Traffic Impact Assessment

Proposed Residential Development
Cudgegong Town Centre –
Stage 1 DA & Stage 2 Concept Plan

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## Contents

1. Introduction 1

2. Site and Context 3

3. Existing Traffic Conditions 6
   3.1 Existing Road Hierarchy 6
   3.2 Future Road Hierarchy 9
   3.3 Public Transport 11
   3.4 Existing Site Generation 11

4. Description of Proposed Development 14

5. Parking Requirements 17
   5.1 Council Controls 17
   5.2 Accessible Parking 19
   5.3 Motorcycle Parking 20
   5.4 Car Share Parking 20
   5.5 Bicycle Parking 20
   5.6 Servicing 21

6. Traffic Impacts 23
   6.1 Trip Generation 23
   6.2 Trip Distribution 26

7. Access & Internal Design Aspects 28
   7.1 Access 28
   7.2 Internal Road Network 29
   7.3 Internal Design Aspects for Stage 1 31
   7.4 Internal Design Aspects for Stage 2 33

8. Conclusions 34

Appendix A: Area 20 Indicative Layout Plan
Appendix B: Reduced Architectural Plans
Appendix C: Swept Path Analysis
Appendix D: Intersection Sight Distance Plan
1. Introduction

TRAFFIX has been commissioned by Restifa & Partners Pty Ltd to undertake a traffic impact assessment (TIA) in support of a development application and concept plan relating to a two stage development for the Cudgegong Town Centre.

The Stage 1 Development Application is for a residential development comprised of 239 units within two (2) buildings. The Stage 2 Concept Plan is in relation to the concept plan for the provision of a mixed used development comprising commercial, residential and retail use. The development provides access for Stage 1 via New East-West Street 1 and New East West Street 2 with access for Stage 2 provided on New Est-West Street 1 and existing Cudgegong Road. Both stages include the construction of the internal road network.

This site is located at 43-54 Cudgegong Road, Rouse Hill and forms part of the ‘Area 20’ Precinct. The lots are legally described as Lots 72 and 73 in DP 208203 Stage 1 is proposed in a B4 ‘Mixed-Use’ Zone whilst Stage 2 falls within the B2 ‘Local Centre’ Zone as part of the North West Growth Centre established by the NSW Government. In this regard, the development has been assessed under the Blacktown City Council Growth Centre Precincts Development Control Plan 2016 (BCC Growth Centre DCP 2016). Reference has also been made to the AUSTROADs Guide, Schedule 4 of the Blacktown DCP: Area 20 Cudgegong Road Station and the ARUP Riverstone East Precinct Transport and Access Study (2015) which provides details regarding all modes of transport for the urban release area as part of Sydney’s North West Growth Centre (NWGC) which the Area 20 Precinct is adjacent to.

This report documents the findings of our investigations and should be read in the context of the Statement of Environmental Effects (SEE) prepared separately. The proposed development Stages are comprised of the following:

- **Stage 1:** 289 residential units;
- **Stage 2:** 9,600m² commercial & retail GFA and 476 residential units.

Due to the size and capacity of development referral to this proposal requires referral to the Roads and Maritime Services under the provisions of *State Environmental Planning Policy (Infrastructure)* 2007.
The report is therefore structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the parking requirements
- Section 6: Assesses traffic impacts
- Section 7: Discusses access and internal design aspects
- Section 8: Presents the overall study conclusions.
2. Site and Context

The Stage 1 site is situated west of the existing Cudgegong Road and north of the proposed Cudgegong Railway Station. It is located 1.3 kilometres west of Windsor Road and 1.8 kilometres west of the Rouse Hill Town Centre. The site has an irregular configuration with a total lot area of approximately 40,460 m² with Stage 1 having an area of approximately 20,160m² and Stage 2 having an area of approximately 20,300m².

The site has a western frontage of approximately 175 metres to the New North-South Street 1, a northern frontage of approximately 280 metres to the proposed New East-West Street 2, an eastern boundary of approximately 230 metres to Cudgegong Road and a southern boundary of approximately 280 metres to the proposed Railway Street North.

A Location Plan is presented in Figure 1, with a Site Plan presented in Figure 2. Reference should be made to the Precinct Indicative Layout Plan which is included in Appendix A.
Figure 1: Location Plan
3. Existing Traffic Conditions

3.1 Existing Road Hierarchy

The road hierarchy in the vicinity of the site is shown in Figure 3 with the following roads of particular interest:

- **Windsor Road**: an RMS State Road (MR184) that generally runs in a north-south direction between Windsor in the north to Parramatta in the south. In the vicinity of the site, Windsor Road accommodates three lanes of traffic in each direction with a dividing median, south of the intersections with Schofields Road. North of the intersection with Schofields Road, Windsor Road has five (5) traffic lanes with two (2) northbound lanes and three (3) southbound lanes. Windsor Road is subject to 80km/h speed zoning and generally provides T-Way bus lanes on both sides.

