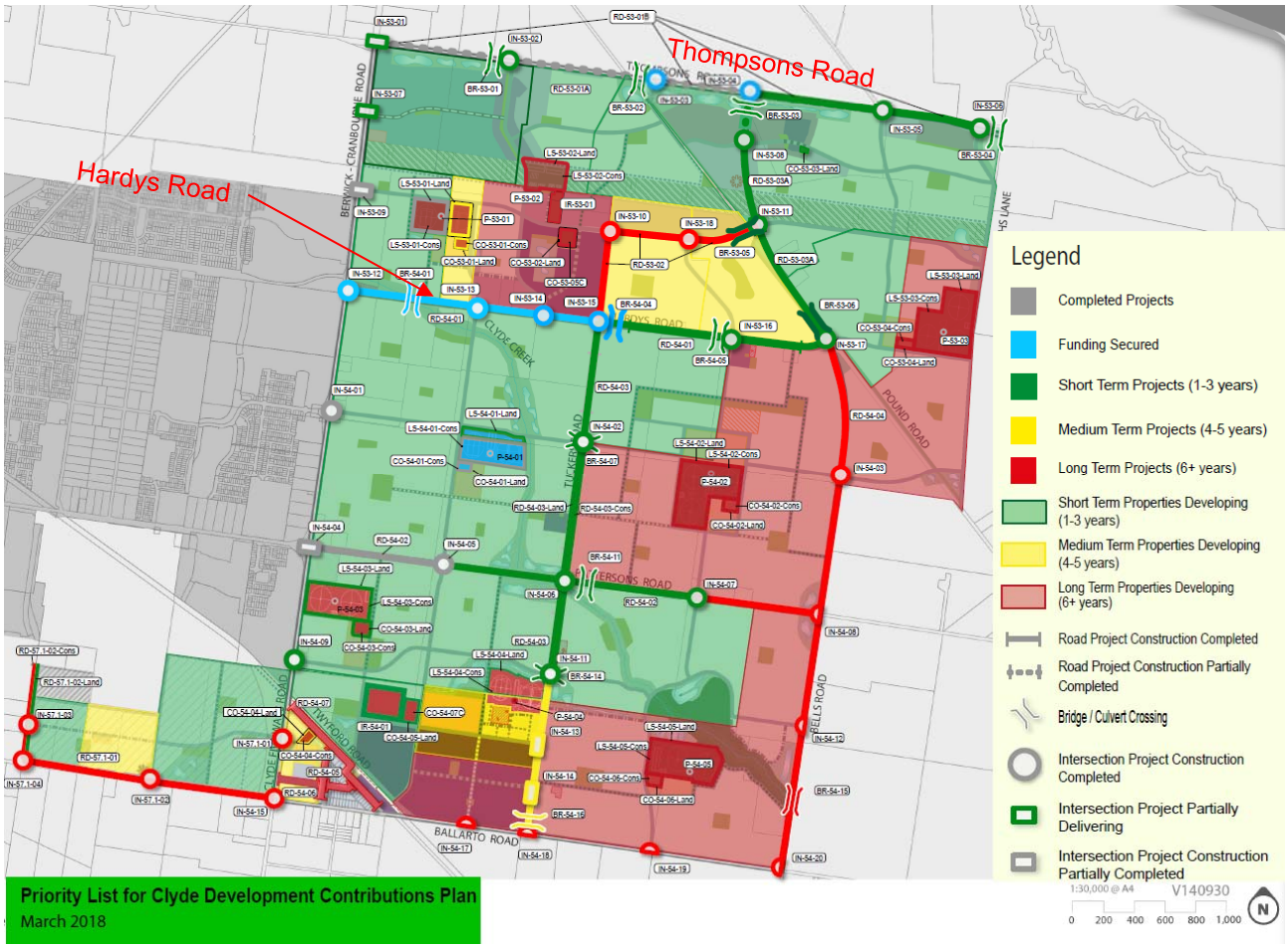


Figure 8-4 Clyde DCP Staging Plan



9 Traffic Assessment

9.1 Soldiers Road Capacity

9.1.1 Existing Intersection Performance

The following sets out a SIDRA assessment of the performance of intersections along Soldiers Road based on traffic data detailed in Section 4.3.2. The key outputs of SIDRA are:

