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Greenfields Development Company No.2
08-Mar-2019

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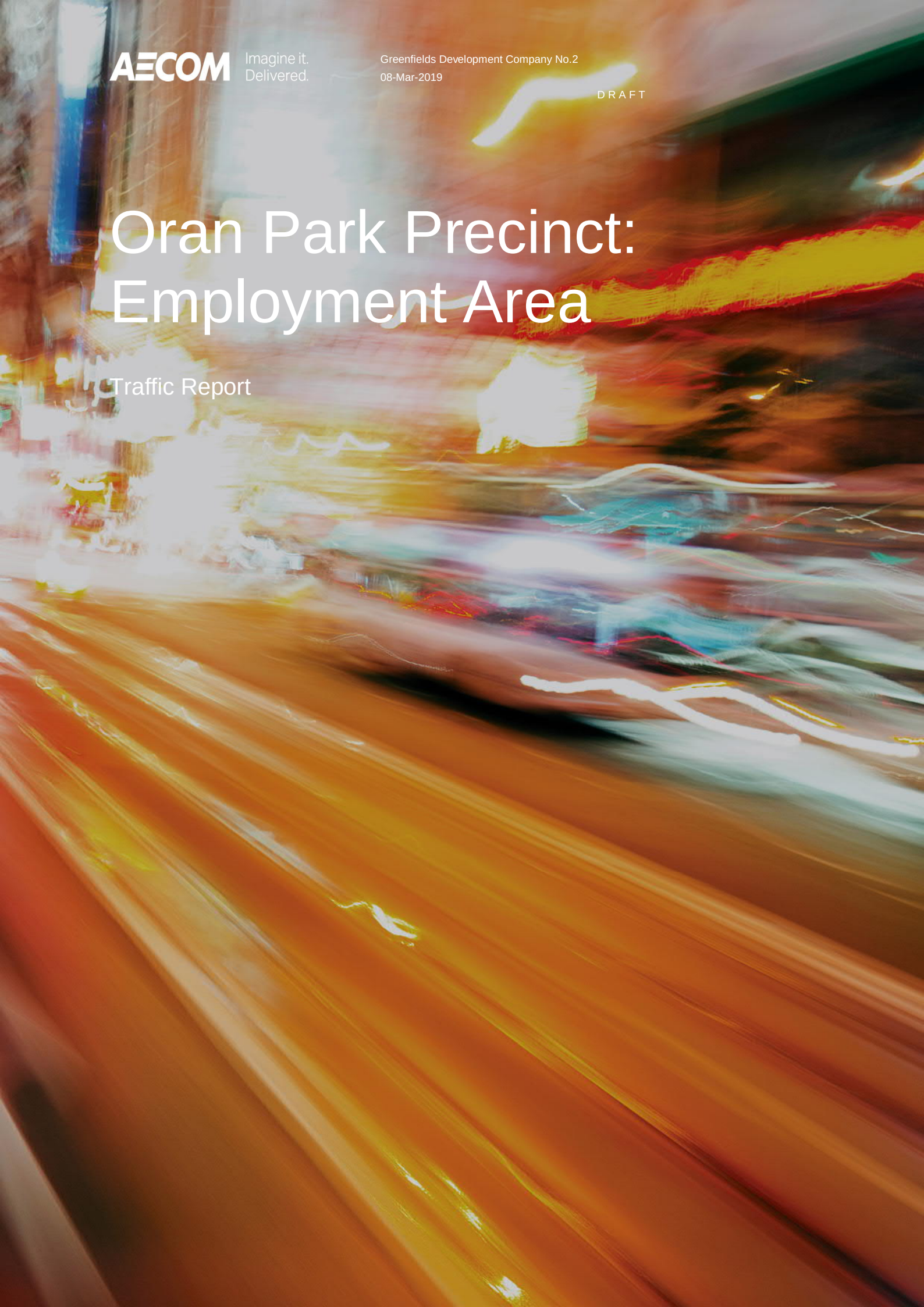
Oran Park Precinct: Employment Area

Traffic Report



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Oran Park Precinct: Employment Area

Traffic Report

Client: Greenfields Development Company No.2

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Quality Information

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			Name/Position	Signature
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B	08-Mar-2019	Draft Final	Nick Bernard Associate Director	

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1.0 Introduction

AECOM has been commissioned by Greenfields Development Company (GDC2) to prepare a traffic study to support the proposed modifications to the Oran Park Precinct Indicative Layout Plan (ILP). These proposed modifications seek to expand the Oran Park Employment Area by converting the adjacent residential area to the east to employment lands.

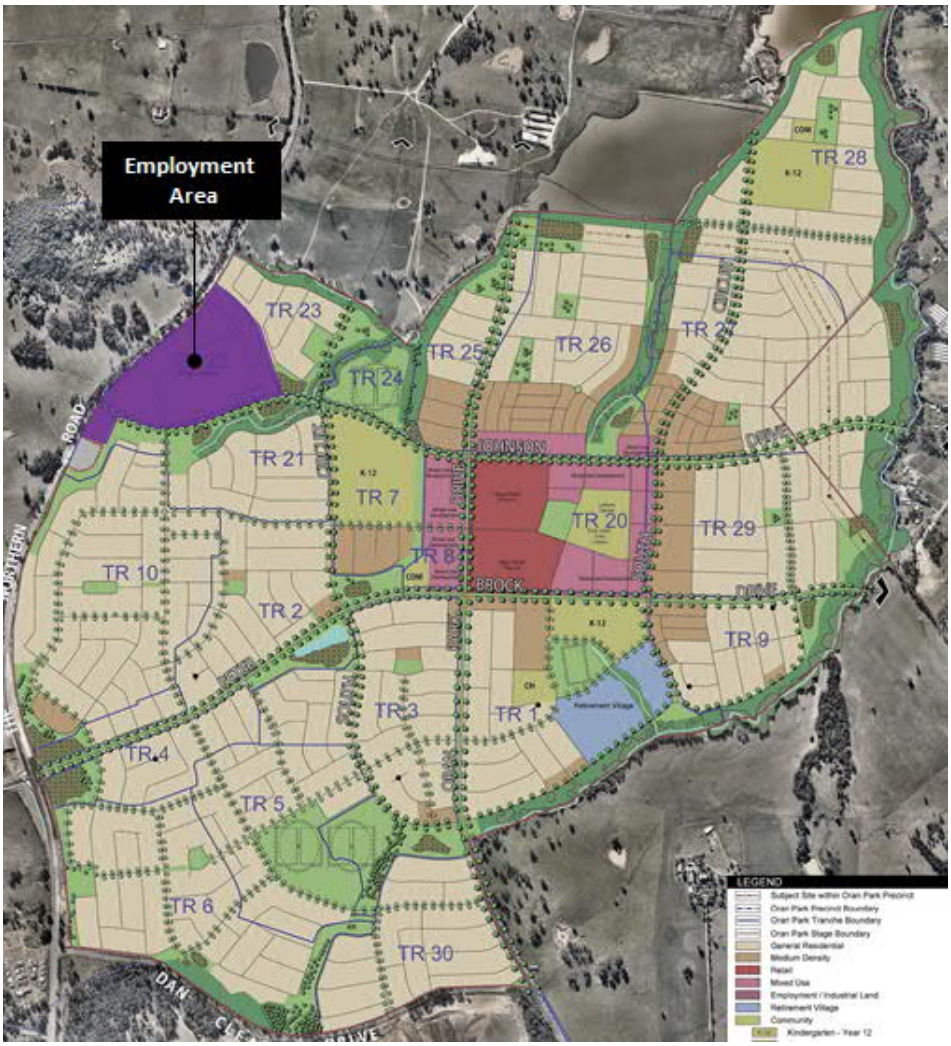
This traffic study has been prepared to support the Planning Proposal submission to Camden Council and assess the traffic and transport impacts of expanding the Oran Park Employment Area.