- **Schofields Road**: an RMS Regional Road that generally runs in an east-west direction between Railway Terrace, Schofields in the west and Windsor Road in the east. Schofields Road generally accommodates two lanes in each direction with a divided median. It is subject to 70km/h speed zoning in close proximity to the site.

- **Cudgegong Road**: a local road that generally runs in a north-south direction between Guntawong Road in the north to Schofields Road in the south. It accommodates a single lane of traffic in either direction and is subject to 60km/hr speed zoning.

It should be noted that internal infrastructure located within the North West Growth Centre (NWGC) is intended to be upgraded to accommodate the development of the precinct. Specifically, the *North West Growth Centre Road Framework (2011)* developed a road hierarchy which identifies the future alignment of the Principle Arterial roads, Transit Boulevards, Sub Arterial and Collector roads, based on the existing and future road network. This future network is shown in Figure 4.
Additionally the Cudgegong Town Centre site will provide four (4) new local roads. Two (2) roads will traverse in an east-west direction and two (2) will traverse in a north-south direction. The layout of the road network can be seen in the Architectural Plans provided in Appendix B.

Figure 3: Existing Road Hierarchy
Figure 4: Future Road Hierarchy

Legend
A  New North South Road 1
B  New North South Road 2 (Main Street)
C  New East-West Road 1
D  New East-West Road 2
3.2 Future Road Hierarchy

The future road hierarchy in the vicinity of the site is shown in Figure 4, with the following of particular interest:

- **New East-West Street 01**: a proposed local road which traverses in an east-west direction between the New North-South Street 01 in the west and Cudgegong Road in the east. New East-West Street 01 is proposed to provide two way traffic flow on an 11 metre wide carriageway. New East-West Street 01 will separate the northern residential buildings from the proposed Stage 2 development of the Cudgegong Town Centre site and provide a combined 3.5m wide verge and footpath on the northern and southern side.

- **New East-West Street 02**: a proposed local road which traverses in an east-west direction between New North-South Street 01 in the west and Cudgegong Road in the east. New East-West Street 01 is proposed to provide two way traffic flow on an 11 metre wide carriageway. New East-West Street 02 will border the northern frontage of the site and provide a combined 3.5m wide verge and footpath on the northern and southern side.

- **North-South Street 01**: a proposed local road which traverses in a north-south direction between New East-West Street 02 in the north and the proposed New East-West Street 01 in the south. North-south Street 02 is proposed to be a two way road on a 25 metre verge with an 11.3 metre carriageway and 6.85m verge and footpaths on the eastern and western sides.

- **North-South Street 02**: a proposed local road which traverses in a north-south direction between New East-West Street 02 in the north and the proposed New East-West Street 01 in the south. The street is proposed to be a two way road on an 18 metre verge with an 11 metre carriageway and 3.5 verge and footpaths on the eastern and western sides. North – South Street 02 will be the Main Street of the Cudgegong Town Centre.
Railway Street North: a proposed local road which traverses in an east-west direction between New North-south Street 01 and the existing Cudgegong Road.

It is noted that the intersection of New East-West Street 02 and the existing Cudgegong Road is proposed controlled by a roundabout. The layout of the intersection can be seen in the Indicative Layout Plan provided in Appendix A. Additionally the following streets are proposed to be constructed as part of the 2 Stage development only:

- New East-West Street 01
- New East-West Street 02
- North-South Street 01
- North-South Street 02 (Main Street)

The indicative layout of the future road network is shown in Figure 4 above and the geometric design of the proposed layout is discussed in more detail in Section 7.2 of this report.
3.3 Public Transport

Due to the low density rural nature of the Area 20 precinct, public transport to the area is limited. The site is currently serviced by a single bus route being the Busways Route T75. The existing and future bus services that operate in the locality are shown in Figure 5.

Notwithstanding, as density within the NWGC increases, access to the local bus network are expected to improve, in response to a demonstrated demand. It is anticipated that new services would be provided and would generally follow collector roads, with strategic bus corridors provided along Transit Boulevards and Principle Arterial roads.

It is also noteworthy that as part of the North West Rail Link project, two (2) new railway stations will be constructed in the vicinity of the subject site. The Cudgegong Road Station will be located parallel to Schofields Road between Cudgegong Road and Tallawong Road, which is at furthest 330 metres (4 minute walk) from the site. The Rouse Hill Station will be located directly outside the Rouse Hill Town Centre, which is approximately 1.8 kilometres from the subject site. The above train lines connect to Epping, where connections to the T1 North Shore, Northern & Western Line are provided. The North West Rail Link is scheduled for completion in 2019. The future bus and rail network published in the NWGC Road Framework report is shown in Figure 6 for the area adjacent to the subject site.

