Traffic Impact Assessment Report

Oakdale East Industrial Precinct

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# Table of Contents

1 INTRODUCTION .................................................................................................................. 1  
1.1 OVERVIEW .................................................................................................................. 1  
1.2 STUDY SCOPE ............................................................................................................. 1  
1.3 SITE CONTEXT ........................................................................................................... 3  
1.4 STRATEGIC CONTEXT ............................................................................................... 4  
1.5 REPORT STRUCTURE ................................................................................................. 6  

2 PROPOSED DCP CONTROLS ......................................................................................... 7  
2.1 INTRODUCTION ........................................................................................................... 7  
2.2 ROADS AND TRAFFIC ............................................................................................... 7  
2.3 CAR PARKING ............................................................................................................ 9  
2.4 PEDESTRIANS AND CYCLISTS ................................................................................. 11  
2.5 PUBLIC TRANSPORT ............................................................................................... 11  

3 ROAD NETWORK ........................................................................................................... 12  
3.1 EXISTING ROAD NETWORK .................................................................................... 12  
3.2 FUTURE ROAD NETWORK ...................................................................................... 15  

4 TRAFFIC ASSESSMENT ............................................................................................... 20  
4.1 SUB-REGIONAL TRAFFIC ASSESSMENTS ............................................................... 20  
4.2 OLD WALLGROVE ROAD UPGRADE MODELLING .................................................. 20  
4.3 OAKDALE ESTATE UPGRADE COMMITMENTS ....................................................... 25  
4.4 OAKDALE EAST TRAFFIC GENERATION ................................................................. 26  
4.5 SUB-REGIONAL TRAFFIC IMPACTS ......................................................................... 27  
4.6 CONSTRUCTION TRAFFIC IMPACTS ....................................................................... 27  

5 PARKING REQUIREMENTS ......................................................................................... 28  
5.1 INDUSTRIAL CAR PARKING OVERVIEW ................................................................. 28  
5.2 DCP PARKING RATES ............................................................................................... 28  
5.3 PROPOSED PARKING RATES ................................................................................... 28  

6 PUBLIC TRANSPORT & PEDESTRIAN / CYCLE LINKAGES ....................................... 31  
6.1 PUBLIC TRANSPORT LINKAGES ............................................................................. 31  

7 DESIGN COMMENTARY .............................................................................................. 34  
7.1 RELEVANT DESIGN STANDARDS .......................................................................... 34  
7.2 ESTATE ACCESS ROAD ............................................................................................ 34  
7.3 INTERNAL DESIGN ASPECTS .................................................................................. 35  

8 CONCLUSIONS ............................................................................................................. 36  

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## Appendices

*Appendix A: SIDRA Performance Measures & Level of Service Explanatory Note*
1 Introduction

1.1 Overview

Ason Group has been engaged by Goodman Property Services (Aust) Pty Ltd, to prepare a traffic and transport assessment to inform a Development Control Plan (DCP) for the Oakdale East Industrial Estate (OEE). The DCP area is on the southern portion of Austral Bricks’ Plant 3, which is located at 224-398 Burley Road, Horsley Park (the Site) and is currently used for quarrying purposes. The Site consists of approximately 32 hectares of land and is located within the Western Sydney Employment Area (WSEA) within the Fairfield Local Government Area (LGA).

The DCP would guide the future development of the OEE, which comprises the fourth and final stage of the broader Oakdale Industrial Estate (the Estate) development. The other development stages of the Oakdale Industrial Estate include:

- Oakdale Central – which is nearing completion.
- Oakdale South – under construction.
- Oakdale West – State Significant Development Application is currently being considered by the Department of Planning & Environment (DP&E).

1.2 Study Scope

This TIA provides an assessment of the existing and future operation of the road network servicing OEE, the broader WSEA, and other transport related issues. Key elements of this traffic and transport assessment include:

- A review of the existing and proposed future road network providing access to the sub-regional road network.
- A review of previous traffic assessments relating to the sub-regional road network, and to the key roads providing access to the wider Estate and specifically OEE.
- An assessment of traffic generation characteristics of OEE and how it aligns with the previous traffic assessment findings.
- An assessment of design considerations for OEE.

In the preparation of this TIA report, reference has been made to the appropriate traffic and transport guidelines and assessment criteria, including:

- RMS Guide to Traffic Generating Developments (RMS Guide)
• RMS Technical Direction TDT 2013/04a, Guide to Traffic Generating Developments – Updated Traffic Surveys (RMS TDT/04a)
• Austroads Guide to Road Design (Austroads)
• Australian Standard 2890.1: Parking Facilities – Off Street Car Parking (AS 2890.1)
• Australian Standard 2890.2: Parking Facilities – Off Street Commercial Vehicle Facilities (AS 2890.2)
• Australian Standard 2890.6: Parking Facilities – Off Street Parking for People with Disabilities (AS 2890.6)

This Report utilises the most recent assessments of key infrastructure projects within the broader WSEA in providing an appropriate assessment of the relative impacts of OEE. These assessments include:

• *Western Sydney Employment Area – Southern Link Road Network Strategic Transport Assessment*, prepared by AECOM, 18 April 2011 (SLRN Report)
• *Old Wallgrove Road Upgrade (Roberts Road - M7 Motorway) Traffic and Transport Report*, prepared by GHD, 30 April 2012 (GHD 2012 Report)
• *Broader Western Sydney Employment Area – Transport Planning Preliminary Analysis, Exhibition Draft*, prepared by GHD, June 2013 (BWSEA Transport Report)
• *Old Wallgrove Road Extension Traffic Modelling* prepared by GHD, 18 July 2013 (OWR Extension Report)
• *Old Wallgrove Road Extension Interim Network Testing*, prepared by GHD, 28 March 2014 (OWR Extension Report)
• *Broader WSEA SLRN – Options Refinement* (2014), prepared by AECOM, 6 May 2014 (SLRN Options Report)
• *Erskine Park Traffic Modelling – Proposed Western North South Link Road*, prepared by GHD, May 2016 (WNSLR Report)

The above studies detail the broader traffic environment in the vicinity of OEE, and the road infrastructure upgrades required. These assessments have shown that the generation of the industrial area (including OEE) is supportable from a traffic and transport perspective subject to the provision of the planned upgrades.

