CB+E Traffic, Transport and Infrastructure Assessment

Final Report

17 February 2015
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EXECUTIVE SUMMARY

ES.1 Introduction

This report details the intersection and local level network impacts, other transport modes and civil engineering issues of and for the proposed development of the Canberra Brickworks and Environs (CB+E) in Yarralumla, ACT. The development involves modifications to the existing road network, which includes Adelaide Avenue/Yarra Glen, Cotter Road, Denman Street, Dudley Street, Kintore Crescent, Kent Street and Novar Street. The development will generate additional population, jobs and retail activity in Yarralumla and Deakin. The CB+E Master Plan is shown in Figure ES.1.
ES.2  Development Staging

For the purposes of this report, the proposed development configuration has been divided into three site areas (or stages) as shown in Figure ES.2:

- Stage 1 (green): The interchange and northern blocks
- Stage 2 (blue): Southern blocks
- Stage 3 (orange): Canberra Brickworks and West Deakin

Figure ES.2: CB+E Development Site Areas
ES.3 Road Network Layout

The existing road network layout is shown in Figure ES.3. The Canberra Brickworks site is currently accessed via Denman Street. Traffic on Cotter Road accessing West Deakin and Yarralumla (and vice versa) must do so via Dudley Street.

Figure ES.3: Existing Road Network
The road and street network changes corresponding with the development stages are shown in Figure ES.4.

- **Stage 1** includes realignment of Cotter Road, the Cotter Road – Adelaide Avenue/Yarra Glen full diamond interchange and partial development of the CB+E road network, including Brickworks Road, the northern streets and the western part of Central Street. Dudley Street is retained in its current configuration.
- **Stage 2** includes the completion of the CB+E road network, except for Quarry Ridge Road and the Canberra Brickworks Access Road.
- **Stage 3** is mainly the addition of Quarry Ridge Road and the Canberra Brickworks Access Road to the CB+E road network. This stage includes commercial development in Deakin along Denison Street but there are no road network changes proposed around that area.

![Figure ES.4: Proposed CB+E Master Plan Road Network Development Stages](image)

The major piece of road network infrastructure associated with the CB+E Master Plan is the Cotter Road – Adelaide Avenue/Yarra Glen interchange and Cotter Road extension to Denison Street, as shown in Figure ES.5. The interchange is a full diamond design, allowing all movements between Cotter Road, Adelaide Avenue and Yarra Glen. It will greatly improve road network connectivity, in particular allowing traffic to and from West Deakin access via Cotter Road directly, rather than via Dudley Street (the future CB+E development area) as it does currently. As part of the interchange construction, Cotter Road will also be realigned to the south, freeing up additional land for the CB+E development.
ES.4 Traffic Modelling and Analysis

The following modelling scenarios have been investigated:

- **Existing** represents the road network in 2014 (micro-simulation and intersection modelling only).
- **Do Nothing** represents the road network in 2021 and 2031, with expected land use and road network developments, but without the CB+E Master Plan.
- **CB+E Master Plan Stage 1** is based on the 2021 Do Nothing road network and land use with appropriate changes for the first stage of the CB+E Master Plan.
- **CB+E Master Plan Stage 2** is based on the 2031 Do Nothing road network and land use with appropriate changes for the second stage of the CB+E Master Plan. This includes the concurrent construction of the Adelaide Avenue Bus Stop underneath the Kent Street bridge, which assumes that the existing Adelaide Avenue T2 lane reverts to a Bus Only lane.¹
- **CB+E Master Plan Stage 3** is based on the 2031 Do Nothing road network and land use with appropriate changes for the third and final stage of the CB+E Master Plan.