3.4 Existing Site Generation

The existing site is currently accommodates single dwelling housing which is accessed via Cudgegong Road. As a result, traffic generation from the site is presently negligible.
Figure 5: Existing and Future Public Transport Routes
Figure 6: Future Public Transport Routes (Source: Area 20 DCP)
4. Description of Proposed Development

A detailed description of the proposed development is provided in the Statement of Environmental Effects prepared separately. In summary, the Stage 1 works for which approval is now sought comprises the following components:

- 289 high density units within two (2) buildings known as Building A-B and Building C-D, comprised of:
  - 55 one bedroom units.
  - 22 three bedroom units;
  - 212 two bedroom units; and

- Two (2) levels of basement car park within the western residential building providing 203 spaces

- Two (2) levels of basement car park within the eastern residential building providing 180 spaces

- Provision of two (2) north-south traversing through links for pedestrian manoeuvrability and on-site

- Provision of a roundabout at the intersection of New East-West Street 02 and the existing Cudgegong Road.

In addition the Stage 2 concept plan for which approval is now sought comprises the following components:

- A total of four (4) buildings known as Building 3A, 3B, 4A and 4B.

- An expected yield of 476 high density units within two (2) of these buildings, with an expected configuration of:
  - 58 one bedroom units.
  - 154 two bedroom units; and
  - 28 three bedroom units;
An expected yield of 9,600m² GFA retail & commercial development, including supermarket, specialty retail and restaurant facilities.

Three levels of basement car park beneath buildings 4A & 4B

Three levels of basement car park beneath buildings 3A & 3B.

The Cudgegong Town Centre development will include the provision of a local road network to service the development including:

Four (4) new local roads with two (2) along the northern and southern site boundary with connections to Cudgegong Road in the east and two (2) north-south traversing roads connecting the local roads.

The proposed development described above is in-line with the Development Principles for Cudgegong Local Centre as shown in Schedule 4 of the Blacktown DCP: Area 20 Cudgegong Road Station and provided in Figure 7 below. The traffic and parking impacts arising from the development are discussed in Sections 5 and 6. Reference should be made to the architectural plans submitted separately to Council which are presented at reduced scale in Appendix B.
Figure 7: Development Principles for Cudgegong Local Centre (Source: Area 20 DCP)
5. Parking Requirements

5.1 Council Controls

The Blacktown City Council DCP 2015 (Part A - Section 6) provides parking rates for multi dwelling housing and retail developments as follows:

- 1 car parking space per dwelling plus 0.5 spaces per 3 or more bedroom dwelling, plus 1 visitor space per 5 dwellings.
- 1 space per 30 m² GFA for retail shops less than 200 m² GFA and 1 space per 22 m² for retail shops greater than 200 m².

However, it is noted the proposed development lies within 800m of a proposed network railway station, hence the controls within the State Environmental Planning Policy 65 (SEPP 65) applies to this DA. The SEPP 65 requires the RMS Guide to Traffic Generating Developments be utilised for calculating minimum parking provisions for residential developments if lower than the DCP Controls.

5.1.1 Stage 1 Residential Development

As detailed in Section 4 of this report, the proposed Stage 1 Development includes the provision of 289 units. Table 1 below provides the parking requirements for the proposed development under Council’s DCP and the RMS Guide.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number/Area</th>
<th>SEPP65 Parking Rate</th>
<th>Council Parking Rate</th>
<th>SEPP65 Parking Requirement</th>
<th>Council Parking Requirement</th>
<th>No. Spaces Provided</th>
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</thead>
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<tr>
<td>Stage 1: Residential</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Bedroom</td>
<td>55</td>
<td>0.6 spaces per unit</td>
<td>1 space per unit</td>
<td>33</td>
<td>55</td>
<td>311</td>
</tr>
<tr>
<td>2 Bedroom</td>
<td>212</td>
<td>0.96 spaces per unit</td>
<td>1 space per unit</td>
<td>204</td>
<td>212</td>
<td></td>
</tr>
<tr>
<td>3 Bedroom</td>
<td>22</td>
<td>1.4 spaces per unit</td>
<td>1.5 spaces per unit</td>
<td>31</td>
<td>31</td>
<td></td>
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<tr>
<td>Visitor</td>
<td>289</td>
<td>1 space per 5 units</td>
<td>1 space per 5 apartments</td>
<td>58</td>
<td>58</td>
<td>59</td>
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Table 1: Council Parking Requirements and Provision
As shown in Table 1, the development is required to provide 356 car parking spaces under Council’s DCP and 326 car parking spaces under SEPP 65. In response, the development provides 370 parking spaces across four (4) basement parking levels with two (2) basement car park levels in each residential building, 141 spaces are provided in Building A-B and 170 spaces are provided in Building C-D. The proposal complies with the minimum requirements as set out in the Blacktown City Council DCP and SEPP 65 and is considered acceptable for the Stage 1 Residential Development.