The purpose of this report is to illustrate that the land covered by the DCP area is consistent with the previous studies undertaken and thus the conclusions drawn from those studies remain valid.
1.3 Site Context

The Site is located on the eastern side of Old Wallgrove Road and the northern side of Burley Road and, as discussed, forms part of Austral Bricks’ Plant 3. The surrounding developments predominantly comprise of industrial facilities used for warehousing, distribution and various extractive industries.

At a regional level, the Site is located approximately 40 kilometres west of the Sydney CBD and 20 kilometres west of the Parramatta CBD. It is within the LGA of Fairfield City Council and is zoned IN1 General Industrial. However, it is also subject to controls of the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (SEPP WSEA).

The broader Oakdale Industrial Estate comprises some 421 hectares of industrial-zoned land within the broader WSEA, to the immediate south of the Sydney Water Pipeline (previously referenced as Lands South of Sydney Water Pipeline). OEE is located within the broader Oakdale Industrial Estate and lies to the east of Oakdale Central Industrial Estate, with the two Estates separated by Old Wallgrove Road as shown in Figure 1.

![Figure 1: Oakdale East Local Context](image-url)
1.4 Strategic Context

The WSEA was established by the NSW Government to provide businesses in the region with land for industry and employment, including transport and logistics, warehousing and office space. Located about 50 kilometres from the Sydney central business district, the WSEA will give businesses access to roads and utility services and is well located to the planned Badgerys Creek Aerotropolis.

The Draft Structure Plan for the WSEA proposes the inclusion of lands to the south of OEE at Kemps Creek in an expansion of the WSEA. Once implemented, it is anticipated that a future formal Structure Plan for an expanded ‘Broader Western Sydney Employment Area’ (BWSEA), as shown in Figure 2, would provide for changes in the land use zoning and character of these additional lands to an industrial/employment focus consistent with that of the existing WSEA. The BWSEA within the regional planning context is presented in Figure 3.

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**Figure 2: BWSEA Precinct Plan**

*Source: GHD*

The development of OEE is consistent with the BWSEA Draft Structure Plan, which aims to develop an emerging employment, trade, industrial, freight and logistics complex extending across metropolitan Sydney. In this regard, extensive transport planning has been undertaken by Roads and Maritime Services (RMS) and the DP&E to ensure that suitable road network capacity is provided for the planned development.
development within WSEA. This is evident through the numerous traffic and transport reports to develop supporting infrastructure for the region including the GHD 2012 Report, the BWSEA Transport Report, the OWR Extension Report and the SLRN Options Report.

Figure 3: Oakdale Industrial Estate Regional Context
1.5 Report Structure

The report is structured as follows:

▪ Section 2 provides an overview of the proposed Traffic and Transport DCP Controls.
▪ Section 3 summarises the existing and future road network.
▪ Section 4 presents an overview of the relevant traffic modelling undertaken as part of the planning process for the WSEA, provides a forecast traffic generation for the OEE based on the GHD trip rates and reviews the future traffic impacts of the OEE.
▪ Section 5 outlines the DCP parking rates which are to apply to the OEE.
▪ Section 6 describes the existing public and active transport links and identifies potential to improve these links for OEE.
▪ Section 7 discusses the future design considerations for OEE.
▪ Section 8 provides a summary of the key conclusions.
2 Proposed DCP Controls

2.1 Introduction

Along with the definition of the many 'standard' DCP objectives and controls, Schedule 4 of SEPP WSEA also requires specific consideration of the road (and general transport) network with each Development Precinct to ensure consistency with the broader Transport and Arterial Road Infrastructure Plan.

In this regard, primary access will be provided by 'New Estate Road', which will connect to OWR some 200m south of the intersection with Millner Avenue. It is noted that the initial development of OEE will only occur in the south-east portion of the Site, with the remainder of the Site not expected to be developed for at least 10 years. Until the future development of the Site is better understood, it is difficult to determine the future internal Precinct road network, and as such this assessment and focuses on New Estate Road in the broader context of accessibility to the sub-regional network.

Critically, the designation of New Estate Road as the primary access road would not impact future revisions to the internal Precinct road network and is consistent with the broader road hierarchy proposed within the WSEA.

Having consideration of the above, and moreover with reference to the general DCP requirements for the WSEA Precincts, the broader objectives and controls relating to the key access, traffic and parking sections of the DCP are summarised below.