- Degree of Saturation: ratio of traffic volume compared to capacity, with a ratio of up to 0.90 - 0.95 considered acceptable for a signalised intersection.
- Average delay: the delay time (on average) for vehicles making a particular movement.
- 95th %-ile queue: the queue length that has a 5% probability of being exceeded during the hour.

The results of the SIDRA Intersection analysis for existing volumes is set out below.

9.1.1.1 AM Peak Hour

The existing intersection performance along Soldiers Road during the AM peak hour is set out in Table 9-1.

Table 9-1 Existing Conditions SIDRA Results – AM Peak Hour

Intersection	Approach	Degree of Saturation	Average Delay	95th %-ile Queue
Soldiers Road / O'Shea Road	South	0.355	2.9 sec	Nil
	North	0.587	9.6 sec	6.3 veh
	West	0.120	6.9 sec	0.5 veh
Soldiers Road / Chase Boulevard	South	0.438	4.9 sec	3.4 veh
	North	0.333	5.7 sec	2.4 veh
	West	0.207	10.6 sec	1.2 veh
Soldiers Road / Grices Road	South	0.451	5.0 sec	3.5 veh
	East	0.216	12.7 sec	1.4 veh
	North	0.495	8.1 sec	4.0 veh
	West	0.535	11.4 sec	4.4 veh

9.1.1.2 PM Peak Hour

The existing intersection performance along Soldiers Road during the PM peak hour is set out in Table 9-2.

Table 9-2 Existing Conditions SIDRA Results – PM Peak Hour

Intersection	Approach	Degree of Saturation	Average Delay	95th %-ile Queue
Soldiers Road / O'Shea Road	South	0.270	1.6 sec	Nil
	North	0.594	7.3 sec	6.9 veh
	West	0.286	7.3 sec	1.3 veh
Soldiers Road / Chase Boulevard	South	0.310	5.1 sec	11.6 veh
	North	0.305	5.5 sec	12.8 veh
	West	0.102	8.0 sec	3.2 sec
Soldiers Road / Grices Road	South	0.262	4.6 sec	1.6 veh
	East	0.059	8.6 sec	0.3 veh
	North	0.228	5.9 sec	1.4 veh
	West	0.192	7.6 sec	1.1 veh

9.1.1.3 Summary

The above results indicate that each intersection is currently operating within acceptable limits for existing traffic volumes during both peak hours.

It is noted that the above queue lengths refer to the 95th percentile queue and consequently they differ from the maximum queue lengths that were recorded over a two-hour timeframe at the same time as the traffic surveys.

9.1.2 Sensitivity Testing

In order to establish the practical capacity of Soldiers Road, a sensitivity analysis has been undertaken in SIDRA.

The sensitivity analysis has adopted a constant scale factor for all movements until the Degree of Saturation for the critical movement reaches capacity, with the following exceptions:

- Soldiers Road / O'Shea Road – no traffic growth on the right turn movement from north to west leg (both peaks).
- Soldiers Road / Grices Road – no traffic growth on the right turn movement from west to south leg (AM peak only).

The basis for these assumption is discussed below.

9.1.2.1 Soldiers Road / O'Shea Road Constraints

A review of the Soldiers Road / O'Shea Road intersection indicates that the right turn movement from the north into O'Shea Road is the critical movement. Given that future development is primarily located to the south of the intersection, I would expect negligible growth in the right turn movement relative to through movements on Soldiers Road.

I also note that the existing right turn volume recorded during the surveys may not represent normal conditions given that the right turn lanes at the Clyde Road interchange were closed at the time of the surveys. It would be reasonable to expect that some motorist diverted their trip down Soldiers Road and across O'Shea Road to access the interchange from the south.