5.1.2 Stage 2 Residential & Commercial Development

The Stage 2 Development has been assessed against an indicative provision of 472 units and 9,600m² retail GFA. Indicative yields for the retail / commercial components have also been provided as set out in Table 2, in addition to the parking requirements for these indicative yields.

Table 2: Council Parking Requirements and Provision

<table>
<thead>
<tr>
<th>Type</th>
<th>Number / Area</th>
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<th>Council Parking Rate</th>
<th>SEPP65 Parking Requirement</th>
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<tr>
<td>1 Bedroom</td>
<td>113</td>
<td>0.6 spaces per unit</td>
<td>1 space per unit</td>
<td>68</td>
<td>113</td>
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<tr>
<td>2 Bedroom</td>
<td>308</td>
<td>0.96 spaces per unit</td>
<td>1 space per unit</td>
<td>296</td>
<td>308</td>
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<tr>
<td>3 Bedroom</td>
<td>55</td>
<td>1.4 spaces per unit</td>
<td>1.5 spaces per unit</td>
<td>77</td>
<td>83</td>
</tr>
<tr>
<td>Visitor</td>
<td>476</td>
<td>1 space per 5 units</td>
<td>1 space per 5 apartments</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Total:</td>
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<td></td>
<td></td>
<td>619</td>
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<table>
<thead>
<tr>
<th>Retail / Commercial</th>
<th>Number / Area</th>
<th>SEPP65 Parking Rate</th>
<th>Council Parking Rate</th>
<th>SEPP65 Parking Requirement</th>
<th>Council Parking Requirement</th>
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<tr>
<td>Office</td>
<td>105m²</td>
<td>-</td>
<td>1 space per 40m² GFA</td>
<td>-</td>
<td>3</td>
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<tr>
<td>Restaurant</td>
<td>303m²</td>
<td>-</td>
<td>1 space per 30m² GFA</td>
<td>-</td>
<td>10</td>
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<tr>
<td>Supermarket</td>
<td>3,510m²</td>
<td>-</td>
<td>1 space per 22m² GFA</td>
<td>-</td>
<td>160</td>
</tr>
<tr>
<td>Specialty Retail</td>
<td>5,682m²</td>
<td>-</td>
<td>1 space per 30m² GFA</td>
<td>-</td>
<td>189</td>
</tr>
<tr>
<td>Total:</td>
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<td></td>
<td>-</td>
<td>362</td>
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*Assumed as Retail shop > 200m² GFA
It is noted from the assessment of the preliminary yields that the Stage 2 development shall require in the order of 536 vehicle spaces for residents and 362 spaces for the retail / commercial uses.

The detailed design of this parking provision shall be further assessed at a subsequent Development Application stage, however preliminary analysis indicates the provision of three levels of parking under each block shall be capable of accommodating this requirement in full compliance with AS2890.

5.2 Accessible Parking

It is noted from BCC Growth Centre DCP 2016 that for all residential flat building developments containing 10 dwellings or more, a minimum of 10% of all apartments are to be designed to be capable of adaptation for access by people with all levels of mobility.

Car parking and garages allocated to adaptable dwellings must comply with the requirements of Australian Standards for disabled parking spaces. In addition, AS 4299 (1995) requires an accessible parking space for each adaptable unit. Accordingly, the development requires to provide the minimum adaptable units/accessible parking rate as shown in Table 3 below:

<table>
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<th>Table 3: Council Adaptable Units / Accessible Parking Rates and Provision</th>
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<td><strong>Type</strong></td>
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<tr>
<td>Stage 1</td>
</tr>
<tr>
<td>Adaptable Units</td>
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<tr>
<td>Total</td>
</tr>
<tr>
<td>Stage 2</td>
</tr>
<tr>
<td>Adaptable Units</td>
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<tr>
<td>Total</td>
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It can be seen from Table 3 that the proposed Stage 1 development provides 29 adaptable units and therefore requires 29 accessible parking spaces. In response, the proposed development provides 33 spaces, satisfying Council and AS 4299 requirements. It is noteworthy that the disabled parking
spaces have been designed in accordance with AS 2890.6 (2009) Part 6: Off-street parking for people with disabilities.

**Table 3** also demonstrates that the provision of 476 apartments in the Stage 2 development will include 48 adaptable units and therefore require a minimum of 48 accessible parking spaces. It is considered that the proposed basement car park will readily accommodate this requirement with all accessible parking spaces to be provided in accordance with AS2890.6 (2009) Part 6: Off-street parking for people with disabilities.

### 5.3 Motorcycle Parking

The Blacktown Council DCP does not provide specific rates for the provision of motorcycle parking, therefore the proposed development has not provided any dedicated motorcycle parking. It is noted that the development provides ample parking which could be allocated to motorcycle parking if required by Council.