2.2 Roads and Traffic

2.2.1 Objectives

- To provide a logical and consistent road hierarchy that is appropriate for the Oakdale East Estate DCP area, the broader Precinct (as and when developed) and connections to the broader Western Sydney Employment Area, so as to provide safe and efficient circulation of vehicles.
- To ensure roads balance the needs of pedestrians, cyclists, motorists, heavy vehicles and buses.
- To ensure that roads are designed to accommodate heavy vehicles.
- That road design and hierarchy for the OEE DCP area appropriately considers and allows for existing and future transport and traffic.
2.2.2 Controls

a) The layout of the road network for the site is to generally accord with the Indicative Access Plan as shown in Figure 4.

b) The Local Estate Roads are to be provided with a road reserve of 23 metres and a carriageway width of 15.5 metres, providing two lanes in either direction.

c) New Estate Road is to provide a turning circle at its eastern end to facilitate turning vehicles within the OEE until such time as additional access is provided to OWR.

d) All OEE internal roads are to be designed in accordance with Austroads guidelines, to accommodate the maximum sized vehicles (B-double trucks) accessing the Site.

e) All individual OEE site access points, internal driveways, service and circulation areas must be designed in accordance with the relevant Australian Standards, most notably AS2890.1 and AS2890.2.

f) All vehicles must be able to enter and leave the individual OEE sites in a forward direction.

g) Future access provisions to be considered in detail during through Development Application stages.

h) Fairfield City Council may require the preparation of a Traffic Impact Assessment to determine the forecast traffic generation of individual sites within the OEE, during construction and/or operation. Further, Council may require a Construction Traffic Management Plan be produced to manage the impacts of construction traffic.

i) If appropriate within the OEE, freight handling facilities are encouraged to be co-located to maximise cooperation between industries with regard to materials handling.
2.3 Car Parking

2.3.1 Objectives

- To provide parking areas that are convenient and sufficient for the use of employees and visitors generated by new developments.
- To ensure that vehicular access and circulation is safe and efficient and minimises potential vehicular and pedestrian conflict.

2.3.2 Controls

a) Car parking is to be provided in accordance with the rates provide in Table 1 and is to be provided off-street in locations that are identifiable and accessible from public roads.

b) For activities not specifically identified in Table 1, car parking requirements will be determined on the merits of the application.

c) All parking areas must be provided in accordance with the provisions of the Building Code of Australia and relevant Australian Standards.
d) Parking calculations should be rounded up. Where there is more than one use on a site or within a development each type is to be calculated separately and rounded up separately.

e) Underground or basement level parking is not permitted.

f) The use of stack parking is not permitted.

g) The number of on-site truck parking spaces provided should be on the basis of 1 space for each vehicle present at any one time, excluding those vehicles in loading docks. Under no circumstances is the parking of trucks on public streets acceptable.

Table 1: Car Parking Rates

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Parking Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware and building supplies</td>
<td>1 space per 130m² site area plus 1 space per 40m² gross leasable area of office.</td>
</tr>
<tr>
<td>Garden centres, Plant nurseries, Landscaping material</td>
<td>Determined by parking survey of a Plant Nursery/Garden Centre of a similar scale.</td>
</tr>
<tr>
<td>supplies &amp; Rural supplies</td>
<td></td>
</tr>
<tr>
<td>Light industry, general industry, warehouse or distribution</td>
<td>1 space per 300m²</td>
</tr>
<tr>
<td>centre</td>
<td></td>
</tr>
<tr>
<td>Masonry Plant</td>
<td>OEE will incorporate 1 Masonry Plant. It is known that this use typically has very low staff numbers. Parking is to be based on a First Principles Assessment to determine demand.</td>
</tr>
<tr>
<td>Office</td>
<td>1 space per 40m² GFA</td>
</tr>
<tr>
<td>Freight transport facilities &amp; depots</td>
<td>To be determined by a car parking survey of a comparable facility</td>
</tr>
<tr>
<td>Industrial training facilities</td>
<td>1 space per employee plus 1 space per 5 students.</td>
</tr>
<tr>
<td>Neighbourhood shops</td>
<td>1 space per 40m² gross leasable area</td>
</tr>
<tr>
<td>Places of public worship</td>
<td>Where no seating provided</td>
</tr>
<tr>
<td>1 space per 2m² of worship floor area or 1 space per 3m²</td>
<td></td>
</tr>
<tr>
<td>of gross leasable area (whichever is the greater).</td>
<td></td>
</tr>
<tr>
<td>Funeral homes</td>
<td>1 space per 6 chapel seats plus 1 space per 40m² gross leasable area of office room.</td>
</tr>
<tr>
<td></td>
<td>1 space per 140m² of yard area plus</td>
</tr>
<tr>
<td></td>
<td>1 space per 70m² of shed / processing area.</td>
</tr>
<tr>
<td>Timber yards</td>
<td>Ancillary Office uses are subject to the following requirements:</td>
</tr>
<tr>
<td></td>
<td>1 space per 40m² gross leasable area</td>
</tr>
<tr>
<td>Takeaway food and drink premises</td>
<td>1 space per 7 square metres gross leasable area</td>
</tr>
<tr>
<td>Vehicle sales or hire premises</td>
<td>1 space per 130m² site area plus</td>
</tr>
<tr>
<td></td>
<td>6 spaces per work bay servicing area (if applicable)</td>
</tr>
</tbody>
</table>
2.4 Pedestrians and Cyclists

2.4.1 Objectives

- To encourage travel by active transport.
- To ensure safety between pedestrians, cyclists and vehicles.

2.4.2 Controls

a) Applicants are encouraged to incorporate, in the design of their buildings, safe storage/parking areas for bicycles in secure and accessible locations with weather protection, with adequate shower and change facilities provided for staff (where appropriate).

b) Footpaths are to be a minimum of 1.2m wide.

2.5 Public Transport

2.5.1 Objectives

- To encourage the use of public transport by providing clear and safe pedestrian links to public transport stops.
- To provide comfortable and safe areas waiting areas at public transport stops.