1.1 Background

Oran Park is a major land release area, located in the south west growth region of Sydney. It was rezoned for urban development and is one of the first areas to be planned under the NSW Government's South West Priority Growth Area (formerly the South West Growth Centre). Overall, the precinct has an area of 1,120 hectares and has been rezoned to allow for residential, business, industrial, special purpose, recreational and environmental projection uses, as shown in **Figure 1**.

The Oran Park Precinct Development Control Plan (DCP) was adopted in 2007 by the NSW Department of Planning and Infrastructure (now Department of Planning and Environment) with the intent that the precinct is developed to provide a hierarchy of interconnected streets with safe and convenient public transport, pedestrian and cycleway networks.

Figure 1 Oran Park Precinct – strategic context



Source: Design + Planning, 2018; modified by AECOM, 2019

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1.2 Report structure

The report is structured as follows:

- **Section 2.0** provides a summary of the proposed expansion to the Oran Park Employment Area and provides context from a transport perspective for the site.
- **Section 3.0** discusses the traffic implications associated with the proposed modifications, including forecast road network performance and SIDRA modelling results.
- **Section 4.0** provides a summary of the traffic assessment.

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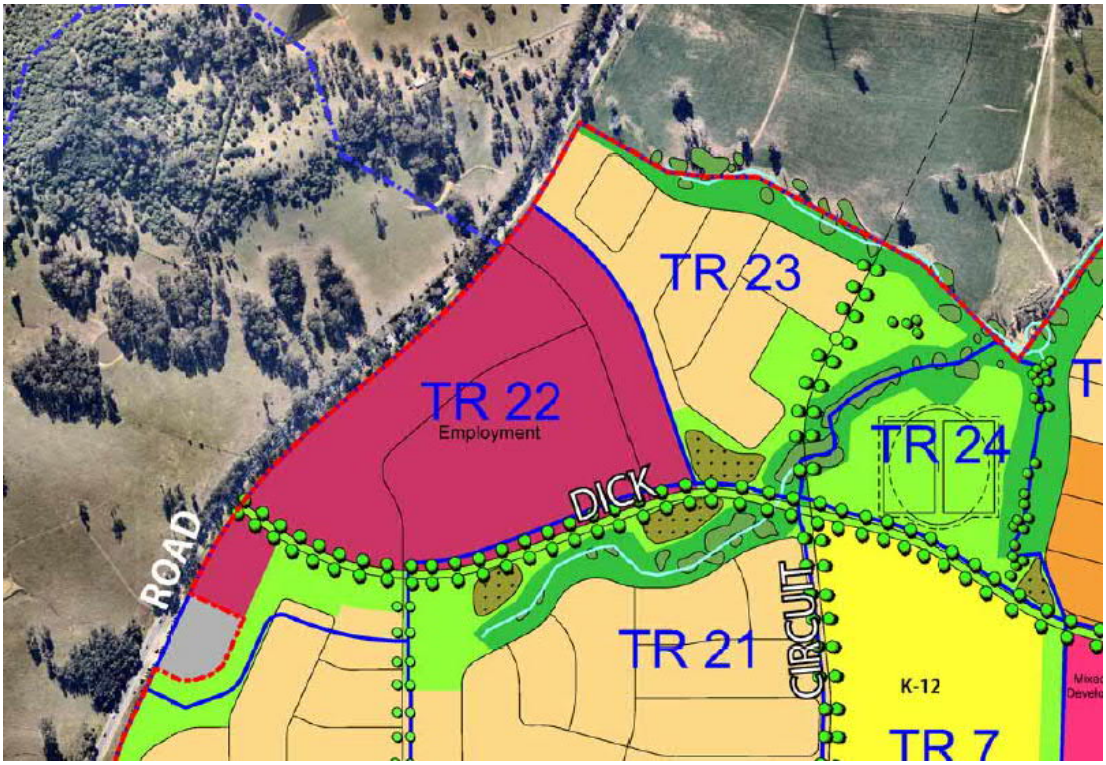
2.0 Oran Park Employment Area

2.1 Current context

The Oran Park Employment Area is located in the north-west section of Oran Park Precinct. It is currently zoned as IN1 – General Industrial under the *SEPP (Sydney Region Growth Centres) 2006.* The Employment Area forms Tranche (TR) 22 of the precinct and is adjacent to the residential areas of TR 21 and TR 23, as shown in **Figure 2**.

The Oran Park Employment Area is expected to provide for a range of employment-generating uses, including industrial, light industrial, warehouse and distribution uses. Higher employment-generating uses are preferred to meet the objective of providing opportunities for local employment within Oran Park Precinct and the wider area.

Figure 2 Oran Park Employment Area



Source: Design + Planning, 2018

The development of Oran Park is to be generally in accordance with the ILP and other controls within the Oran Park Precinct Development Control Plan (DCP). The consent authority is administered by Camden Council.

The Oran Park DCP was prepared by the NSW Department of Planning and adopted in 2007. The DCP contains objectives and development controls relating to the overall layout and vision for the future development of the precinct.

The DCP has two parts:

- Part A contains general objectives and controls that apply to development across the whole precinct
- Part B provides site specific DCPs relating to areas that require further detailed planning, including the Oran Park Employment Area.

It is understood more details with regard to planning and design controls in the form of a Part B amendment to the DCP is currently being prepared for the Oran Park Employment Area.

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2.2 Proposed expansion

The proposed expansion is seeking to convert the adjacent residential area of TR 23 to form part of the Oran Park Employment Area. This results in a total area of approximately 22ha and modifications to the internal road network for the Oran Park Employment Area, as shown in **Figure 3**.

Figure 3 Oran Park Employment Area expansion

Source: Design + Planning, 2019

It is understood the expanded Oran Park Employment Area would contain a mix of IN1 – General Industrial and B5 – Business Development uses. A breakdown of intended land uses is provided in **Table 1**.

Table 1 Proposed land use in the expanded Employment Area

Land Use	Proposed area (ha)
IN1 – General Industrial	18.14
B5 – Business Development*	3.86
Total Employment Area	**22.00**

* permissible retail which at this stage is understood to likely be bulky goods

As shown in **Figure 3,** multiple access points to the site are proposed: along The Northern Road (left-slip lane), Dick Johnson Drive (roundabout) and North Circuit (roundabout and priority intersection). A separate left-in only and left-out only access point is proposed along Dick Johnson Drive, which is understood is to provide access to car parking areas for the B5 – Business Development component of the Oran Park Employment Area.