The Do Nothing scenarios show that the increase in demand on Cotter Road eastbound (either going to the City or Deakin) pushes the demand on Dudley Street above its capacity. This implies that if nothing is done with the current link between Cotter Road and Adelaide Avenue/Yarra Glen, the Dudley Street through traffic in the Do Nothing scenarios will be going through the main streets of

¹ This assumption is made for traffic modelling purposes only and is based on the proposed concept design in the Adelaide Avenue Bus Stops Feasibility Study (SMEC 2013). The final bus stop design is still subject to further investigation and will need to be coordinated between relevant government agencies.
the CB+E development in the CB+E Master Plan scenarios. The strategic transport modelling results show that the construction of a full diamond interchange at the Adelaide Avenue/Yarra Glen – Cotter Road intersection addresses this through traffic issue and also provides additional connectivity between Cotter Road and Yarra Glen, which was previously non-existent.

Strategic transport modelling for the AM peak period was conducted to determine the broader impacts of the development and the proposed road network modifications.

Micro-simulation modelling was conducted for the AM, PM and weekend peak periods in 2014, 2021 and 2031 to test the localised traffic impacts of the land use and road network changes in each scenario.

In 2021, the Adelaide Avenue T2 lane is assumed to revert to a Bus Only lane as a result of the construction of the median bus stop underneath the Kent Street bridge, which effectively reduces the capacity of Adelaide Avenue. The bus stop concept design proposed in the Adelaide Avenue Bus Stops Feasibility Study (SMEC 2013) and the associated road network changes it requires have been assumed for traffic modelling purposes. However, the design and ultimate location is not yet final and will still need to be examined further. Moreover, the impact assessment of this on the Adelaide Avenue/Yarra Glen corridor and the surrounding network (which extends outside the CB+E study area) will need to be investigated in a separate study as it is beyond the scope of this report.

The results indicate that the network changes, which include new connectivity and new signalised intersections, result in sometimes variable effects on performance for a number of the major routes through the study area. The signalised intersections result in increased travel times for routes that previously had right of way, while some routes are shortened or have increased connectivity options due to the network changes, particularly the extension of Cotter Road to Denison Street. In general the effect on the overall network operation is beneficial.

Intersection analysis was conducted with SIDRA Intersection to test the impacts of the network changes, and proposed intersection treatments for mitigation of those impacts. It was previously established that three of the existing intersections; Novar Street – Dudley Street, Kent Street – Denison Street, and Kent Street – Adelaide Avenue off-ramp; should be converted to signal control to maintain acceptable performance in the future. A summary of the intersection analysis is given in Table ES.1.
<table>
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<th>Analysis Notes</th>
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<tr>
<td>Cotter Road – Lady Denman Drive</td>
<td>This intersection was signalised as part of Cotter Road Upgrade Stage 1. Under signal control, it operates well (no worse than LoS C) in all scenarios and peak periods.</td>
</tr>
<tr>
<td>Cotter Road – Dudley Street</td>
<td>The intersection remains in Do Nothing, is moved in Stage 1 and removed entirely in Stage 2. It continues to operate well in the AM peak, however the existing intersection operates poorly in the Do Nothing scenarios in the PM peak. In Stage 1 the simplified temporary intersection design greatly improves its performance.</td>
</tr>
<tr>
<td>Cotter Road – Brickworks Road</td>
<td>This intersection operates well in all stages and peak periods.</td>
</tr>
<tr>
<td>Kent Street – Denison Street</td>
<td>In its existing Do Nothing configuration, the average delay indicates good overall performance, however the worst movement LoS is poor. Conversion to signal control greatly improves performance in the PM peak and gives similar overall performance, albeit with better control, in the AM peak.</td>
</tr>
<tr>
<td>Kent Street – Adelaide Avenue Off-ramp</td>
<td>In its existing Do Nothing configuration, the intersection operates increasingly poorly in the AM peak period, reaching LoS F by 2021. Signalisation of this intersection in the CB+E Master Plan scenarios offers a clear improvement in performance; LoS A in all years. In the PM peak, the intersection operates well in all years in both the Do Nothing and CB+E Master Plan configurations.</td>
</tr>
<tr>
<td>Novar Street – Dudley Street/ Adelaide Avenue On-ramp</td>
<td>The existing Do Nothing roundabout design is expected to operate well into the future, however this configuration does not provide adequate pedestrian accessibility and safety, which is addressed by signalising the intersection. A signalised option has been presented that exploits the full width of the Kent Street bridge, which results in LoS C/D performance in the AM and PM peak periods.</td>
</tr>
<tr>
<td>Cotter Road – Adelaide Avenue/ Yarra Glen Interchange</td>
<td>The six lane full diamond option operates well in all years in both the AM and PM peaks.</td>
</tr>
<tr>
<td>Cotter Road – Denison Street</td>
<td>This new intersection has been analysed with signal control. It performs well in the AM peak at LoS C, and is LoS D in the PM peak.</td>
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ES.5 Other Transport Modes