2.5.2 Controls

a) Bus stop locations should be provided in close proximity to the key OEE interface intersection(s) with OWR so as to reduce walk distance.

b) Bus stops should be designed to provide suitable shelter and seating.

c) Consideration is to be given to implementation of a Workplace Travel Plan to encourage non-car transport and increase public transport usage. This is to be done at such a time that the necessary infrastructure is in place for the Workplace Travel Plan to be successful (i.e. public transport links are improved to the broader area).
3 Road Network

3.1 Existing Road Network

3.1.1 Introduction

The existing and proposed road network in the vicinity of OEE is shown in Figure 5, while key roads and intersections providing access for OEE are detailed below.

3.1.2 M7 Motorway

The M7 motorway is a high capacity road link of state significance and was built to accommodate future traffic growth in the Western Sydney region. It provides a key north-south link, to the east of OEE, between the M2 motorway in the north and the M5 motorway to the south as part of the Sydney orbital road network. A major interchange between the M7 motorway and M4 Western motorway is located 2.5 km north of OEE, which connects the Sydney CBD and western Sydney suburbs. The motorway carries 4 trafficable lanes within a divided carriageway and is generally subject to a 100 km/h speed limit (within proximity of OEE). It carries approximately 70,000 vehicles per day (vpd).

3.1.3 Wallgrove Road

Wallgrove Road is an arterial road that runs in a north-south direction to the east of OEE and parallel to the M7 motorway. The two-lane, two-way road provides a link between Elizabeth Drive in the south and the Great Western Highway in the north. As for the M7 motorway, Wallgrove Road connects to the M4 motorway approximately 2.5 kilometres to the north of OEE. The posted speed limit on the road within proximity of the site is 70 km/h, and the road carries approximately 30,000 vpd.

3.1.4 Lenore Drive

Lenore Drive is a sub-arterial route providing an east-west connection linking Old Wallgrove Road (OWR) to the east and Mamre Road to the west. It provides four lanes (two lanes per direction) along a divided carriageway with a shared path along the northern side of the road.
Figure 5: Existing and Proposed Road Network
3.1.5 Old Wallgrove Road

The recently upgraded Old Wallgrove Road generally runs north-south in the vicinity of the OEE before turning to provide an east-west connection to Wallgrove Road. It forms part of the RMS Main Road (MR 629) route between Lenore Drive and Wallgrove Road. To the south of Lenore Drive, it functions as a local collector road.

The recent OWR upgrade (between Lenore Drive and Wallgrove Road, Eastern Creek) was officially opened on Wednesday 12 April 2017. The project was funded by the NSW Government to provide a vital east-west link connection for the Western Sydney Employment Area.

As part of the planning process, GHD (on behalf of RMS) undertook extensive traffic modelling and analysis using strategic, microsimulation, and local intersection modelling platforms to determine the appropriate road and intersection treatments within the Old Wallgrove Road Upgrade study area. The results were detailed in the report prepared by GHD entitled Old Wallgrove Road Upgrade (Roberts Road - M7 Motorway) Traffic and Transport Report, dated 30 April 2012 (referred to hereafter as the GHD 2012 Report). The modelling was based upon assumptions regarding future land use and associated traffic generation of existing and future development in the area, consistent with planning for the WSEA over the next 20 years.

The GHD modelling informed the design for the now completed OWR corridor upgrades (as shown in Figure 6). In order to achieve satisfactory operation within the study area, the upgrade design provides the following:

- Widening 700m of OWR to two lanes in each direction between Roberts Road and Southridge Street with a central median to allow for 3 lanes in the future;
- Widening a further 700m of OWR to three lanes in each direction between Southridge Street and the Wallgrove Road / M7 interchanges;
- A 400m link road with two lanes in each direction from Quarry Road. This link road will connect Wallgrove Road to the M7 northbound on and off ramps;
- Six bus stops adjacent to each intersection along OWR, and bus priority treatments at signalised intersections;
- 4.5km of shared path for pedestrians and cyclists from the Erskine Park Link Road (now known as Lenore Drive) to the shared pathway on the M7; and
- The upgrade and signalisation of six intersections, including the Old Wallgrove Road / Southridge Street.
3.2 Future Road Network

3.2.1 Southern Link Road

The Southern Link Road (SLR) will provide additional road infrastructure to accommodate travel demand generated by employment areas within the (South of) Warragamba Pipeline area. The indicative route alignment for the SLR was initially identified in the SEPP (WSEA) 2009 and has since been refined to the current alignment as shown in Figure 7, which comprises of:

- An east-west SLR generally running parallel to Lenore Drive between Mamre Road to the west and Wallgrove Road to the east. Traffic generated by the WSEA would use Mamre Road to connect to the wider road network to and from the north and south.

- A connection with OWR and an Eastern North-South Link Road to join an extension of Archbold Road. The proposed Archbold Road extension is to extend from Lenore Drive to the M4 Motorway, with the interchange between Archbold Road and the M4 Motorway. The extension is currently being progressed by the RMS and is expected to be delivered in 5-10 years and will provide improved accessibility to the WSEA with access to the M4 Motorway being provided without the...
need to access either Wallgrove Road or the M7 Motorway, thereby reducing future travel times across the network.

- The WNSLR is a proposed north-south link between Lenore Drive to the north and connecting to the SLR to the south. An assessment of this key road link is provided in Section 4.1.