9.1.2.2 Soldiers Road / Grices Road Constraints

A review of the Soldiers Road / Grices Road intersection indicates that the critical movement is the right turn from the west leg to the south during the AM peak hour. Having regard to the surrounding land uses, it would appear that most of this traffic is associated with the Hillcrest Christian College. Similar to the Soldiers Road / O'Shea Road intersection, this movement is likely to experience a lesser increase compared to Soldiers Road.

I also note that school based traffic have the ability to divert their trip via Macumba Drive and Viewbright Road to access the traffic signals located south of the roundabout.

9.1.2.3 Sensitivity Analysis

The growth rates produced by the sensitivity testing are set out in Table 9-3.

Table 9-3 Sensitivity Analysis SIDRA Results – Traffic Growth Factor to Capacity

Intersection	AM Peak Hour	PM Peak Hour
Soldiers Road / O'Shea Road	146%	166%
Soldiers Road / Chase Boulevard	188%	268%
Soldiers Road / Grices Road	188%	286%

The capacity of Soldiers Road / O'Shea Road intersection could be further increased by providing a right turn lane on the north leg Soldiers Road. This measure would improve safety and increase capacity of southbound traffic movements.

In my opinion, the upgrade of this intersection to include a right turn lane on the north leg is warranted based on existing conditions regardless of the development of the Minta Farm PSP.

If this measure were implemented by Council, it would increase capacity to approximately 164% - 206% of existing volumes during the AM and PM peaks respectively.

Quantifying the above peak hour increase into a daily increase is not a linear exercise as the increase in volumes is likely to result in a redistribution of traffic on the network, as well as the redistribution of traffic over the day (i.e. the duration of the peak period extending).

Having regard to the above considerations and the results of the sensitivity analysis, I would expect the practical capacity of Soldiers Road to be approximately 15,000 – 18,000 vpd.

9.2 External Traffic – Clyde North and Thompson Road PSPs

9.2.1 Traffic Generation and Yield

For the purpose of my assessment, I have adopted a daily traffic generation rate of 8 movements per lot.

The Clyde North and Thompson Road PSPs provide indicative lot yields for each property (equivalent to a yield of 16 lots per net developable hectare).

I have adopted these lot yields for land identified as short-term development within Council's DCP Staging Plans, with an indicative catchment area applied to the land situated along the North-South Arterial. The catchment areas are shown in Figure 9-1 and Figure 9-2.

Existing development within the Clyde North and Thompson Road PSPs was then deducted based on estimates made from aerial photography.

Based on the above assumptions, in the order of 2,250 lots would be expected to be developed in the short-term within the Clyde North and Thompson Road PSPs.