### 5.4 Car Share Parking

The Blacktown Council DCP does not provide specific rates for the provision of car share parking, therefore the proposed development has not proposed any car share parking on site. It is noted that the development provides ample parking which could be allocated to car share parking if required by Council, however with a need for car share spaces to be accessible by members of the general public it is recommended any proposed car share spaces be allocated to on street parking on the new streets proposed, rather than within the secure basement parking.

### 5.5 Bicycle Parking

The Blacktown City Council Growth Centre Precincts (BCC GCP) DCP requires bicycle parking to be provide at a rate of 1 space per 3 dwellings. Therefore, the development is required to provide bicycle parking as summarised in **Table 4** overleaf.
### Table 4: Council Bicycle Parking Requirements and Provision

<table>
<thead>
<tr>
<th>Type</th>
<th>Number / Area</th>
<th>DCP Parking Rate</th>
<th>Requirement</th>
<th>No. Spaces Provided</th>
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<tr>
<td><strong>Stage 1:</strong></td>
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<tr>
<td>Dwelling</td>
<td>239</td>
<td>1 space per 3 dwellings</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td><strong>Stage 2:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwelling</td>
<td>476</td>
<td>1 space per 3 dwellings</td>
<td>159</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>159</td>
<td>-</td>
</tr>
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</table>

It can be seen from **Table 4** that the proposed Stage 1 development requires a total of 80 bicycle parking spaces. In response, the development proposes 85 bicycle parking spaces for residents, 47 in Building A-B and 38 in building C-D. Hence, the Stage 1 development satisfies Council requirements and is considered acceptable.

**Table 4** also identifies the expected bicycle parking requirements for the residential component of Stage 2 of the development. The development is expected to require in the order of 159 bicycle parking spaces for the residential component.

The Blacktown City Council DCP and the Growth Centre Precinct DCP do not nominate a specific rate for the provision of bicycle parking for commercial / retail developments. Should Council require the provision of bicycle parking for these uses a rate of 1 space per 300m² for staff and 1 space per 500m² for visitors is recommended in the AUSTROADs Guide to Traffic Management (Part 11 - Section C2.2).

It is noted the details of the proposed bicycle parking provision shall be addressed under a future Development Application for Stage 2.

#### 5.6 Servicing

The BCC Growth Centre DCP 2016 does not provide a rate for the provision of service vehicle parking. Notwithstanding, the development proposes all servicing and garbage collection for both
5.6.1 Stage 1 Residential Development

The development proposes all servicing and garbage collection within the Stage 1 site from two (2) ‘Through Site Links’ which will allow trucks to traverse in a north-south direction through each of the western and eastern residential buildings.

The expected generation is for an average of less than one vehicle per day to use the shared space. The frequency is defined as ‘occasional servicing’ in AS2890.2, with the Australian standards indicating a reverse manoeuvre is permissible at this frequency. Nevertheless, all movements to and from site shall be undertaken in a forward direction.

Swept path analysis has been undertaken for a 12.5m HRV in accordance with AS 2890.2 (2002), which confirms satisfactory operation and is provided in Appendix C.

5.6.2 Stage 2 Mixed-Use Development

The Stage 2 development proposes all servicing and garbage collection from two (2) loading docks, one (1) in each of the eastern and western blocks.

The loading dock access for the eastern block will be designed to accommodate a 19m Articulated Vehicle to service a potential supermarket in addition to residential refuge collection, with access provided to Cudgegong Road. The loading dock access for the western block shall be provided from New East-West Street 1, it shall be designed for a 12.5m HRV and accommodate general retail servicing in addition to residential refuge collection. A preliminary assessment indicates a turntable shall be provided in each dock to allow forward entry and egress.

Reference should also be made to the Precinct Indicative Layout Plan which is included in Appendix A for the proposed servicing access locations for Stage 2.
6. Traffic Impacts

6.1 Trip Generation

The RMS Technical Direction 2013/04a (TD 2013/04a) was published in August 2013 documenting updated trip rate and research data to that published in the RMS Guide to Traffic Generating Developments. It is particularly noteworthy that the Technical direction states that "the information herein should be used to supplement the current Guide and replace those sections of the Guide indicated". The following sections detail the expected traffic generation for each component of the proposed development based on those rates.

6.1.1 Stage 1 Residential Development

The trip rates that apply to the high density residential dwellings are:

- AM peak: 0.19 vehicle trips/dwelling; and
- PM peak: 0.15 vehicle trips/dwelling.

The application of the above rates to the schedule of units discussed in Section 4, adopting a directional split of 80% in the direction of peak flow, results in the following trip generation for the 289 units in the proposed development:

- AM peak: 44 veh/hr (11 in, 44 out); and
- PM peak: 43 veh/hr (35 in, 8 out).