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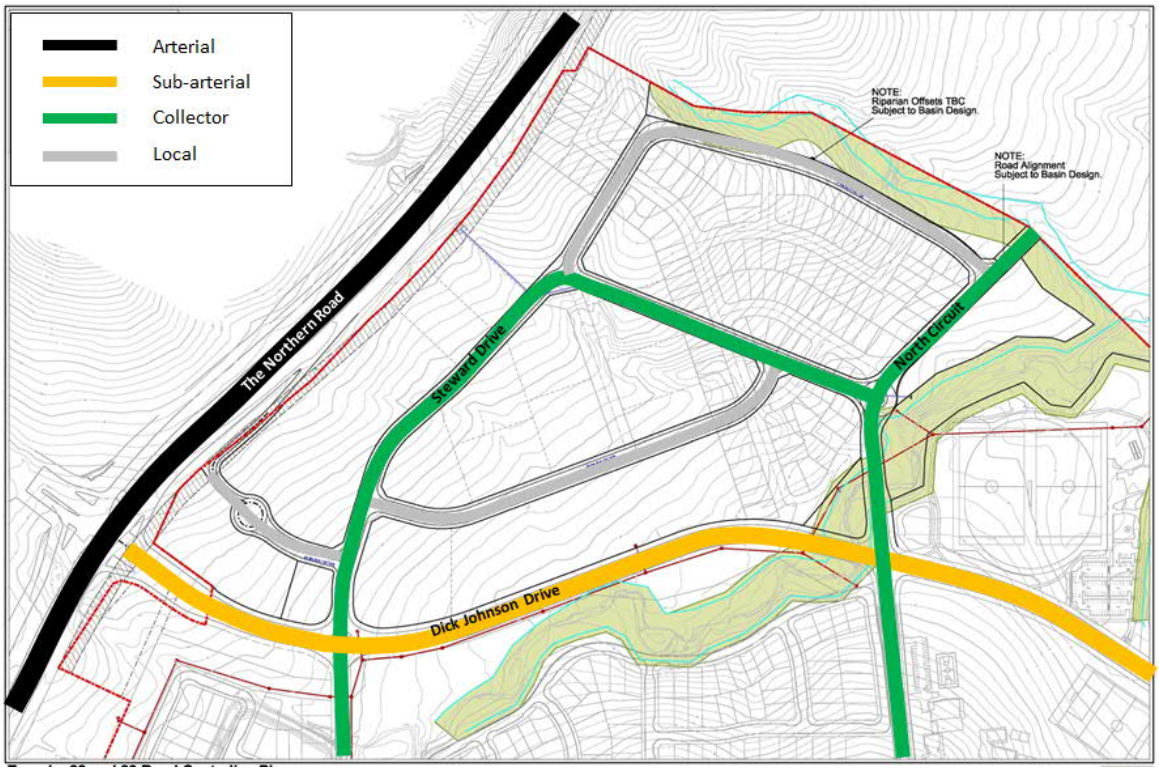
2.3 Road network

The design of the road network within the precinct caters for a range of transport modes and provides an integrated hierarchy of roads to facilitate residential amenity, traffic efficiency and safety. The Oran Park road network has been designed with a clear hierarchy of roads that are well distributed and enable access to and from the Oran Park Employment Area.

Figure 4 Oran Park Employment Area road network



Source: Design + Planning, 2019; modified by AECOM, 2019

Key roads surrounding the study area are shown in **Figure 4,** which include:

- The Northern Road is an arterial road providing a north-south link from Oran Park Precinct to surrounding suburbs and the greater arterial road network. The road connects the sub-arterial road of Dick Johnson Drive to the M4 Western Motorway (to the north) and the Hume Motorway (to the south). A proposed southbound slip lane will provide vehicles direct access from The Northern Road into the Oran Park Employment Area.
- Dick Johnson Road is currently planned as a four-lane sub-arterial road, providing an east-west link through the Oran Park Precinct. It provides access to the wider strategic road network through connections to The Northern Road (to the west), Leppington (to the north-east) and Camden Valley Way (to the east). Dick Johnson Drive will provide bus services to the Town Centre and surrounding areas through stops located at the eastern end of the Employment Area.
- Steward Drive is a two-lane collector road providing a north-south link between Peter Brock Drive and Dick Johnson Drive. Steward Drive (north of Dick Johnson Drive) will primarily service industrial vehicles and people employed within the area, connecting them to the sub-arterial road network.
- North Circuit is a two-lane collector road providing a link from Dick Johnson Drive to the Oran Park Employment Area. It operates as higher order collector road that serves local and through traffic and provides drivers with a route choice to avoid perceived congestion on the higher order roads. North Circuit will also service industrial vehicles and employees within the area.

Swept path analysis should be undertaken during the detailed stage to ensure that the internal road network is able to accommodate the manoeuvring of heavy vehicles.

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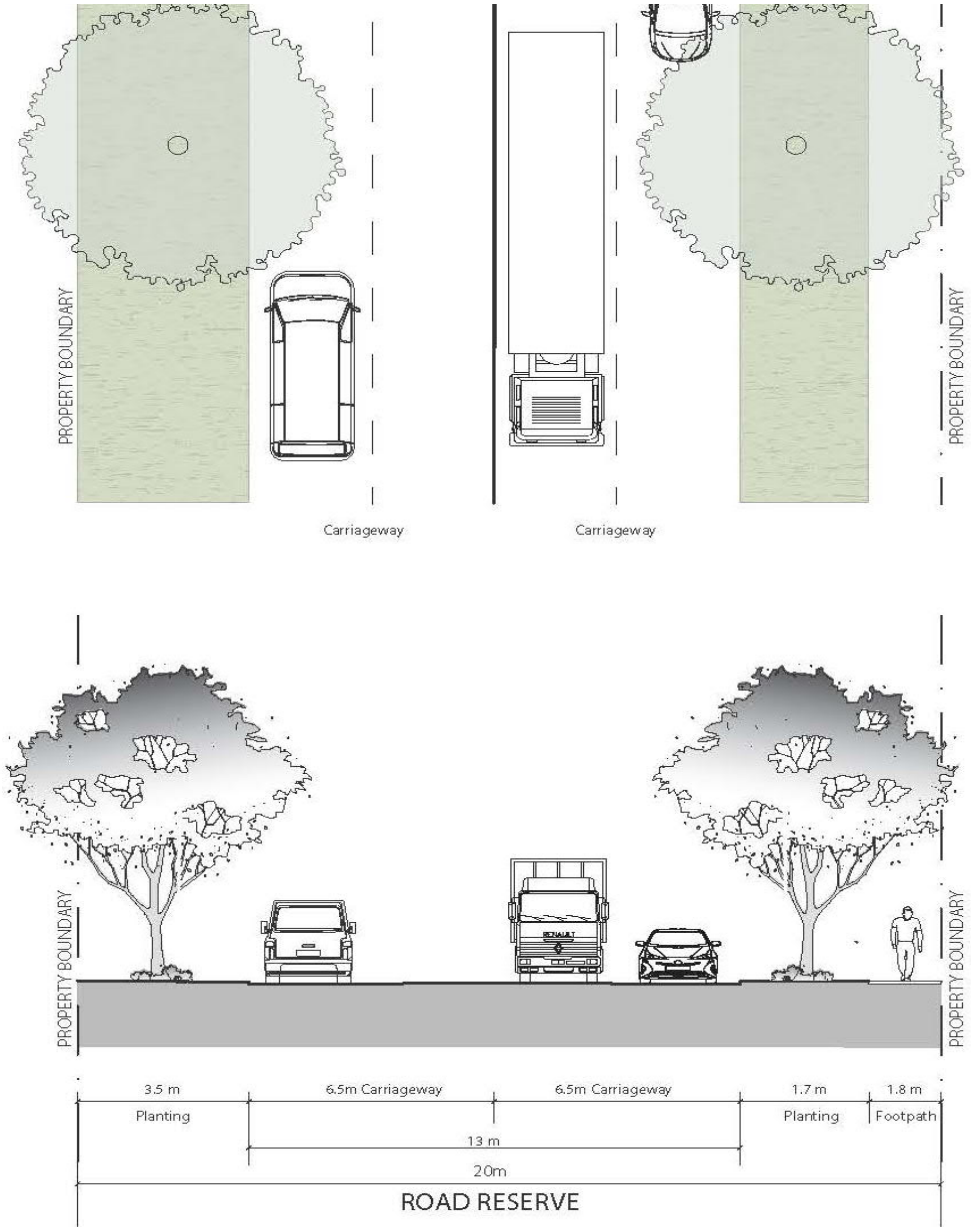
2.4 Cross-sections

Roads within the Oran Park Employment Area would be required to accommodate heavy vehicles, which would need a travel lane width of 3.5m. The typical road cross-section for internal roads is presented in **Figure 5**.