An assessment was conducted into the public transport, cyclist and pedestrian access to the development. The current Strategic Public Transport Network Plan (SPTNP) recommends a stop on Adelaide Avenue near the Kent Street overpass, and this has been included in the micro-simulation modelling assumptions for the relevant scenarios (CB+E Master Plan Stages 2 and 3). The development is expected to be medium-high density and mixed-use, which is favourable for increasing public transport mode share in line with the targets set out by Transport for Canberra. Connection of the major north-south and east-west roads within the study area to the existing trunk cycleway network will provide sufficient cyclist accessibility for the area. Recommendations for provision of pedestrian and both on-road and off-road bicycle facilities are shown in Figure ES.6.

The bus stop proposed for construction in the median of Adelaide Avenue to the east of the Cotter Road – Adelaide Avenue interchange (as part of CB+E Master Plan Stage 2) is within 750 m of nearly all of the residential zones within the CB+E development as recommended by the SPTNP. It is also shown in Figure ES.6.

*Figure ES.6: Potential Pedestrian and Cycle Facilities and Attractors (Bus Stop Catchment Shown)*
ES.6 Civil Infrastructure

The modelling suggests that all of the required fill material for earthworks and site grading can be obtained on-site, with a 10,000 m³ surplus of cut material. The extent of earthworks is shown in Figure ES.7, with purple representing fill and red representing cut.

![Earthworks Requirements](image)

**Figure ES.7: Earthworks Requirements**

Stormwater issues are expected to be manageable, with eight sub-catchments developed to align with the CB+E Master Plan. No major issues are anticipated for stormwater management, water quality or WSUD, although two of the sub-catchments will require gross pollutant traps.

A summary of impacts and proposed measures to utility services is outlined in Table ES.2.
Table ES.2: Summary of Impacts to Utility Services

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<th>Impacts and/or Proposed Measures</th>
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<td>ICON</td>
<td>• ICON to be relocated in Stage 1.</td>
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| ActewAGL Sewer  | • The northern part will drain via the existing sewer through the Royal Canberra Golf Course (RCGC) to the Molonglo Outfall Sewer (MOS).  
                  • The southern part will drain to the Woden Valley Trunk Sewer (WVTS).  
                  • Both connections are required in Stage 1. |
| ActewAGL Electricity | • Relocation/ Removal of existing assets in each stage. |
| ICON Water      | • Reconfiguration between the South Canberra and Woden Low Pressure Zones.  
                  • Precinct to be supplied from the South Canberra Zone. This will require new connections and the provision of Zone Valves.  
                  • Upgrades to the main in Denman Street to 225 mm diameter and possibly an additional connection; will be needed to meet the fire risk category of F4 (60 L/s) in Stage 1.  
                  • All mains within the development to be 150 mm diameter minimum. |
| Telstra/ NBNCo  | • Further advice to be obtained from NBNCo for each stage  
                  • Services for Telstra and NBN to be accommodated within a shared trench. |
| Gas             | • Relocation of existing 63 mm PE 210 kPa from Dudley Street/Dunrossil Drive and upsize to 110 mm PE to allow for the 32 N and 50 N service lines. |
ES.7 Conclusions

ES.7.1 Road Network and Parking

Three development stages are proposed, with the following main road network improvements:

- Construction of a full diamond interchange at the Cotter – Adelaide Avenue/Yarra Glen intersection.
- Introduction of a new signalised intersection between Cotter Road and Brickworks Road, which effectively replaces the existing Cotter Road intersections with Dudley Street and Dunrossil Drive.
- Introduction of new connections between the proposed CB+E development and the existing Yarralumla street network.
- Signalisation of three intersections on Kent and Novar Streets.