Figure 9-1 Assumed North-South Arterial Catchment – Clyde North PSP

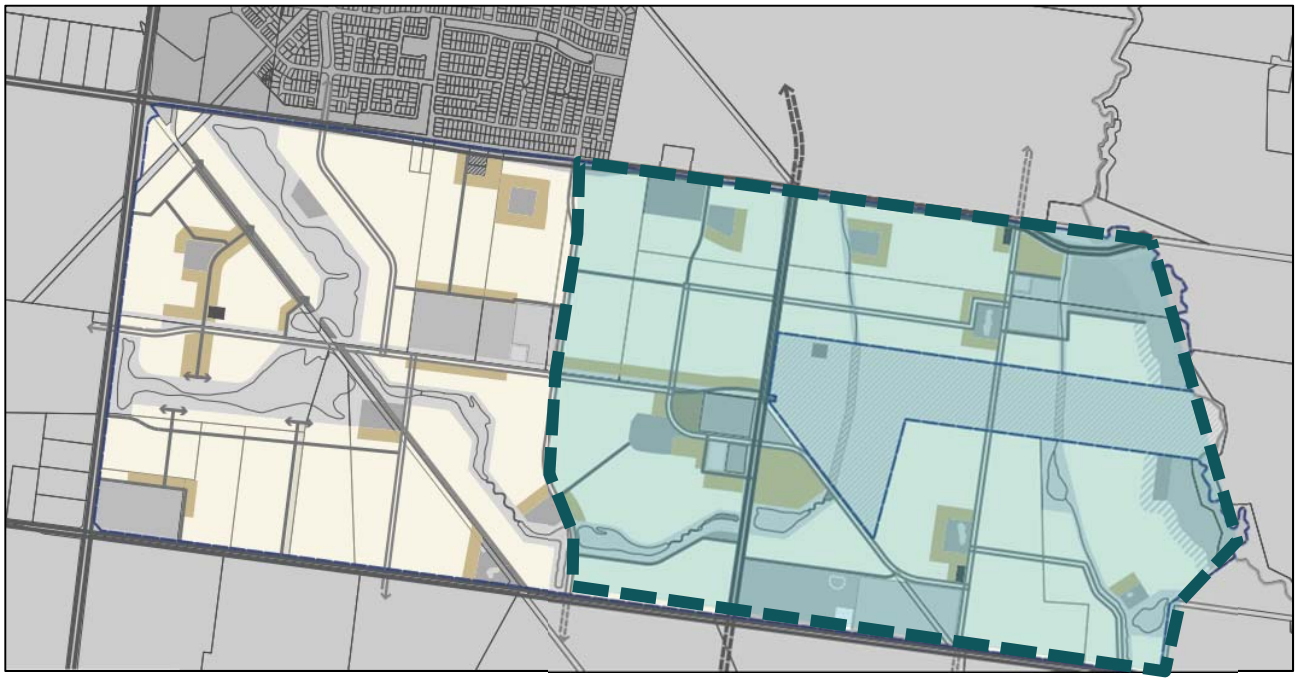
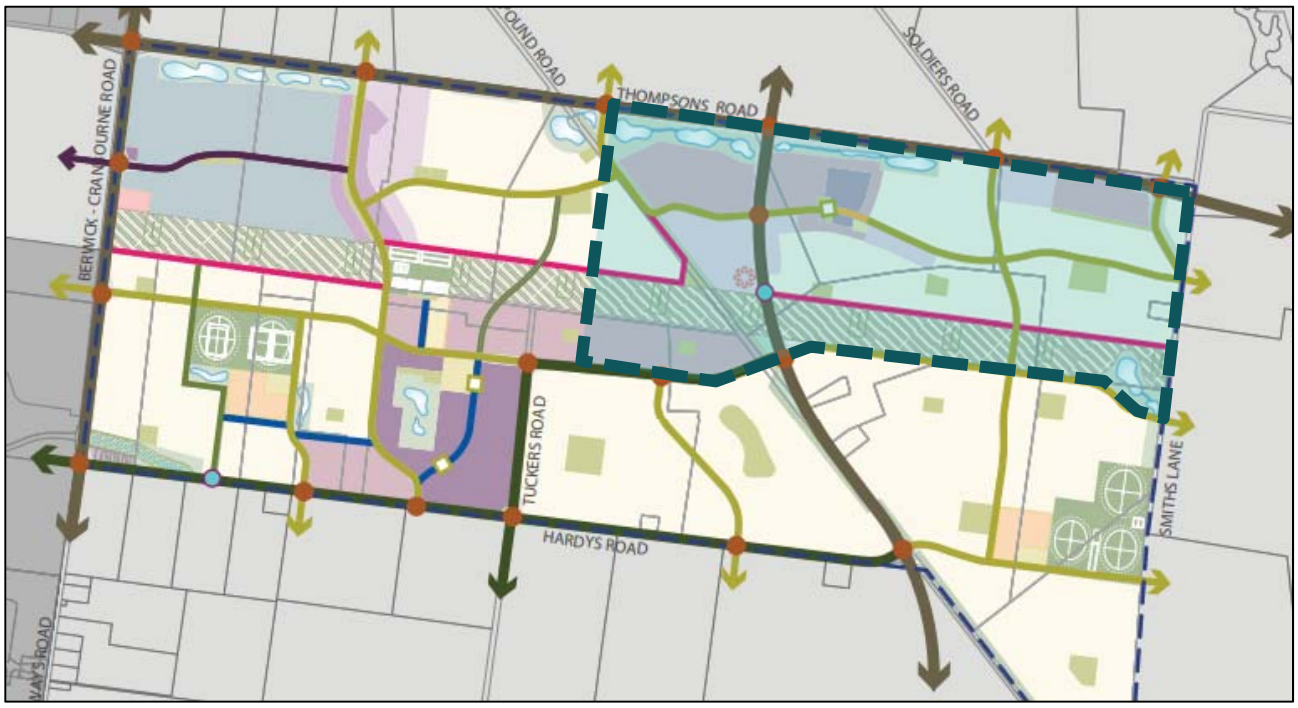