It is noted that the SLR network planning and development process is ongoing and is therefore potentially subject to change due to further refinement of the route alignment and access arrangements. It is worthy of note that the development of OEE does not rely on the SLR to appropriately accommodate trip generation.
Figure 7: Proposed Southern Link Road Network and Alignment

Source: AECOM
3.2.2 Western Sydney Infrastructure Plan

A number of road and infrastructure upgrades are proposed for the area as part of the Western Sydney Infrastructure Plan (WSIP) – a road investment program funded by the Federal and State Government. The aim of the plan is to provide increased road transport capacity ahead of future traffic demand, as planned residential and employment development is delivered in western and south western Sydney growth centre precincts, and the Broader Western Sydney Employment Area.

As shown in Figure 8, the plan involves a number of significant road network improvements in the vicinity of the Site, including:

- Upgrade of The Northern Road to a minimum of four lanes between Narellan and the M4 Motorway, South Penrith, including an interchange (underpass) at Bringelly Road. Construction on the first section of The Northern Road started in 2016;
- Construction of a new east-west motorway to the airport between the M7 Motorway and The Northern Road, (to be known as the M12 Motorway). Consultation on the preliminary design and access strategy was undertaken in February and March 2018 and construction is expected to start in the early 2020s;
- Upgrade of Bringelly Road to a minimum of four lanes between The Northern Road and Camden Valley Way. Construction started in January 2015;
- Construction of the Werrington Arterial Road by upgrading Kent Road and Gipps Street to four lanes between the Great Western Highway and at the M4 Motorway. The project was completed in May 2017;
- Upgrade of the Glenbrook intersection of Ross Street and the Great Western Highway. Work began in June 2018; and
- A $200 million package for local roads upgrades (Australian Government funded).

In summary, the arterial road network in the vicinity of the Site is undergoing - and will continue to undergo - significant upgrades to benefit all road users.
Figure 8: Western Sydney Infrastructure Plan Road Network Upgrades

Source: RMS
4 Traffic Assessment

4.1 Sub-Regional Traffic Assessments

As previously stated, numerous traffic and transport assessments have been prepared examining the WSEA, with the Oakdale Industrial Estate a specific inclusion in these studies. Of particular relevance to this Report are the past assessments of the following key roads and intersections:

- OWR, and its connection to Wallgrove Road and the M7
- Lenore Drive
- The SLR
- North-South connections between the SLR and OWR/Lenore Drive
- North-South connections between Lenore Drive & the M4 (specifically via Archbold Road)

A brief overview of the most recent and relevant assessments is provided below, focusing on the current determination of appropriate infrastructure in the area and of specific relevance to this Report.

4.2 Old Wallgrove Road Upgrade Modelling

4.2.1 GHD 2012 Report Overview

As discussed, the GHD Report provides a detailed assessment of the future traffic demands in the section of OWR between the M7 and Roberts Road, and was the key reference document for the upgrade works undertaken by the RMS. The assessment provided a suite of modelling based on previous RMS strategic assessments, including:

- Strategic modelling using a sub-area model in EMME.
- Micro-simulation model of the corridor using Paramics.
- Intersection modelling of key intersections using SIDRA.

With regard to this assessment, the most relevant information provided in the GHD 2012 Report relates to land use assumptions and trip generations rates for the OEE (and the broader WSEA) that underpin the GHD 2012 Report assessment and its findings.
4.2.2  GHD 2012 Report Yield Forecasts & Trip Rates

Further to the above, Table 2 (extracted from the GHD 2012 Report) provides a land use schedule that was at the time consistent with the expectations of development within the Oakdale Estate, noting that the Oakdale Estate sits within the area referred to as “Lands south of Pipeline” in the GHD Report.

Table 2: WSEA Future Lane Use

<table>
<thead>
<tr>
<th>Area</th>
<th>Land Use Type</th>
<th>2021</th>
<th>2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Creek Industrial</td>
<td></td>
<td>550</td>
<td>550</td>
</tr>
<tr>
<td>Ropes Creek Industrial</td>
<td></td>
<td>115</td>
<td>173</td>
</tr>
<tr>
<td>Erskine Park Employment Area</td>
<td></td>
<td>326</td>
<td>326</td>
</tr>
<tr>
<td>Lands south of Pipeline</td>
<td></td>
<td>270</td>
<td>507</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1,261</td>
<td>1,556</td>
</tr>
</tbody>
</table>

Source: GHD (April 2012)

With regard to trip generation (applied to these yield forecasts), the GHD 2012 Report utilised the following trip rates:

- Eastern Creek Precinct: 21 trips per hectare for two-hour peak period.
- Ropes Creek Precinct: 10 trips per hectare for two-hour peak period.
- Erskine Park Employment Area: 10 trips per hectare for two-hour peak period.
- Lands south of Sydney Water Pipeline: 21 trips per hectare for two-hour peak period.

4.2.3  Old Wallgrove Road Extension Report (2013)

Building on their initial report, the Old Wallgrove Road Extension Traffic Modelling (OWR Extension Report) prepared by GHD in 2013 for the DP&E (formerly the Department of Planning & Infrastructure) provides a detailed review of a future extension of OWR, and includes the following modelling methodology:

- Establish trip generation and future road network assumptions based on reviews of GHD, AECOM and Halcrow transport reports.
- Two-tier modelling approach, using the Old Wallgrove Road EMME Strategic Traffic Model (a sub-area built from RMS Highway Model) for the general assignment and SIDRA for intersection performance analysis.
- Incorporation of agreed trip generation rates and road network assumptions for 2021 and 2031 horizon years.
- Select Link Analysis for apportionment of traffic on proposed Red and Green north-south link roads.
- Intersection performance (Average delay and LoS) for key intersections.