Parking for residential, commercial and retail developments within the CB+E is expected to be provided in accordance with the ACT Parking and Vehicular Access General Code. On-street parking will be available throughout the development and additional public parking will also be provided at specific sites.

ES.7.2 Traffic and Transport

The modelling indicates that in the near term, Cotter Road traffic will overwhelm the existing Adelaide Avenue on-ramp and begin to use Dudley Street as a rat-run to access Adelaide Avenue via the on-ramp from Novar Street. This is in addition to the through traffic between Cotter Road and West Deakin that also uses Dudley Street. As this route is replaced by the CB+E development, an alternative was needed. The full diamond interchange provides this alternative, and was shown by the modelling to reduce the amount of through and rat-running traffic to an insignificant level as it provides more direct access from Cotter Road to Adelaide Avenue, Yarra Glen and West Deakin (and vice versa).

Due to the expected future traffic increases, a number of existing intersections on Kent and Novar Streets are required to be signalised. In addition, there are new signals at the intersections of Cotter Road with Brickworks Road, Adelaide Avenue/Yarra Glen interchange and Denison Street. These additional signals have an overall effect of slowing down the traffic while providing greater control and, importantly, greater pedestrian accessibility and safety than the existing give-way and roundabout intersections.

The proposed development road hierarchy incorporates on-road cycling with connections to the existing on-road and off-road cycling networks, and shared paths are provided on both sides of most streets. The Adelaide Avenue bus stop under the Kent Street bridge will provide good public transport accessibility. A new Park & Ride facility can be included on the Deakin side of the development to complement the proposed bus stop.

ES.7.3 Civil Infrastructure

The modelling suggests that all of the required fill material for earthworks and site grading can be obtained on-site, with a 10,000 m³ surplus of cut material. Stormwater issues are believed to be manageable, with eight sub-catchments developed to align with the CB+E Master Plan. No major issues are anticipated for stormwater management, water quality or WSUD, although two of the sub-catchments will require gross pollutant traps. Relocations/upgrades of utility services have been considered in the preliminary investigations, however these will have to be revisited and re-assessed during the detailed design stage of the development.
1. INTRODUCTION

The proposed Canberra Brickworks and Environs (CB+E) development in Yarralumla ACT is envisioned to create a compact and vibrant new community that continues the pattern of the existing suburb. A variety of housing types, scales and form are expected to be constructed, with allowance for mixed-use and commercial buildings as well.

The proposed CB+E Master Plan is shown in Figure 1.1.

![Canberra Brickworks and Environs Master Plan](image)

Figure 1.1: Canberra Brickworks and Environs Master Plan

The CB+E development plan has undergone a number of iterations since 2010. The currently proposed CB+E Master Plan and corresponding assessments have been developed and undertaken based on discussions with stakeholders and community feedback.

SMEC has been commissioned by the Land Development Agency (LDA) to undertake preliminary civil engineering investigations associated with the proposed CB+E development. More specifically, the works focused on the assessment of impacts on traffic, transport and infrastructure within and around the proposed development.