The proposed Stage 1 development is under the maximum allowable development for the area under Schedule 4 of the Blacktown DCP: Area 20 Cudgegong Road Station. The trip generation detailed above is considered to be readily accommodated within the local road network with the upgrades that have already been proposed for the precinct.

6.1.2 Stage 2 Mixed-Use Development

The Stage 2 Mixed Use Development is subject to the controls outlined in Schedule 4 of the Blacktown DCP: Area 20 Cudgegong Road Station for the retail yield, the building height controls and the floor space ratio as follows:
The retail and commercial floor area within the Local Centre may be in the order of 12,500m² – 15,000m² to ensure that the Centre functions with its position in the regional centres hierarchy.

Retail Premises in a B4 Mixed Use Zone shall be a maximum of 300m² for any single premises to ensure the distribution of retail use is concentrated in the local centre.

The Local centre is to be a compact, mixed use centre with a high level of public transport accessibility to Cudgegong Road Station demonstrating the important principles of Transit Oriented Development.

A range of building heights is permitted, generally 2-6 storeys (15m) up to 6-8 storeys (26m).

The Area 20 Precinct Finalisation Report by The Department of Planning and Environment (2015) identified that the floor to space ratio (FSR) for the Area 20 precinct would be provided with a control of 2.75:1 for the Town Centre.

It is noted the proposed Stage 2 development meets all requirements of Schedule 4 of the Blacktown DCP: Area 20 Cudgegong Road Station for building heights and FSR provisions. It is also noted an additional B2 zone is provided within Area 20, south of the Cudgegong Railway Station site. Hence the proposed 9,600m² of retail and commercial development within Stage 2 of this proposal provides 64% - 77% of the expected 12,500m² to 15,000m² GFA for the Area 20 precinct.

As such, it is considered that the proposed Stage 2 development is in line with the requirements of Schedule 4 of the Blacktown DCP: Area 20 Cudgegong Road Station and hence the road network and intersection upgrades as proposed in the DCP, shall readily accommodate the Stage 2 development.

The Precinct Road Hierarchy and intersection treatments are shown in Figure 8 overleaf, for reference.
Figure 8: Area 20 Precinct Future Road Hierarchy (Source: Area 20 DCP)
In order to assess an indicative yield for the Stage 2 concept plan the RMS Guide to Traffic Generating Developments provides the trip generation for residential, supermarket, retail, restaurant and commercial developments as presented in Table 5 below. It is noted that ARUP completed a Transport and Access Study for the Riverstone East Precinct (2015) for the Precinct adjacent to Area 20 and the traffic generation rates for the ARUP study are in line with the rates presented below.

### Table 5: Trip Generation for Stage 2 Proposed Mixed-Use Development

<table>
<thead>
<tr>
<th>Type</th>
<th>No / Area</th>
<th>AM Rate</th>
<th>PM Rate</th>
<th>AM Rate</th>
<th>PM Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>476</td>
<td>0.19 vehicle trips per dwelling</td>
<td>0.15 vehicle trips per dwelling</td>
<td>90</td>
<td>71</td>
</tr>
<tr>
<td>Supermarket</td>
<td>3,510m²</td>
<td>9.38 vehicle trips per 100m²</td>
<td>12.50 vehicle per 100m²;</td>
<td>329</td>
<td>439</td>
</tr>
<tr>
<td>Specialty Retail</td>
<td>5,682m²</td>
<td>1.15 vehicle trips per 100m²</td>
<td>4.60 vehicle per 100m²</td>
<td>65</td>
<td>261</td>
</tr>
<tr>
<td>Restaurant</td>
<td>303m²</td>
<td>1.25 vehicle trips per 100m²</td>
<td>5.00 vehicle per 100m²</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Commercial</td>
<td>105m²</td>
<td>1.60 vehicle trips per 100m²</td>
<td>1.20 vehicle per 100m²</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td><strong>490</strong></td>
<td><strong>787</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 5 the trip generation of the proposed Stage 2 development is 490 vehicle trips during the AM peak period and 787 vehicle trips in the PM peak period, distributed as outlined in Section 6.2.

### 6.2 Trip Distribution

The ARUP Transport and Access Guide for the Riverstone East Precinct (2015) included the results of traffic surveys undertaken in March 2014 to establish the existing traffic volumes and distributions within the Riverstone Precinct, adjacent to the Area 20 precinct in which the subject site falls. The results of those surveys demonstrated the distribution of traffic as follows:

- **AM Peak period**

  60% of development traffic to be distributed towards the east

  40% of development traffic to be distributed towards the west.
PM Peak period

40% of development traffic to be distributed towards the east

60% of development traffic to be distributed towards the west.