Additionally, the OWR Extension Report included the following infrastructure assumptions:

- Erskine Park Link Rd (now Lenore Drive): assumed in all scenarios and both years
- Archibold Rd Extension: assumed in all scenarios and both years
- Southern Link Rd: assumed in all scenarios for 2031 only
- Red Link Rd: assumed to be 4 lanes
- Green Link Rd: tested 2 lane and 4 lane configurations
- An Oakdale Centre/Oakdale South zone with access to Old Wallgrove Road (and the broader network).

The broader modelling scenarios examined in the OWR Extension Report for the Scenario year of 2031 are shown in Figure 9.

![Figure 9: 2031 Network Scenarios](source: GHD (July 2013))
4.2.4 GHD 2012 Report Future Trip Generation Forecasts

With consideration of the GHD yield forecasts and trip generation rates, Table 3 (extracted from the GHD 2012 Report) provides a summary of 2031 trip generation forecasts. From the results of the detailed modelling of the sub-regional road network, the GHD 2012 Report then provides recommendations for the upgrade of OWR between the M7 and Roberts Road, which were the basis of the RMS upgrade works.

Table 3: Traffic Generation – 2031 AM (2 Hour Peak)

<table>
<thead>
<tr>
<th>Area</th>
<th>Developed Area (ha)</th>
<th>Percent of Total Area</th>
<th>2-hour AM Peak Vehicle Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>In</td>
</tr>
<tr>
<td>Eastern Creek</td>
<td>550</td>
<td>100%</td>
<td>9,240</td>
</tr>
<tr>
<td>Ropes Creek</td>
<td>173</td>
<td>100%</td>
<td>1,384</td>
</tr>
<tr>
<td>Erskine Park Employment Area</td>
<td>326</td>
<td>100%</td>
<td>2,608</td>
</tr>
<tr>
<td>Lands south of Pipeline</td>
<td>507</td>
<td>100%</td>
<td>8,518</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,556</strong></td>
<td><strong>100%</strong></td>
<td><strong>21,750</strong></td>
</tr>
</tbody>
</table>

Source: GHD (April 2012)

4.2.5 OWR Extension Report (2013) Trip Generation Forecasts

Perhaps of most significant relevance to this report is that Section 3 of the OWR Extension Report assigns a trip generation of 929 two-hour peak trips (or an average of some 465 peak hour trips) to the OEE in 2021 based on 50% completion; and some 1744 two-hour peak trips (or an average of some 872 peak hour trips) to OEE in 2031 based on 100% completion.

Further to the assignment, Section 6 of the OWR Extension Report provides the following summary of future intersection operations (shown by Figure 10), presented in Table 5Table 4.
Table 4: Future Intersection Performance

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Control Type</th>
<th>Period</th>
<th>Design Year 2021</th>
<th>Design Year 2031</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Average Delay (sec)</td>
<td>Level of Service¹</td>
</tr>
<tr>
<td>1 Signals</td>
<td>AM</td>
<td>34.5</td>
<td>C</td>
<td>43.6</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>45.9</td>
<td>D</td>
<td>53.2</td>
</tr>
<tr>
<td>2 Signals</td>
<td>AM</td>
<td>17.1</td>
<td>B</td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>25.1</td>
<td>B</td>
<td>27.3</td>
</tr>
<tr>
<td>3 Signals</td>
<td>AM</td>
<td>23.3</td>
<td>B</td>
<td>46.9</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>25.3</td>
<td>B</td>
<td>51.9</td>
</tr>
<tr>
<td>4 Signals</td>
<td>AM</td>
<td>27.5</td>
<td>B</td>
<td>53.1</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>42.1</td>
<td>D</td>
<td>52.3</td>
</tr>
</tbody>
</table>

Source: GHD (July 2013)

¹ See Appendix A for an explanatory note on Level of Service and SIDRA performance measures.

Figure 10: Assessed Intersections

Source: GHD (July 2013)

In summary therefore, the OWR Extension Report includes a trip generation total for OE, the broader Oakdale Estate and surrounding precincts as previously adopted (i.e. “Lands south of Pipeline”); assigns trips from key precincts to the constructed/proposed connector and sub-regional roads; and ultimately concludes that the proposed road infrastructure (which, as per Scenario 3 in Figure 9 above, is either under construction, approved, or under final design consideration) will provide appropriate levels of service at all key intersections. Finally, and critically, the analysis also adopts a future traffic generation for the Oakdale East Estate under full development of 872 peak hour movements.
4.3 Oakdale Estate Upgrade Commitments

As result of the sub-regional traffic modelling detailed above, Goodman entered into a Voluntary Planning Agreement (VPA) with the Minister for Planning, the purpose of which was to provide works in kind to offset components of the necessary contributions ($180,000 per hectare of net developable area) for components of the Oakdale Central and Oakdale South Estates. In this regard, the planning agreement provides approval from the Minister to upgrade components of OWR including (but not limited to):

- Upgrade of the existing roadway from a one lane (each way) to a two lane (each way) carriageway with a central median,
- Traffic signalisation at the intersection of OWR / Milner Avenue – as shown in Figure 11, and
- Provision of an additional right turn lane at the intersection of OWR / Erskine Park Link Road (now Lenore Drive) – as shown in Figure 12.

The approved works adopted within the VPA generally reference the findings of the GHD modelling, however minor amendments to the intersection layouts were also proposed (and incorporated in the final approved works) to ensure that the works would accommodate all future demands generated through the development of lands in the locality. The works identified under the VPA have now been completed.