Figure 9-2 Assumed North-South Arterial Catchment – Thompsons Road PSP



9.2.2 Traffic Distribution

To inform the distribution of traffic, I have sourced 'trip purpose' data for outer metropolitan Melbourne recorded in the VISTA 2013 survey[9].

The proportion of trips on Soldiers Road has then been estimated by applying differing proportions for trip type based on Journey to Work data and the locations of shops, schools, etc.

The adopted assumptions are detailed in Table 9-4.

Table 9-4 Clyde North and Thompson Road PSPs – Traffic Distribution onto Soldiers Road

Trip Type	Percentage of Daily Trips (by Driver)	Percentage of Daily Trips using Soldiers Road
Work	35%	26%
Shopping	21%	20%
Drop off / Pick up	18%	35%
Social / Recreation	15%	20%
Personal business	7%	20%
Other	3%	20%
Education	1%	35%
Weighted Average		**24.9%**

Based on the above, it is estimated that approximately one-quarter of trips generated by development located within the Clyde North and Thompson Road PSPs will travel on Soldiers Road.

Assuming the short-term development of approximately 2,250 lots within the Clyde North and Thompson Road PSPs, this would equate to a generation of 4,500 vpd on Soldiers Road.

[9] *Victorian Integrated Survey of Travel and Activity collected in the 2012-13 financial year.*

9.3 Initial Traffic – Minta Farm PSP

The exhibited PSP allows the development of 1,000 lots prior to the construction of the North-South Arterial.

For the purpose of my assessment, I have assumed a traffic generation rate of 8 movements per lot and 60% of daily traffic will travel north of Soldiers Road (south of O'Shea Road), which is based on an assessment of VISTA trip purposes in the context of the local road network and destinations.

Adoption of these assumptions equates to 4,800 vpd onto Soldiers Road (south of O'Shea Road).

9.4 Indicative Future Volumes

Table 9-5 sets out the indicative daily volume on Soldiers Road (south of O'Shea Road), inclusive of existing volumes, initial development of Minta Farm PSP and external growth generated by the Clyde North and Thompsons Road PSPs.

Table 9-5 Weekday Daily Volumes on Soldiers Road (South of O'Shea Road)

Source	Weekday Traffic Volumes
Existing Traffic Volumes	9,844 vpd*
Minta Farm PSP Volumes (1,000 lots)	4,800 vpd
Clyde North PSP & Thompson Road PSP Volumes	4,500 vpd
Total	**19,100 vpd**

** Conservatively assumes no redistribution or mode shift of existing traffic following completion of the Clyde Road Interchange upgrade.*

Based on the above, volumes on Soldiers Road (south of O'Shea Road) are likely to be operating near capacity on Soldiers Road just prior to the construction of the North-South Arterial.

Future traffic volumes may be less than indicated in the above as traffic growth is likely to be self-limiting as drivers will choose to take alternative routes with less congestion relative to Soldiers Road.