Figure 5 Typical road cross-section



Source: GDC2, 2019

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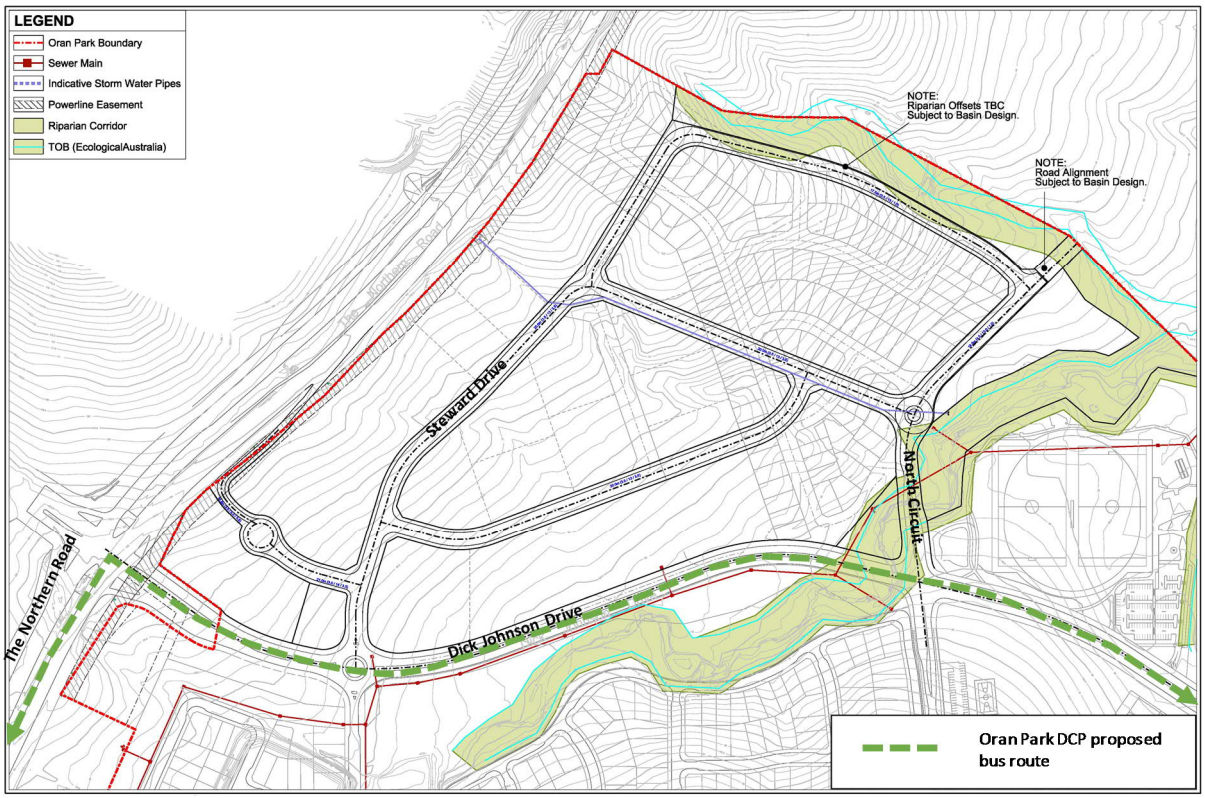
2.5 Public transport

The Oran Park public transport network has been developed to encourage the provision and use of public transport within Oran Park Precinct. Key bus routes have been identified in the Oran Park DCP, which aim to connect areas within the precinct to the Town Centre and nearby key local centres. This includes bus operations along Dick Johnson Drive, which fronts the Oran Park Employment Area.

Figure 6 illustrates the bus routes within the vicinity of the Oran Park Employment Area.

Figure 6 Public transport routes - Bus



Source: Design + Planning 2019; modified AECOM, 2019

Design + Planning have developed the *Oran Park Bus Services Strategy (2017)* to rationalise the location of bus shelters within the precinct. The proposed locations for bus shelters in the vicinity of the Oran Park Employment Area are presented in **Figure 7**.

The provision of bus services to the Oran Park Employment Area with sheltered facilities would help encourage future workers and visitors to use of this mode of transport. Consideration should be given to providing a bus shelter on the southern side of Dick Johnson Drive in proximity to a pedestrian crossing facility.

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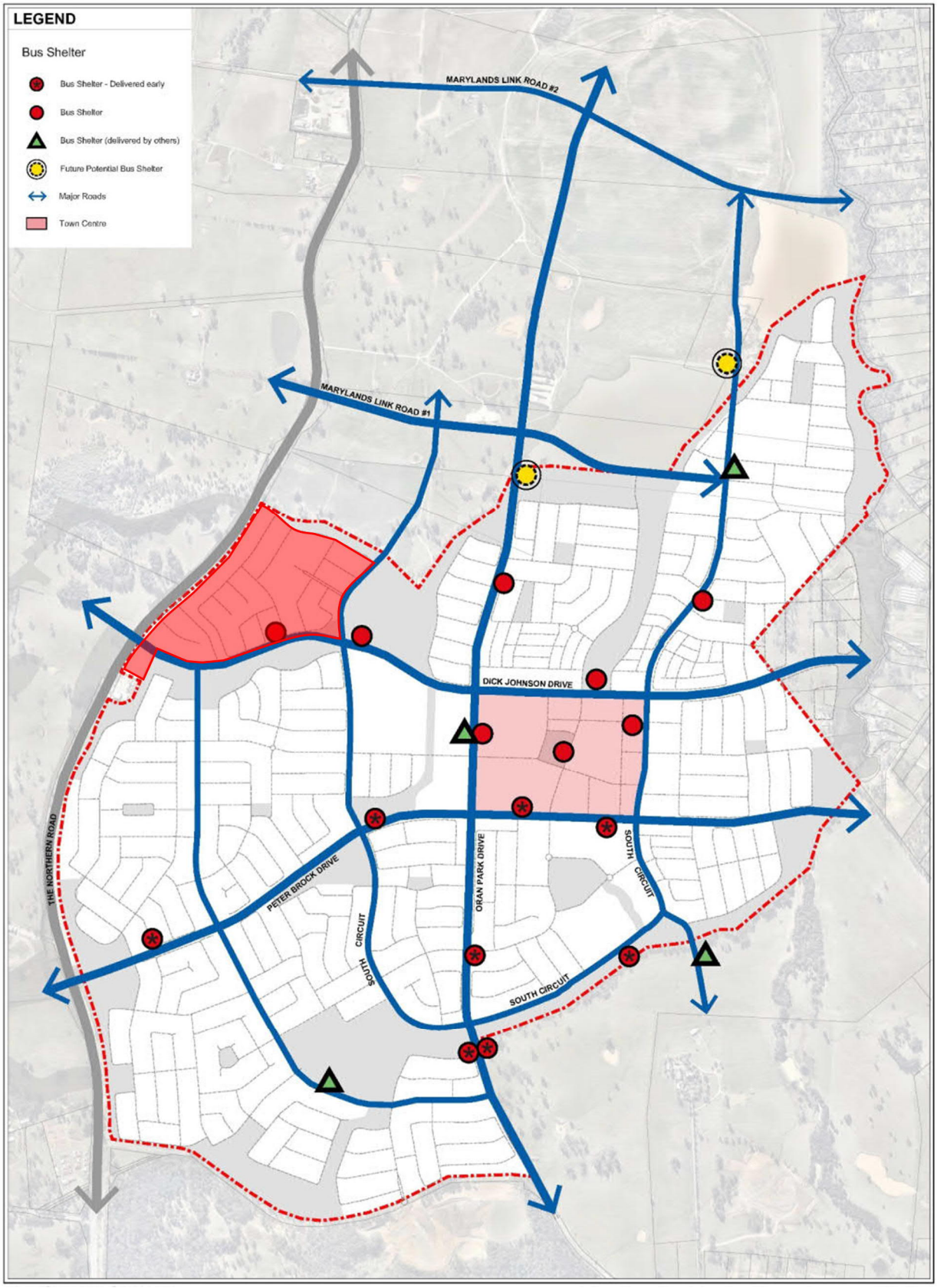
Figure 7 Oran Park bus services strategy plan