Figure 11: Approved Intersection Layout of Old Wallgrove Road & Milner Avenue
4.4 Oakdale East Traffic Generation

4.4.1 GHD Traffic Generation Estimates

As previously discussed, the GHD analysis adopts a future traffic generation forecast for the OEE precinct under full development of 872 peak hour movements. This was based on a traffic generation rate of 21 trips per hectare over a two-hour peak period, or approximately 10.5 trips per hectare during the peak hour.

Importantly, the traffic generation total assumed for OEE by GHD was based on a forecast developable area of 83 hectares. Now that more detailed site planning has been completed, it has been determined that the OEE (subject to the DCP) will only provide approximately 32 hectares of development area; this represents a 62% decrease over the area assumed by the GHD analysis. Application of the GHD trip rate to this area results in a forecast traffic generation for the OEE of 336 vehicle trips per peak hour, or some 529 fewer vehicle per hour than assessed by GHD.

Given that there are no proposals to reduce the level of committed and future upgrades to the road network (themselves based on the GHD modelling including a high generating OEE) it can therefore be concluded that the traffic generated by the OEE would be accommodated by the future road network, and that indeed levels of service in the network would be as predicted if not better than reported by GHD.

Figure 12: Approved Intersection Layout of Old Wallgrove Road & EPLR (Lenore Drive)
4.5 Sub-Regional Traffic Impacts

As discussed in Section 4.1, RMS and other government agencies have over time invested significant resources in determining the future infrastructure of the WSEA lands and the Oakdale Estate so as to determine broader road infrastructure requirements, and thence to guide the implementation of that infrastructure as development occurs. All of those assessments have included a trip generation allocation for the Oakdale Estate, and indeed in some instances for the individual Oakdale Precincts, so as to ensure that the trips generated by those Oakdale Precincts can be appropriately accommodated within the broader sub-regional road network.

With reference to all available information, the key question therefore is whether development of Oakdale East would result in a trip generation commensurate with that determined for the Precinct in those assessments. Specifically, does it present the potential for the future Masterplan to generate traffic in excess of the 872 veh/hr as identified in the GHD Report and in other assessments undertaken on behalf of the RMS and DP&E.

With reference to sections above, it is clear that the DCP area is significantly less than the estimated area adopted in all traffic modelling undertaken, traffic modelling which underpins the package of sub-regional road upgrades within the broader WSEA both planned and approved. As a consequence, the conclusions and recommendations of the detailed assessments of key sub-regional intersections remain entirely relevant and valid, allowing for a conclusion that the trip generation of OEE would not detrimentally impact of the future operation of any key intersections further to the provision of approved/planned road network infrastructure.

4.6 Construction Traffic Impacts

A Construction Traffic Management Plan (CTMP) would be required to be prepared for each development stage. The CTMP would detail the appropriate measures by which to minimise traffic impacts on the surrounding road network; ensure safety and efficiency for workers, pedestrians and road users; and provide information regarding the construction vehicle access routes and any changed road conditions (if applicable).

The CTMP would be undertaken in consultation with Council and is expected to be a required as a formal Condition of Consent in future Development Application approvals.
5 Parking Requirements

5.1 Industrial Car Parking Overview

Significant technological advances in recent times have resulted in reduced employee densities within warehouse developments, with the 2012 Employment Typology Study for the WSEA, prepared for DP&E, indicating employment densities of less than 20 employees per hectare. These low employee densities are obviously a factor in the low trip generation of similar industrial developments and are evident in the fact that many of industrial developments within the broader WSEA provide car parking significantly in excess of actual employee parking requirements.

5.2 DCP Parking Rates

Chapter 12 of Fairfield Council’s DCP 2013 requires that car parking for warehouse or distribution centres be provided at the rate of 1 space per 80m² of GFA; and for light industry to be provided at a rate of 1 space per 70m² GLFA including ancillary office, plus 1 space per unit for factory units.

The rates apply to all industrial development within the Fairfield LGA; however, given the significant variations in employee densities for industrial sites, it is apparent that a ‘one size fits all’ parking rate requires further review. Indeed, to this end we note the Oakdale South Estate is based on parking rates of 1 space per 300m². This is the parking rate proposed for the OEE also; how this parking rate was derived is discussed below.

5.3 Proposed Parking Rates

The proposed car parking rates for the OEE are based on the warehouse car parking rates outlined in the RMS Guide. In this regard, Section 5.11.2 of the RMS Guide requires parking for warehouse developments be provided at the rate of 1 space per 300m² of GFA.

The car parking rate of 1 space per 300m² adopted in the RMS Guide was established through surveys of 10 facilities. The surveys demonstrated car parking requirements that ranged between one space per 80m² and one space per 960m², with a mean and standard deviation of one space per 338m² and one space per 280m² respectively. The adopted rate of 1 space per 300m² therefore reflected a “middle range” parking rate. Furthermore, the adopted parking rate was also based on employee densities of approximately 45 employees per hectare – almost double the densities established by the DP&E for the WSEA.

For the assessments of Oakdale South and Oakdale West, surveys of eight comparable industrial developments were undertaken to establish the effective parking rate of operational developments within the WSEA – adopting the same methodology as that used in establishing the RMS rate. The
surveys included industrial developments (generally warehouse or freight forwarding facilities) in numerous locations including:

- Erskine Park,
- Oakdale Central; and
- M7 Business Hub.

The results of these surveys are summarised in Table 5.