The recent upgrade of the Clyde Road Interchange, as well as the ongoing upgrade of east-west links and intersections along Clyde Road associated with the Clyde North and Clyde DCPs means that Clyde Road is able to cater for any overflow traffic if Soldiers Road were to reach its practical capacity for a short period prior to the construction of the North-South Arterial.

The preceding assessment is also likely to provide a conservative estimate as it assumes the full build-out and occupation of approximately 2,250 lots in the PSP areas to the south, as well as the full build-out and occupation of 1,000 lots within the Minta Farm PSP.

It is also noted that volumes would progressively drop along Soldiers Road, with volumes dropping by 2,000 vpd just south of Chase Boulevard and 4,000 vpd just north of Grices Road based on existing volumes.

Table 9-6 provides a review of traffic volumes on other streets that provide a freeway overpass with a similar cross-section and direct property access to establish whether the anticipated volumes are reasonable in the context of streets with a comparable role and function.

Table 9-6 Review of Daily Volumes on Similar Roads along the Monash Freeway Corridor

Road	Average Annual Daily Volume (AADT)*
Power Road between Heatherton Road and Kidds Road	23,000 vpd
Tooronga Road between Toorak Road and Malvern Road	20,000 vpd
Auburn Road between Riversdale Road and Toorak Road	17,000 vpd
Gladstone Road between Police Road and Brady Road	12,000 vpd

** Weekday volumes are typically 5% higher than the AADT volume.*

Based on the volumes for the above roads, I don't think it would be unreasonable for volumes on Soldiers Road to approach capacity for a short period prior to the construction of the North-South Arterial.

10 Delivery of the North-South Arterial

10.1 Mechanisms for Delivery

The exhibited PSP allows the construction of 1,000 lots prior to the delivery of the North-South Arterial.

It is clear that the delivery of the North-South Arterial to the Beaconsfield Interchange will fulfil a broader need in the sub-regional road network, however, the timing of delivery should also have regard to the equity of delivery upon the Minta Farm PSP.

Based on my traffic assessment, I am of the opinion that Soliders Road will reach practical capacity just prior to the construction of the North-South Arterial. As volumes increase, I would expect the redistribution of traffic on the local network, as well as a travel mode shift for some users (e.g. students riding to school rather than being driven by their parents), resulting in Soldiers Road volumes levelling out and not continuing to increase. In my view, the cap of 1,000 lots for the delivery of the North-South Arterial is an appropriate threshold to minimise the duration of short-term traffic impacts on Soldiers Road.

In my view, the trigger for delivering the North-South Arterial should not be tied to an arbitrary assessment of when volumes on Soldiers Road exceed the notional collector street threshold, but instead should be based on how much development is required to fund the delivery of the North-South Arterial via the ICP.

Following construction of the North-South Arterial, volumes on Soldiers Road are likely to drop substantially, with an ultimate volume in the order 1,300 vpd predicted by the Cardno modelling south of O'Shea Road. Given that residents along Soldiers Road will enjoy much greater amenity following the construction of the North-South Arterial compared to existing conditions, I am of the opinion that it would be reasonable to allow volumes on Soldiers Road to increase towards the practical capacity of Soldiers Road during the initial development of the Minta Farm PSP.

10.2 Duplication

The exhibited Minta Farm PIP covers the construction of two-lane carriageway along the North-South Arterial. The funding and construction of the second carriageway to provide the duplicated cross-section is the responsibility of the relevant road authority.

Table 5.1 of Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis sets out typical mid-block capacity for urban roads with interrupted flow. For an undivided road, it sets out a one-way capacity of 900 vehicles per hour (i.e. 1,800 vehicles per hour two-way).

Peak to daily ratios along arterial roads are typically in the order of 8% to 10%[10], indicating that the capacity of a 2-lane arterial road is in the order of 18,000 to 22,500 vehicles per day.

Based on the preceding traffic assessment, volumes on the North-South Arterial are likely to fall within the practical capacity indicating that the route will function satisfactorily when initially constructed. Extra capacity could be provided at signalised intersections via short stand-up lanes if necessary.