Source: Design + Planning, 2018

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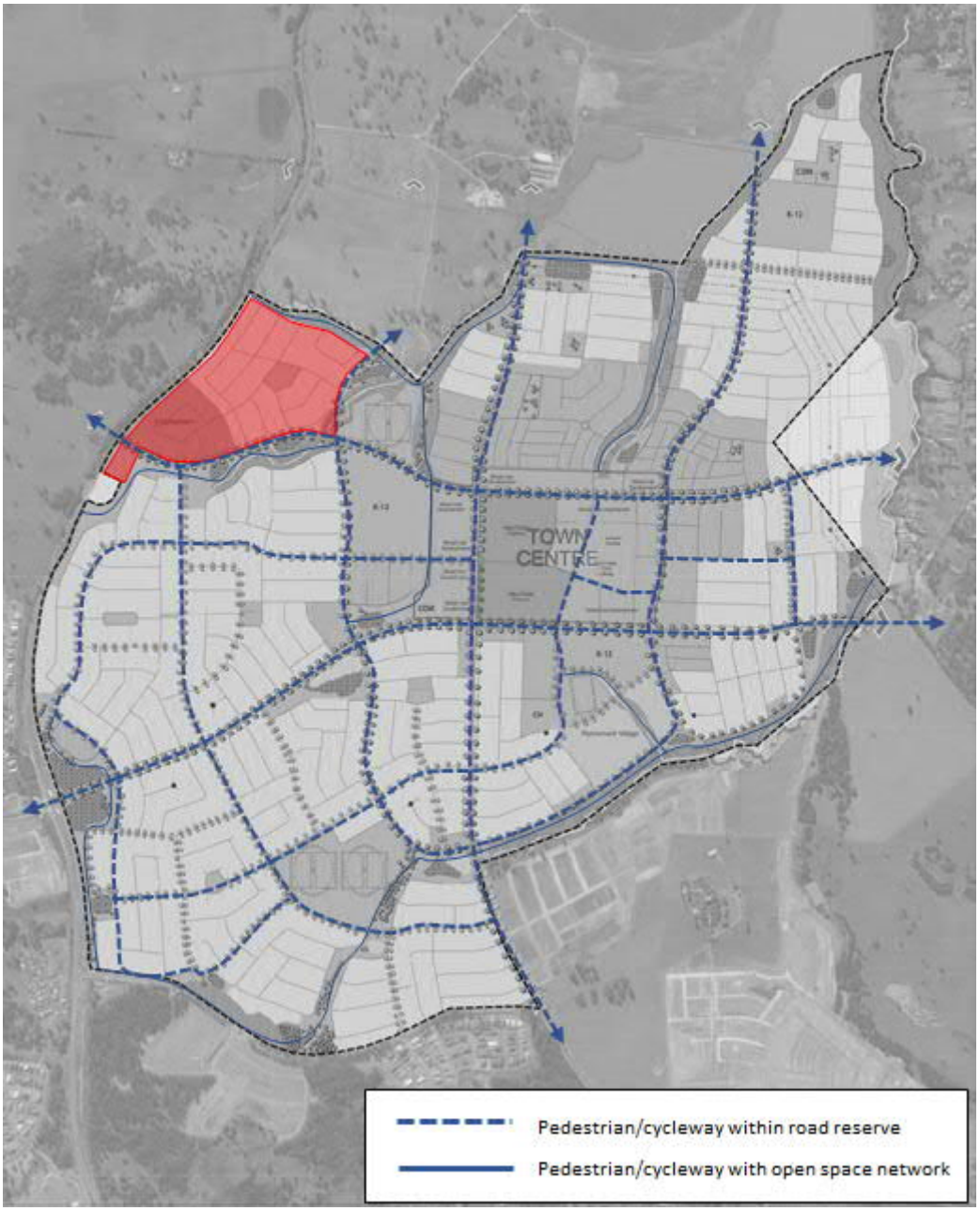
2.6 Walking and cycling

The Oran Park Precinct incorporates integrated pedestrian and cycle routes throughout the precinct providing linkages to the broader network, promoting a high level of pedestrian permeability. Key pedestrian and cycleway routes have been identified in the Oran Park DCP.

The shared path network, presented in **Figure 8** , illustrates how the key routes connect the Oran Park Employment Area to the wider precinct. The shared path network will promote pedestrian and cycling activity to the area.

Figure 8 Oran Park pedestrian and bicycle network



Source: AECOM, 2018; modified by AECOM, 2019

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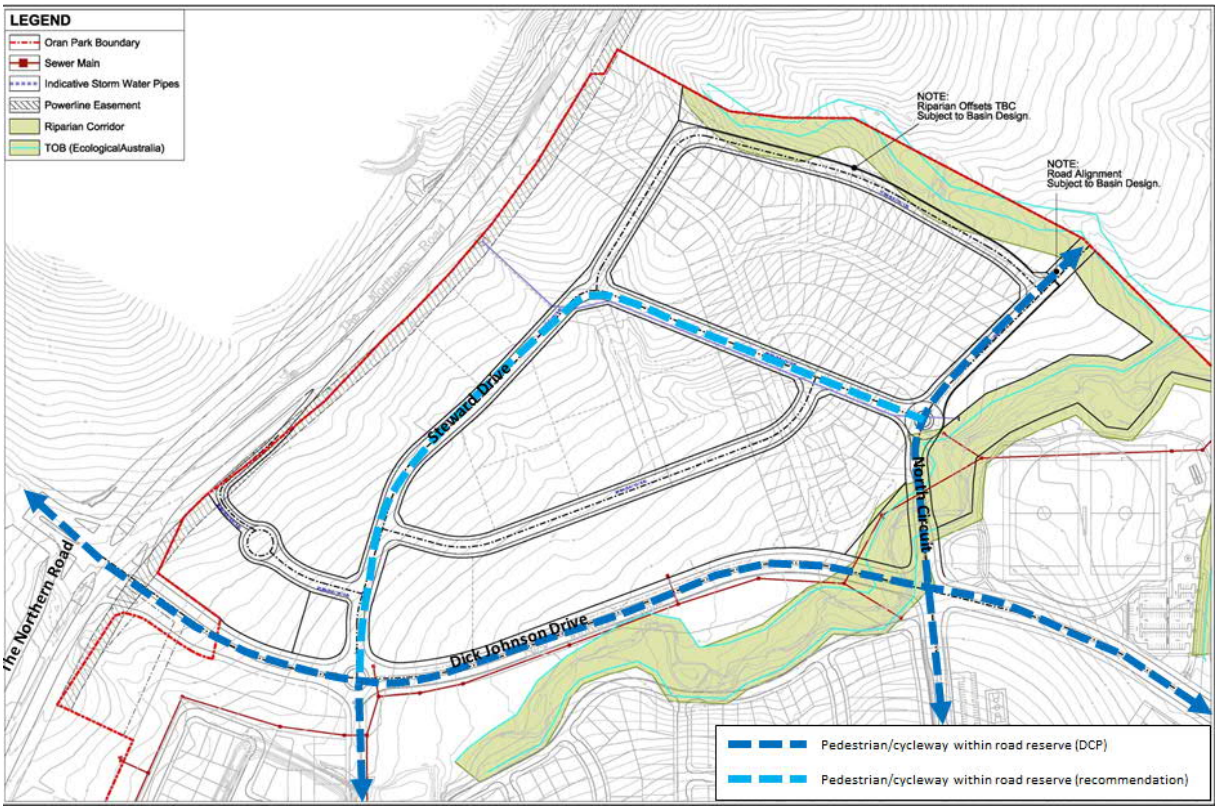
It is recommended the off-road shared path along Steward Drive is extended within the Oran Park Employment Area, as shown in **Figure 9**. This would provide direct connections and encourage walking and cycling to the area, as well as reduce the conflict of heavy vehicles and cyclists on internal roads.