The distribution of traffic was included in the strategic modelling for the Riverstone East Precinct and the Area 20 DCP as discussed in Section 6.1 of this report. The proposed development yield is in line with the requirements of the DCP and the traffic volumes and the distribution of such traffic is considered to be accommodated by the proposed road network upgrades for the Area 20 precinct.

Hence it is concluded the traffic generation calculate in Section 6.1 is within the threshold that is inherent in this strategic planning and is considered supportable.
7. Access & Internal Design Aspects

7.1 Access

7.1.1 Stage 1 Residential Development

The development proposes a total of 383 parking spaces with access to New East-West Street 01, a local road. The western residential building provides a total of 203 car parking spaces and the eastern building provides 180 spaces. Therefore, both residential buildings require a Category 2 driveway under AS 2890.1 (2004), being a combined 6.0 to 9.0 metres. In response, the development proposes two (2) 7.2 metre-wide driveways, which meets this requirement. As the proposal includes residential and visitor access for both car parks an intercom will be provided along each access for security.

Swept path analysis has been undertaken of the proposed arrangements with the use of a B99 vehicle in accordance with AS 2890.1 (2004). The site accesses and internal roads have been tested using swept path analysis, attached in Appendix C and demonstrate satisfactory operation based on AS2890.1 (2004) requirements.

Additionally, each residential building proposes a ‘through site link’ as a pedestrian link which will be utilised for occasional servicing. The frequency of the proposed servicing requirements are expected to be less than once per day on average.

Each through site link provides and access driveway on New East-West Street 01 and an egress driveway on New East-West Street 02. Swept path analysis confirms satisfactory operation of all access and egress points with a 12.5m HRV, which is considered to be the largest vehicle accessing the site. The swept path analysis is included in Appendix C, for reference. It is noted that the proposed access driveways for the through site links are provided adjacent to the proposed residential car park access driveways.

To ensure an appropriate delineation for pedestrians, a separation of a minimum of 1 metre is provided between the residential and through site link access driveways. In addition, a delineated roll top kerb treatment and footway paving has been provided to aid pedestrians. It is noteworthy however that the pedestrian through site link receives a minimal volume of vehicle traffic and exiting service vehicles shall be required to give way to pedestrians ensuring pedestrian safety.
7.1.2 Stage 2 Mixed-Use Development

As discussed in section 5.6.2 of this report Stage 2 will provide two loading access points for the eastern building loading dock access will be provided on Cudgegong Road and the western building loading dock access will be provided from New East-West Street 1.

In addition to the access for servicing two access points are proposed for the residential and commercial components. One access will be provided from Cudgegong Road and one from New North-South Street 1. Reference should be made to the Precinct Indicative Layout Plan which is included in Appendix A for the proposed access locations for Stage 2. The detailed design of these access treatments for Stage 2 shall be completed in a subsequent Development Application.

7.2 Internal Road Network

7.2.1 DCP Requirements:

The objectives of Blacktown City Council Growth Centre Precincts DCP 2010 with regards to the layout and design of new roads include:

- To establish a hierarchy of interconnected streets that give safe, convenient and clear access within and beyond the Precinct;
- To assist in managing the environmental impacts of urban development including soil salinity and stormwater;
- To contribute to the creation of an interesting and attractive streetscape;
- To facilitate energy efficient lot and building orientation; and

The typical geometric road design for a Local Street proposed within the DCP and Council’s Engineering Guide for Development is shown in Figure 9, overleaf.
The key features of a Local Street under Council’s DCP is summarised in **Table 6** below.

### Table 6: Required Internal Road Geometric Design

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Road Reserve</th>
<th>Carriageway</th>
<th>Nature Strip</th>
<th>Speed Limit</th>
<th>AADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Street</td>
<td>16.0m</td>
<td>9.0m</td>
<td>2x3.5m</td>
<td>50km/h</td>
<td>1,000 – 3,000</td>
</tr>
</tbody>
</table>

#### 7.2.2 Proposed Design:

The indicative internal road network is shown in **Appendix A** and seeks to provide efficient connectivity to all lots within the Stage 1 development. The proposed carriageway widths for the internal road network are as follows:

- 11.0m carriageway for the New East-West streets 01 & 02 with 3.5m wide verge on the northern and southern sides;
- 11.0m carriageway for the New North-South Street 01 with 3.5m wide verge on the northern and southern sides; and
11.3m carriageway for North-South Street 02 (Main Street) with a 6.85m verge on the eastern and western side

Based on the above, the proposed future road layout exceeds the requirements of Council’s DCP and is considered to be a superior arrangement. Additionally, the site distances achieved at each of the proposed intersections meet the minimum requirements as set out in Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections which nominates a safe intersection site distance of 97 metres for roads with a 50km/h 85th percentile speed. Furthermore, an 85th percentile roundabout speed of 30km/h has been assumed for the proposed roundabout leading to a requirement for 33m of approach sight distance. A plan indicated the sight distance at each proposed new intersection is included in Appendix D. Reference should be made to the Civil Engineering report prepared separately in support of this development application, for any additional information concerning the detailed design of the road and internal intersection layouts.