The processes involved and the resulting outcomes of the investigations are discussed in this report.
2. DEVELOPMENT STAGING

The proposed development configuration is presented below. For the purposes of this report, the development has been divided into three site areas as shown in Figure 2.1:

- Stage 1 (green): The interchange and northern blocks
- Stage 2 (blue): Southern blocks
- Stage 3 (orange): Canberra Brickworks and West Deakin

![Figure 2.1: CB+E Development Site Areas](image)

The staging of the development is presented early in this report as most of the assessments discussed in subsequent chapters take into account how the development will progress through the three stages.
2.1. Construction Staging

Staging of the works has been determined by the LDA. The following section outlines the indicative infrastructure scope of works and duration estimate for each stage:

- **Stage 1**
  - Deliver ten residential sites and associated road infrastructure.
  - Denman Street Park.
  - Upgrade of the Cotter Road – Adelaide Avenue interchange to a full diamond interchange design, including demolition of the existing Cotter Road overpass bridge.
  - Extension of Cotter Road to Denison Street, including cyclist underpass.
  - Dudley Street and Kent Street intersection signalisation.
  - Denison Street and Kent Street intersection signalisation.
  - Adelaide Avenue westbound off ramp and Kent Street intersection signalisation.
  - ICON and HV relocations.
  - Water supply upgrade on Denman Street.
  - Stormwater and Sewer trunks along Brickworks Road and Maxwell Street South.
  - Estimated construction duration is 2 to 2.5 years.

It should be noted that blocks alongside Denman Street Park are expected to trigger the need to build the sewer tie, which connects to the Woden Valley Trunk Sewer (WVTS). The development of these blocks may logically fit better into the Stage 2 works.

- **Stage 2**
  - Deliver 16 residential sites and associated road infrastructure.
  - Adelaide Avenue Bus Stop (below Kent Street bridge).
  - Estimated construction duration is 12 to 14 months.

- **Stage 3**
  - Deliver ten residential sites and associated road infrastructure.
  - Quarry Park and Bentham Street parking upgrades.
  - Brickworks heritage site upgrades.
  - Estimated construction duration is approximately 6 months.
### 3. ROAD NETWORK LAYOUT

#### 3.1. Existing Road Network

A diagrammatic illustration of the existing road and street network within and around the CB+E site is shown in Figure 3.1. It shows that the intersection between Cotter Road and Adelaide Avenue/Yarra Glen currently provides access between Cotter Road and Adelaide Avenue only. The unavailability of a link between Cotter Road and Yarra Glen causes a considerable amount of rat-running in Curtin via McCulloch Street, both in the AM and PM peak periods.

Vehicles travelling between Cotter Road and Deakin do so via Dudley Street, as this is currently the most direct route. Dudley Street is also used by vehicles travelling between Cotter Road and Yarralumla.

Dunrossil Drive is the main access road to Government House.

The existing Canberra Brickworks site can be accessed via Denman Street.

![Figure 3.1: Existing Road Network](image_url)

#### 3.2. Proposed CB+E Road Network

The CB+E Master Plan includes modifications to the existing road network and the addition of new roads and streets as part of the development as shown in Figure 3.2. Changes in the surrounding arterial road network include the re-alignment of Cotter Road and the introduction of a full diamond interchange, providing full accessibility between Cotter Road and Adelaide Avenue/Yarra Glen. In addition to the re-alignment, Cotter Road is also proposed to be extended to link with Denison Street in Deakin.
The extension of Cotter Road to Denison Street in Deakin complements the CB+E road and street network as it facilitates direct access between Cotter Road and Deakin. Without this new link, vehicles will be travelling through the CB+E development via Brickworks Road and Central Street, as these effectively replace the Dudley Street link.

![Figure 3.2: Proposed CB+E Master Plan Road Network Development](image)

Access to the new development is via a new road, called Brickworks Road, introduced at the western edge of the subdivision. This new road effectively replaces the current link roads from Cotter Road into Yarralumla and Government House, which are Dudley Street and Dunrossil Drive respectively.