Pedestrian footpaths are to be provided on at least one side of all roads with appropriate provision for safe crossings for pedestrians and cyclists within the Oran Park Employment Area, if required and warrants are met.

Figure 9 Recommended extension of off-road shared path along Steward Drive



Source: Design + Planning, 2019; modified by AECOM, 2019

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3.0 Traffic assessment

3.1 Background

The strategic road network and intersections in the Oran Park Precinct are being designed with long term infrastructure needs in mind, following assessment of traffic requirements upon full development of the Oran Park Precinct (and adjacent precincts). Infrastructure requirements are being determined through use of strategic (CUBE) traffic modelling software and detailed intersection modelling (SIDRA).

AECOM has developed a strategic CUBE model for the Oran Park Precinct. The model has been used to inform the design and planning of the precinct. It was prepared to represent a long term scenario, based on future forecasts where the development of Oran Park would be completed and the development of surrounding regional areas would have taken place. The modelling incorporates the most up-to-date information on the characteristics of the road network, the proposed nature, mix and location of land uses and the likely timing of their implementation.

This modelling has been progressively developed over many years to reflect changes proposed to the precinct. It has been presented and discussed at various stages with Camden Council, the NSW Roads and Maritime Services and Department of Planning and Environment to agree the appropriateness of inputs, assumptions and consequent infrastructure requirements.

3.2 Updates to the CUBE Model

The Oran Park CUBE model has been refined to better reflect future demand for travel. These refinements include:

- Network inputs – the network structure has been updated to reflect the latest road network layout and intersection control for the Oran Park Precinct, including the proposed increased development yield within the Employment Area. The zoning system and centroid connectors were also updated to reflect the latest structure plan.
- Demand inputs – land use inputs have been updated to reflect the latest residential and non-residential land use projections for the Oran Park Precinct, including the Oran Park Employment Area, and to assist in the demand generation process.
- Modelling procedure – the coding of roads to better distribute traffic to and from zones and the assignment procedure to produce more reasonable volume-delay results across the facility types.

Outputs from the CUBE model were used as traffic volume inputs to the SIDRA modelling to determine the performance of the road network adjacent to the Employment Area during the 2036 AM and PM peak hour.

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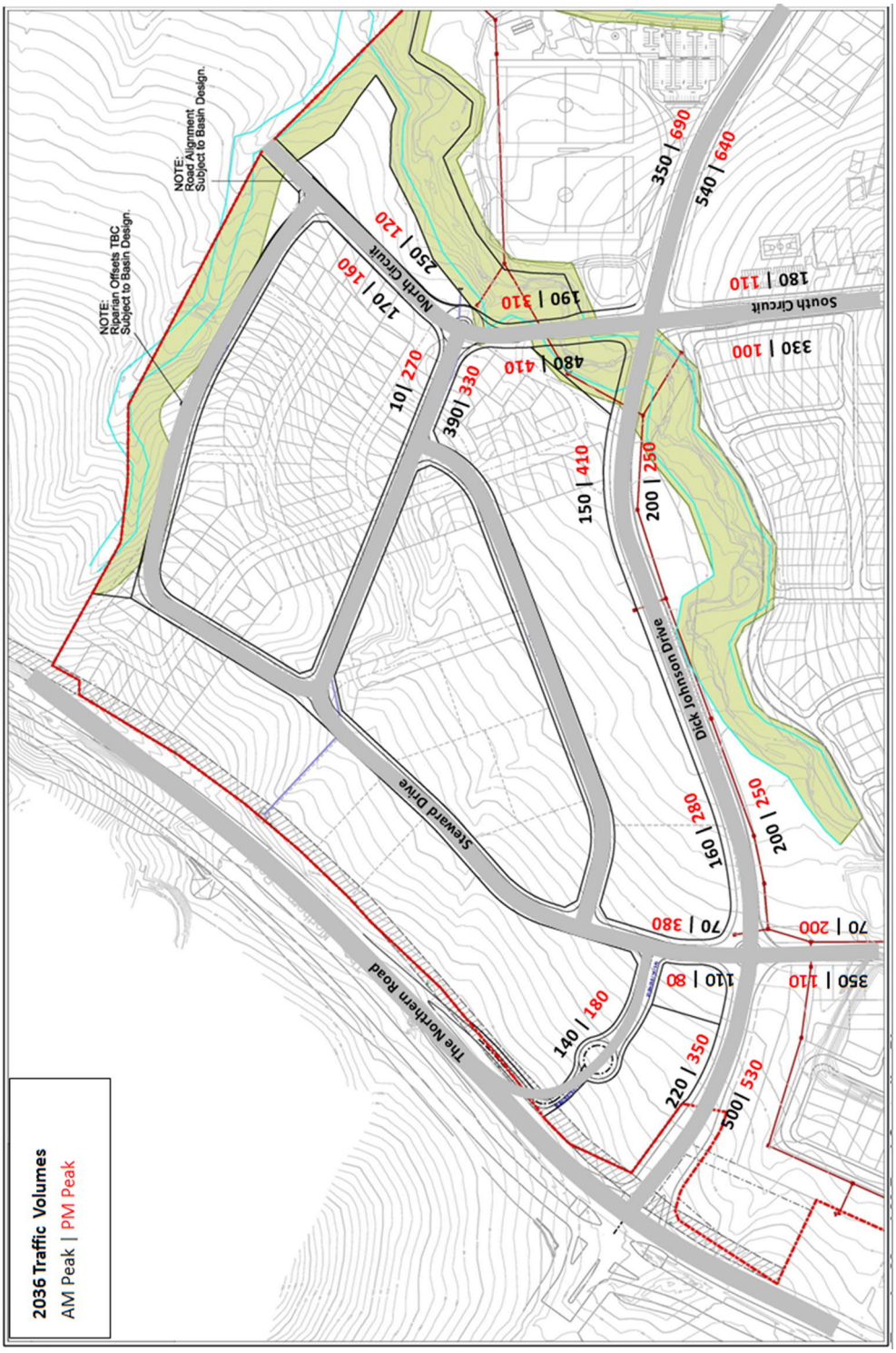
3.3 Traffic volumes

The forecast 2036 AM and PM peak hour midblock traffic volumes surrounding the Oran Park Employment Area are presented in **Figure 10**. Assuming a lane capacity of 900 vehicles per hour on sub-arterial and collector roads at Level of Service D (*Guide to Traffic Generating Developments*, Roads and Maritime 2002), no capacity issues are forecast on any of the roads in this area of the precinct in 2036.