7.3 Internal Design Aspects for Stage 1

7.3.1 Residential Parking:

The car parking provided on-site within the site boundary complies with the requirements of the AS 2890.1 (2004) and the following characteristics are noteworthy:

- All residential parking spaces have been designed in accordance with a Class 1A user and are provided with a minimum space length of 5.4m a minimum width of 2.4m and a minimum aisle width of 5.8m;

- All disabled parking spaces are designed in accordance with AS 2890.6 (2009). Spaces are provided with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.

- All spaces located adjacent to obstructions of greater than 150mm in height are provided with an additional width of 300mm; and

- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.

- A 600mm island has been provided to accommodate an intercom for secure access to the residential basement carparks.
7.3.2 Ramps

- The ramps between the basement, ground and upper ground levels have been assessed in accordance with the requirements of AS 2890.1 (2004) and this demonstrates satisfactory operation.

- The vehicular ramp has a gradient of 5% (1 in 20) for the first 6m inside the property boundary and vehicular control points, in accordance with Clause 3.3 of AS 2890.1 (2004).

- The vehicular ramp has transitions provided at 10% (1 in 10) for a minimum of 2m and a maximum grade of 1:5, in accordance with the minimum requirements of AS 2890.1 (2004).

7.3.3 Clear Head heights

- A minimum clear head height of 2.2m is provided for all areas within the basement car park as required by AS 2890.1 (2004).

- A clear head height of 2.5m is provided above all disabled spaces and shared areas, as required by AS 2890.6 (2009).

- A minimum clear head height of 4.5m is provided for the through site link.

7.3.4 Other Considerations

- All columns are to be located outside of the parking space design envelope shown in Figure 5.2 of AS 2890.1 (2004).

- Appropriate visual splays are provided in accordance with the requirements of Figure 3.3 of AS 2890.1 (2004) at the vehicular accesses.

- A swept path analysis of all critical movements has been undertaken to confirm geometry and compliance with the relevant standards.

7.3.5 Service Area Design

- The internal design of the service area has been undertaken in accordance with the requirements of AS 28909.2 (2002) for the maximum length vehicle proposed on site being a 12.5m HRV vehicle.

- A swept path analysis has been undertaken as permissible under AS 2890.2 (2002) and confirms the internal design. The swept path assessment is included in Appendix C.
In summary, all on-site car parking areas have been designed in accordance with the AS2890.1, AS2890.2 and AS2890.6. It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

7.4 Internal Design Aspects for Stage 2

The detailed design for the Stage 2 development will be provided with the Development Application. All access, ramps and on-site car parking areas shall be designed in accordance with the AS2890.1 with servicing and accessibility requirements designed in accordance with AS2890.2 and AS2890.6 respectively.
8. Conclusions

In summary:

- The proposed development is referred to as the Cudgegong Town Centre development consisting of a Stage 1 Development Application and a Stage 2 concept plan.

- Stage 1 of the development consists of 239 residential dwellings, as well as construction of local and private road to service the entire development. The Stage 2 concept plan includes an indicative yield of 9,600m² GFA commercial / retail development and 476 residential dwellings.

- The proposed internal road network has been designed in accordance with Council’s DCP and the key geometric considerations are generally satisfied.

- The Stage 1 development satisfies the residential car parking requirements of the BCC Growth Centre DCP and in addition provides surplus parking for the visitor use. The parking provision for Stage 2 shall be assessed at a future Development Application stage.

- The traffic generation of Stage 1 of site is considered to be minimal, resulting in 46 veh/hr in the AM peak and 36 veh/hr in the PM peak (in and out movements combined). This traffic is dispersed and localised impacts will be very moderate, so that the proposal will not result in any material impact to the surrounding road network.

- The traffic generation of Stage 2 of the site is considered to be in line with the yields determined for the Area 20 Precinct and the nominated road upgrades outlined by the Riverstone East Traffic and Access Study by ARUP which was referred to in the Finalisation Report for the Area 20 Precinct by the Department of Planning. The proposed development will generate traffic that is within the threshold that is inherent in this strategic planning.

- The Stage 1 site accesses and internal roads have been assessed for access by the proposed service vehicle being an 12.5m HRV and demonstrates satisfactory operation based on the swept path analysis undertaken. The accesses for Stage 2 shall be assessed at a future Development Application stage.

It is therefore concluded that the proposal is supportable on traffic planning grounds.
Appendix A

Area 20 Indicative Layout Plan
Appendix B

Reduced Architectural Plans
Appendix C

Swept Path Analysis
Appendix D

Proposed Intersection Site Distance