Following delivery of the initial carriageway, it is expected that VicRoads / Council will monitor the growth in traffic volumes and performance along the North-South Arterial to determine when the duplication should occur.

[10] A review of the peak to daily ratios of the ultimate scenario VITM plots indicates a ratio of 8.4% during the AM peak hour and 9.5% during the PM peak hour.

11 Review of Traffix Group Evidence

As part of my scope, I have been instructed to review the expert evidence statement prepared by Mr Will de Waard of Traffix Group.

The evidence statement that I have been provided includes an updated traffic impact assessment based on the previous assessment undertaken by Traffix Group.

The updated assessment adopts a daily traffic generation rate of 8 movements per lot for the initial development of the Minta Farm PSP. The assessment also considers additional traffic generated by the ongoing development of the Clyde North PSP area.

Changes have also been made to the traffic distribution based on the assumption that the duplication and extension of O'Shea Road, as well as the upgrade of the Beaconsfield Interchange will be completed by 2022. Changes have also been made to the global traffic distribution based on updated 'Journey to Work' data from the 2016 ABS Census.

The updated assessment indicates that Soldiers Road is likely to carry approximately 14,150 – 16,000 vpd assuming development of the Sect. 96A application and the completion of the extension of O'Shea Road to the Beaconsfield Interchange. It is noted that all other roads operating within their respective environmental capacities.

The updated assessment has also considered the impact of traffic associated with the development of the initial 1,000 lots. The assessment identified that the ongoing development of Minta Farm PSP will displace volumes from the PSP areas to the south onto Clyde Road via Grices Road and Thompsons Road, with volumes on Soldiers Road to remain at practical capacity as more lots develop. I agree with this proposition.

I consider the assumptions made to be appropriate and the assessment to be generally 'fit-for-purpose' in assessing the future traffic flows on Soldiers Road and other nearby roads.

The evidence statement also makes recommendations regarding the interim arrangements on Soliders Road. Table 11-1 sets out my opinions regarding the recommendations made by Mr Will de Waard in his evidence statement (as extracted from the Summary of Opinions).

Table 11-1 Response to Will de Waard Recommendations regarding Soldiers Road

Will de Waard Recommendation	Chris Butler Comment
d) Council as the Road Authority for Soldiers Road will need to consider improvements to facilitate the traffic volumes in the interim conditions (even without any contribution from the Minta Farm PSP area). I have identified two potential options including: i) Option 1: Modified Soldiers Road cross-section including a painted median and refuge islands, or ii) Option 2: The early truncation of Soldiers Road at Grices Road and the provision of local traffic management to minimise 'rat running' traffic.	Option 1 – I agree that it would be desirable for an interim cross-section with a painted median and pedestrian refuges to be provided along Soldiers Road (as stated in my own recommendations regarding the Sect. 96A application at Section 7.2). Opinion 2 – A preferable location for truncation of the route prior to the delivery of the North-South Arterial to the O'Shea Road extension would be on the north leg of the future Thompsons Road / North-South Arterial intersection. This position would limit traffic growth from areas to the south of Thompsons Road and would maintain connectivity to the Hillcrest Christian College, as well as eliminating the need to implement short-term traffic management measures on the local network east of Soldiers Road.
i) I recommend the inclusion of Permit conditions for the 96A application as follows: i) Construction of the modified Soldiers Road cross-section including a painted median to assist property access to the existing dwellings on the south/west side of the road and include pedestrian refuge islands at key pedestrian desire points. The construction of the modified cross-section should be limited to the frontage of the 96A application. ii) In the interim condition when Soldiers Road traffic volumes are high, property access movements to lots fronting Soldiers Road from the Minta Farm PSP area would be difficult with the modified cross-section. On this	Regarding i), I consider the upgrade of a modified cross-section along the Sect. 96A frontage to be a reasonable condition, with this reflected in my own recommendations regarding the Sect. 96A application at Section 7.2. Regarding ii), I consider a restriction on the development of lots directly fronting Soldiers Road until after the North-South Arterial has been constructed to be a reasonable condition for the Sect. 96A application, with this reflected in my own recommendations set out at Section 7.2.