Figure 10 2036 forecast traffic volumes at Oran Park Employment Area



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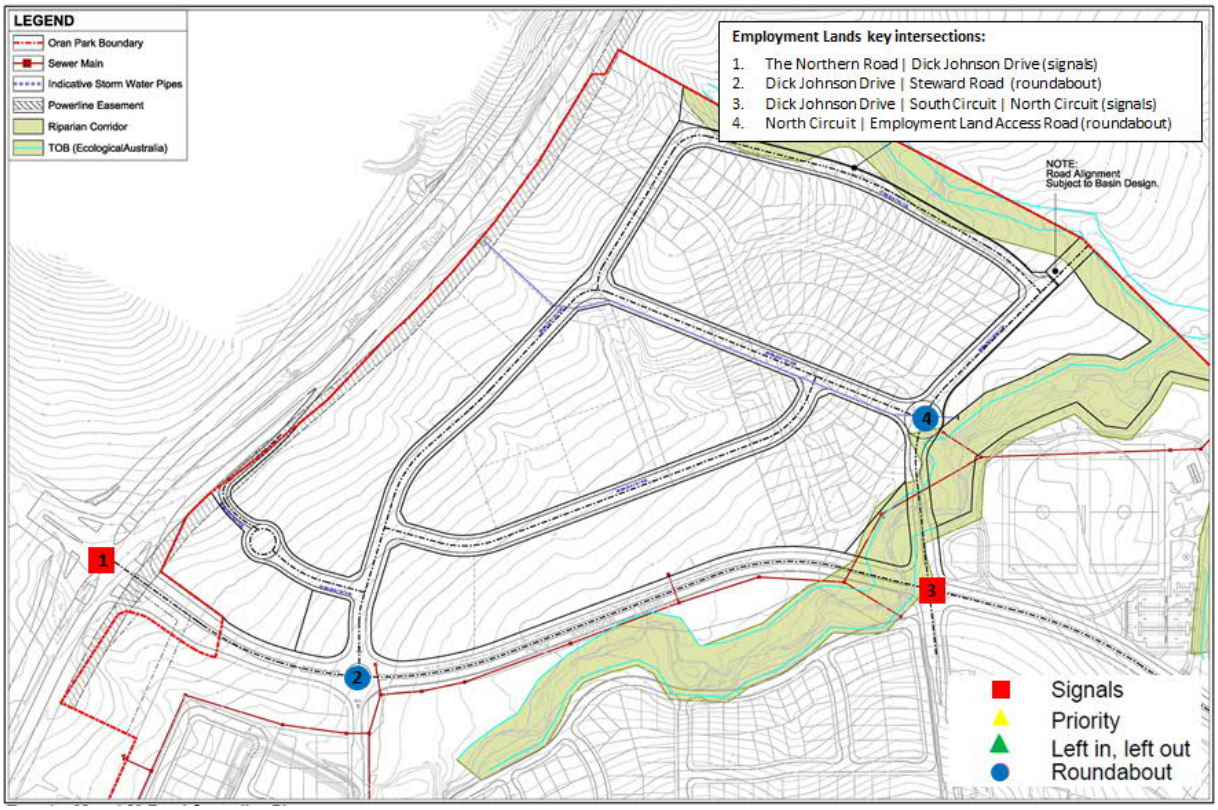
3.4 Key intersections

Key intersections surrounding the Oran Park Employment Area have been assessed with the aid of SIDRA. Intersections modelled are shown in **Figure 11** and include:

1. The Northern Road | Dick Johnson Drive (signals)
2. Dick Johnson Drive | Steward Drive (roundabout)
3. Dick Johnson Drive | South Circuit | North Circuit (signals)
4. North Circuit | Steward Drive (roundabout).

Figure 11 Key intersections modelled in SIDRA



Source: Design + Planning, 2019; modified by AECOM, 2019

3.5 Intersection performance

Intersection analysis, including the determination of proposed layouts and anticipated performance, was undertaken for the key intersections providing access to the Oran Park Employment Area. Intersection analysis was completed using SIDRA Intersection 8.0 modelling software. The performance indicators for SIDRA 8.0 are as follows:

- Degree of Saturation (DoS) – measure of the ratio between traffic volumes and capacity of the intersection. DoS is used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase rapidly. Satisfactory operations usually occur with a DoS of less than 0.9
- Average Delay – duration, in seconds, of the average vehicle waiting at an intersection, which corresponds to the Level of Service (LoS) – a measure of the overall performance of the intersection

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Forecast turning movements for each intersection were extracted from the CUBE model and individual intersections were assessed to understand the impacts that the anticipated traffic volumes may have on the intersection operation. The geometric layout for each intersection was based on the latest intersection design provided by GDC2.

As part of the Western Sydney Infrastructure plan, RMS is upgrading The Northern Road to support future growth in the South West region. The road corridor is being progressively upgraded between The Old Northern Road, Narellan and Jamison Road, South Penrith. Construction is being undertaken in sections, upgrading the road corridor to provide three lanes in each direction (two traffic lanes and a kerbside bus lane) with a central median to allow for future widening for an additional lane in each direction. *The Northern Road Upgrade REF* (2012) identified future widening would be required by 2036.

The intersection layout for The Northern Road | Dick Johnson Drive has been based on the 2036 intersection layout identified in *The Northern Road Upgrade REF*. The configuration of the eastern approach of the intersection has been updated to reflect the Dick Johnson Drive DA04, which proposes a 130m right turn bay on this approach.

A summary of the performance results for key intersections is provided in **Table 2**. The left-in only and left-out only intersections on Dick Johnson Drive were also modelled in SIDRA, however minimum delays are forecast to be experienced at these intersections and as a result the modelling results have not been reported. During the detailed design and planning of the B5 – Business Development component of the area, consideration should be given to providing a deceleration lane for the left-in only access point along Dick Johnson Drive. This is to be assessed during the Development Application stage when land uses for that parcel of land are confirmed.

Table 2 Intersection performance results (2036 AM and PM peak hour)

Ref	Intersection	Peak hour	Degree of Saturation (DoS)	Level of Service (LoS)	Average Delay (sec)
1	Dick Johnson Drive | The Northern Road^	AM	0.828	D	54.0
		PM	0.714	D	49.0
2*	Dick Johnson Drive | Steward Drive	AM	0.349	A	10.0
		PM	0.394	A	11.1
3	Dick Johnson Drive | North Circuit | South Circuit	AM	0.434	C	32.2
		PM	0.529	C	30.1
4*	North Circuit | Steward Drive	AM	0.370	A	9.6
		PM	0.299	A	10.1

Note:

* sites 2 and 4 are roundabouts, as such, the LoS reported is based on the movement with the worst delay.

^ traffic volumes along The Northern Road were based on 2036 traffic volumes used in the traffic modelling reported in *The Northern Road Upgrade REF* (2012).

The modelling results indicate that the Oran Park Employment Area is not anticipated to have adverse impacts on the key intersections on the surrounding road network. The modelling results show that all intersections operate satisfactorily with the LoS ranging from LoS A to LoS D and DoS remaining under 0.9.

Analysis of modelling results indicates minor upgrades are required at Dick Johnson Drive | South Circuit | North Circuit to accommodate the expected queue lengths. This includes:

- Extension of the westbound right turn bay from 50m to 70m
- Extension of the southbound left turn bay from 35m to 50m

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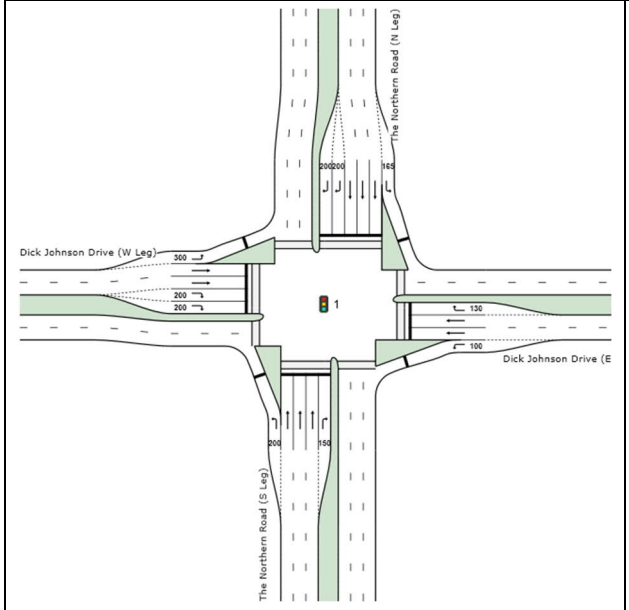
It is also recommended the southbound right turn lane at Dick Johnson Drive | South Circuit | North Circuit be extended to be able to accommodate additional heavy vehicles within the turn bay. The current 35m right turn bay could accommodate one semi-trailer. It is proposed to be extended to 65m which could accommodate approximately three semi-trailers.