The internal connectivity of the CB+E development, and its interfaces with the existing road network, have been the subject of a number of recent investigations, primarily to address the issue of rat-running through the development. The current CB+E Master Plan road network is a product of these investigations. The connection of Quarry Ridge Road to both Denman Street and Bentham Street was investigated as it provides a clear bypass link for traffic between Cotter Road and North Yarralumla. This complements the Cotter Road – Adelaide Avenue interchange and extension of Cotter Road to Denison Street, as it was found to noticeably reduce the effect of rat-running traffic within the CB+E development. In addition to Quarry Ridge Road, the absence or presence of connections to Woolls Street, Maxwell Street and Abbott Street were investigated, however it was the connection of Quarry Ridge Road that largely dictated the travel patterns of rat-running Yarralumla traffic through the development.

### 3.3. Road Hierarchy

The proposed road hierarchy is shown in Figure 3.3. The highest level roads in the CB+E Master Plan are Brickworks Road and Central Street, which are classified as Minor Collector. The road reserve for this level includes shared paths, and space for both on-road cycling and on-street parking on both sides. The majority of CB+E streets are classified as Access Street B, which have on-street parking on
both sides and shared paths on both sides. Quarry Ridge Road is *Access Street A*, which has on-street parking on one side and shared paths on both sides. There is a *Rear Lane* for property access running parallel to and between North Terrace and Central Street, which has shared paths but no provision for parking.

![Image of a map showing the road network and development stages]

**Figure 3.3: Proposed CB+E Master Plan Road Hierarchy**

### 3.4. Road Network Staging

The road and street network development stages are shown in Figure 3.4, consistent with the development site areas shown earlier in Figure 2.1.

- **Stage 1** includes realignment of Cotter Road, the Cotter Road – Adelaide Avenue/Yarra Glen full diamond interchange and partial development of the CB+E road network, including Brickworks Road, the northern streets and the western part of Central Street. Dudley Street is retained in its current configuration.

- **Stage 2** includes the completion of the CB+E road network, except for Quarry Ridge Road and the Canberra Brickworks Access Road.

- **Stage 3** is mainly the addition of Quarry Ridge Road and the Canberra Brickworks Access Road to the CB+E road network. This stage includes commercial development in Deakin along Denison Street but there are no road network changes proposed around that area.
3.5. Parking

Parking provision for residential, commercial and retail areas will comply with the *ACT Parking and Vehicular Access General Code*. On-street parking is allowed for by the road/street classification throughout the development as shown in Figure 3.3. In addition, the following are proposed public parking provisions, which are also illustrated in Figure 3.5:

1. ~50-96 additional on-street parking spaces along Bentham Street to provide additional parking for the nearby Yarralumla shops, as well as for Quarry Park and the revitalised Canberra Brickworks area.
2. ~15-20 additional on-street parking spaces for the Denman Street Park.
3. Additional parking provision for Quarry Park and Canberra Brickworks area.
4. Possible Park & Ride facility.
5. Public parking for Canberra Brickworks located adjacent to residential and commercial buildings.
3.6. Mint Interchange

A full diamond interchange has been proposed to connect Cotter Road to Adelaide Avenue and Yarra Glen. The proposed Cotter Road alignment and interchange configuration are shown in Figure 3.6. The current interchange between Cotter Road and Adelaide Avenue only provides access for traffic travelling between the two roads, and there is no direct connection between Yarra Glen and Deakin or Yarralumla. The full diamond interchange (also referred to as Mint Interchange) provides direct access to West Deakin from Cotter Road, and also allows access to and from the south via ramps connecting to Yarra Glen. This latter connection is expected to reduce traffic on McCulloch Street, as it provides a higher quality north-south alternative route for traffic to and from Lady Denman Drive.

As part of the full diamond interchange development, Cotter Road will be realigned to the south, freeing up further land for the CB+E development. The existing and proposed Cotter Road alignments can be seen in Figure 3.6.

The proposed detail of the intersection configuration at the interchange is shown in Figure 3.7. It shows six lanes over Yarra Glen, with two through lanes and a dedicated right turn lane in each direction, which allows the most flexible and efficient signal operation.