Will de Waard Recommendation	Chris Butler Comment
basis, I recommend that no lots are constructed with direct property access to Soldiers Road in the interim condition. In the ultimate conditions when Soldiers Road is truncated and traffic volumes reduce, the lots fronting Soldiers Road can be constructed.	

12 Conclusions

With regard to the exhibited Minta Farm PSP, I am of the opinion that:

- Consideration should be given to amending the exhibited Street Network Plan set out in the PSP to show O'Shea Road as a six-lane primary arterial road rather than a secondary four-lane arterial road, with associated changes to the path network updated on the Public Transport and Path Network Plan.
- It would be preferable to show the classification of Soldiers Road on the Street Network Plan, with a 'bus capable' cross-section for Soldiers Road set out in the PSP.
- Consideration should be given to providing a left-in / left-out access from Soldiers Road to the North-South Arterial a short distance north of Grices Road to improve connectivity within the local network as an alternative to truncating Soldiers Road. This change could be resolved when the concept plans are updated for the Minta Farm ICP or alternatively during the subdivision design phase.
- Consideration should be given to amending the exhibited Land Use Budget and PIP to provide an unsignalised T-intersection at the Grices Road / Eastern Connector intersection (IN-06) given that the interim construction of Grices Road set out in the Clyde North DCP only extends to the eastern connector road and there is no need to provide the east leg as part of the interim works associated with the PSP.
- The Cardno Strategic Transport Modelling Assessment indicates that the exhibited road network is generally 'fit-for-purpose' under ultimate conditions.

With regard to the proposed Sect. 96A application, I am of the opinion that:

- The Soldiers Road cross-section set out in the One Mile Grid report would be suitable to adopt for the length of Soldiers Road south of O'Shea Road.
- It would be preferable to withhold lots directly fronting Soldiers Road until after the North-South Arterial has been constructed and Soldiers Road has been truncated (i.e. lots would only be accessed via internal streets during initial development).
- An interim cross-section could be implemented along Soldiers Road that uses the parking lane along the Minta Farm frontage as the through lane, enabling a painted median to be provided for vehicles accessing existing properties along the west / south-west side of Soldiers Road thus improving safety and traffic flow prior to the construction of the North-South Arterial.

With regard to sub-regional traffic issues and the delivery of the North-South Arterial, I am of the opinion that:

- Soldiers Road currently provides a higher level of connectivity and function within the sub-regional road network compared to a typical connector street and a higher classification (e.g. 'Trunk Collector') would be more appropriate.
- Existing traffic volumes on Soldiers Road have exceeded the notional threshold for a collector street, with volumes likely to continue to increase due to ongoing development of the Clyde North, Thompsons Road and Clyde Creek PSPs to the south, independent of Minta Farm.
- In order to contain the growth of Soldiers Road, Council should expedite the construction of Hardys Road and Thompsons Road and associated signalised intersections at Berwick – Cranbourne Road as part of the Clyde North and Clyde DCP works. Also, the upgrade of the Grices Road / Clyde Road to provide two through and two right turn lanes as identified in Figure 8-3.
- As part of the Thompsons Road / North-South Arterial intersection works, Council should consider the temporary truncation of the northern leg of the North-South Arterial (to be reinstated following completion of the North-South Arterial to O'Shea Road).
- Council should consider upgrading the existing Soldiers Road / O'Shea Road intersection to provide a right turn treatment on the north leg, which would be warranted based on existing volumes.
- It would be reasonable to allow volumes on Soldiers Road to increase towards the practical capacity of Soldiers Road during the initial development of the Minta Farm PSP.
- The trigger for delivering the North-South Arterial should not be tied to an arbitrary assessment of when volumes on Soldiers Road exceed the notional collector street threshold, but instead should be based on how much development is required to fund the delivery of the North-South Arterial via the ICP.