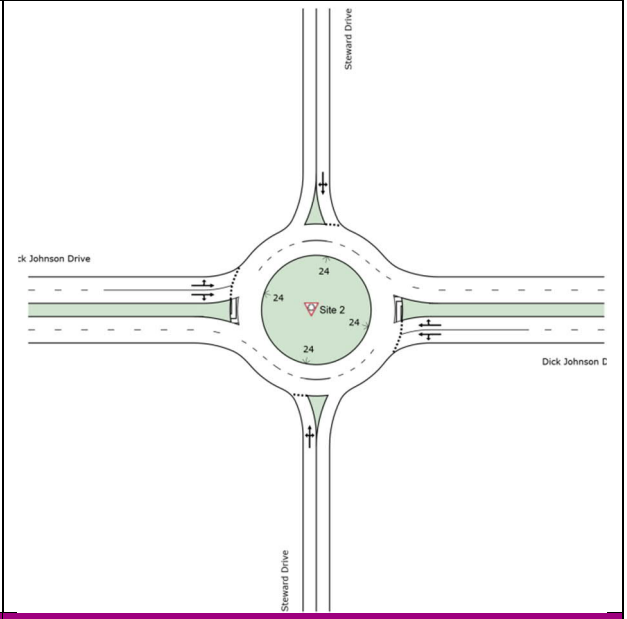
With these proposed upgrades, both signalised intersections perform similarly to the results provided in **Table 2**. The intersection layouts required to accommodate the forecast level of traffic in 2036 are shown in **Figure 12**. Allowance should be made within the road reserve to ensure that sufficient space is provided if these intersections are required to be developed to this extent.

Figure 12 Proposed Employment Area intersection layouts

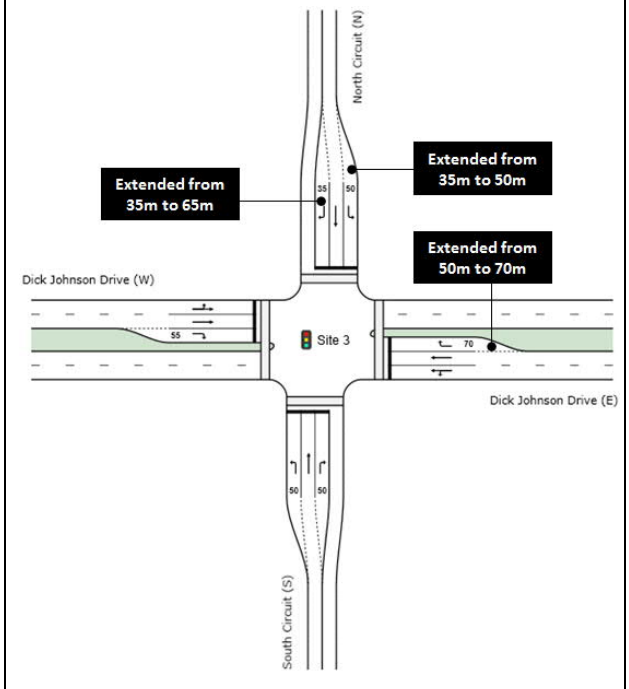
1. The Northern Road | Dick Johnson Drive



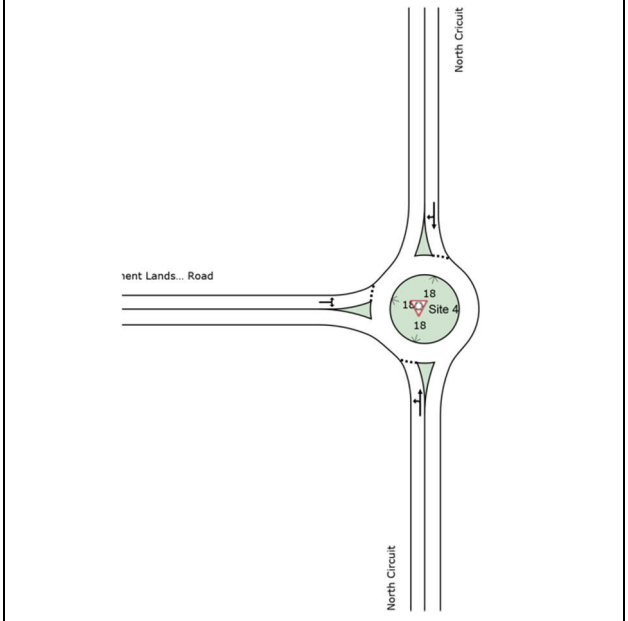
2. Dick Johnson Drive | Steward Drive



3. Dick Johnson Drive | South Circuit | North Circuit



4. North Circuit | Steward Drive



Source: AECOM, 2018

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4.0 Summary

AECOM was engaged by GDC2 to undertake a traffic study to support the proposed expansion of the Oran Park Employment Area. The report will be used to supplement the Planning Proposal submission to Camden Council, which is seeking to convert the residential area of Tranche 23 to employment lands, resulting in a total area of 22ha for the Oran Park Employment Area.

The CUBE traffic model used to inform the design and planning of Oran Park Precinct was updated to reflect the amendments for Oran Park, to reflect the latest known land uses, including the Oran Park Employment Area, and refined to better reflect future demand for travel. SIDRA intersection modelling was used to inform the key road network and intersection requirements surrounding the Oran Park Employment Area.

The following four intersections were assessed as part of the traffic study:

1. The Northern Road | Dick Johnson Drive (signals)
2. Dick Johnson Drive | Steward Drive (roundabout)
3. Dick Johnson Drive | South Circuit | North Circuit (signals)
4. North Circuit | Steward Drive (roundabout).

The modelling indicates that the proposed expansion of the Oran Park Employment Area can be accommodated by the proposed road network in 2036 for the ultimate development of the Oran Park Precinct. Key roads surrounding the Oran Park Employment Area have sufficient capacity to meet forecast traffic demands. In addition, the key intersections assessed are shown to operate at an acceptable level of service (LoS D or better) during the AM and PM peak hours, with minor upgrades required at both signalised intersections.

The modelling has identified the following upgrades are required at Dick Johnson Drive | South Circuit | North Circuit to store expected queue lengths:

- Extension of the westbound right turn bay from 50m to 70m
- Extension of the southbound left turn bay from 35m to 50m

It is also recommended the southbound right turn lane be extended to be able to accommodate additional heavy vehicles within the turn bay. The current 35m right turn bay can accommodate one semi-trailer. It is proposed to be extended to 65m which can accommodate three semi-trailers.

A summary of the geometric layout required for each intersection has been provided. Allowance should be made within the road reserve to ensure that sufficient space is provided if these intersections are required to be developed to this extent.

During the detailed planning of the Oran Park Employment Area, the following recommendations are also proposed:

- Swept path analysis should be undertaken to ensure that the internal road network is able to accommodate the manoeuvring of heavy vehicles.
- Consideration should be given to providing a deceleration lane for the left-in only access point along Dick Johnson Drive at the DA stage when land uses for the B5 – Business Development parcel of land are confirmed.
- Consideration should be given to providing a bus shelter on the southern side of Dick Johnson Drive in proximity to a pedestrian crossing facility.
- Extension of the off-road shared path along Steward Drive to provide pedestrian and cycle links within the Oran Park Employment Area.