**Table 5: Effective Parking Rates for Surveyed Developments**

<table>
<thead>
<tr>
<th>Site Address</th>
<th>Car Parking Provided</th>
<th>Total GFA (m²)</th>
<th>Maximum Parking Demand</th>
<th>Effective Parking Rate (1 space per Xm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bunning’s – 8 Interchange Dr</td>
<td>140</td>
<td>55,550</td>
<td>68</td>
<td>817</td>
</tr>
<tr>
<td>Toll – Lot 11 Wonderland Dr</td>
<td>137</td>
<td>27,440</td>
<td>47</td>
<td>584</td>
</tr>
<tr>
<td>Ingram Micro – 23 Wonderland Dr</td>
<td>300</td>
<td>36,610</td>
<td>183</td>
<td>200</td>
</tr>
<tr>
<td>DHL – Milner Avenue</td>
<td>115</td>
<td>20,170</td>
<td>109</td>
<td>185</td>
</tr>
<tr>
<td>Kimberly Clarke – 35 Sarah Andrews Cl</td>
<td>100</td>
<td>45,210</td>
<td>78</td>
<td>580</td>
</tr>
<tr>
<td>Linfox – 25 Sarah Andrews Cl</td>
<td>217</td>
<td>51,200</td>
<td>116</td>
<td>441</td>
</tr>
<tr>
<td>Ubeeco – 28 Sarah Andrews Cl</td>
<td>150</td>
<td>10,865</td>
<td>71</td>
<td>153</td>
</tr>
<tr>
<td>Woolworths – 29 Sarah Andrews Cl</td>
<td>280</td>
<td>52,705</td>
<td>197</td>
<td>268</td>
</tr>
</tbody>
</table>

**Total Average Rate** 403

The surveys demonstrated a range of between 1 space per 153m² and 1 space per 817m² with a mean and standard deviation of 1 space per 403m² and 1 space per 241m² respectively. Accordingly, based on the methodology adopted in the RMS Guideline, the “middle range” car parking rate based on the surveys would be in the order of 1 space per 350m².

It is evident that these rates are consistent with those established by the RMS Guide, and indeed suggest that a further reduction in overall car parking could be justified. Notwithstanding, and with reference to all available information Table 6 summarises the minimum parking rates proposed for the OEE.
Table 6: Proposed Warehouse Car Parking Rates

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Minimum Car Parking Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehouse / Distribution</td>
<td>1 space per 300m²</td>
</tr>
<tr>
<td>Office</td>
<td>1 space per 40m²</td>
</tr>
</tbody>
</table>

The adoption of a minimum rate of 1 space per 300m² for the warehouse floor areas and 1 space per 40m² for the office floor areas is considered appropriate and sustainable and is consistent with both the RMS Guidelines and State planning policies. The proposed minimum rates will also enable the required flexibility in the design of future developments whilst still ensuring that parking is provided to accommodate both the current and future parking requirements of tenants. For all other permitted uses, it is proposed that parking be provided in accordance with Council’s DCP.

It is noted that 1 Masonry Plant will be provided within OEE. It is understood that this use would require very low staff numbers to be based on-site and results in little demand for visitor parking. Thus, it is proposed that the parking requirement for this use only be based on a first principles assessment that takes account the actual parking demand generated by the staff numbers. This is to be considered at the appropriate detailed DA stage.
6 Public Transport & Pedestrian / Cycle Linkages

6.1 Public Transport Linkages

6.1.1 Existing Bus Services

The existing bus services within the vicinity of the Oakdale Estate are shown in Figure 13 below. It is evident that OEE is not directly serviced by public transport operations at this time. Notwithstanding, the opportunities for future connections have been identified and are discussed further below.

6.1.2 Bus Service Opportunities

There is substantial opportunity to provide improvements to public transport connectivity within WSEA (likely via Lenore Drive) and additional provisions for ‘localised’ services as employment numbers increase and additional road infrastructure becomes available. The planning of bus services in Sydney is governed by the NSW Service Planning Guidelines, which aim to establish Strategic Transport Corridors and a hierarchy of bus route types that:

- link to regional centres (such as Penrith and Mt Druitt).
- pass through patronage generators such as district centres, TAFE colleges, hospitals and universities.
- connect with other transport modes (trains, ferries and other buses).
- are multifunctional (serving journeys to work, education, shopping and recreation).
- are direct and frequent.
- meet the network planning principles.

The establishment of public transport services as early as possible in the development stages of the area is important to ensure that a culture of public transport use is achieved from the outset. To make public transport a viable choice in the study area, the services should ideally:

- integrate with existing bus services in the area.
- connect to regional centres of Penrith, Mt Druitt and Blacktown.
- in the long term connect to areas such as Leppington in the South West Growth Centre, Prairiewood and the Liverpool to Parramatta T-Way.

The completion of Lenore Drive provides the opportunity to extend existing routes further into the WSEA. In addition to the 835 Bus Route, the Busways 738 and 779 services, which currently only extend
partially into OWR from the east and Lenore Drive from the west respectively, could be extended to provide additional services to OEE and the broader Oakdale Industrial Estate.

Figure 13: Public Transport Network
6.1.3 Pedestrian & Cycling Network

Lenore Drive has specifically been designed to provide appropriate cycle infrastructure, linking to the east (to the M7 cycleway) and the west (for the existing Mamre Road cycle path), the start of what has the potential to be a broader framework of cycleways in the sub-region, with the potential for further future augmentation via existing and proposed sub-regional links.

The completed upgrade of OWR and planned WNSLR both include a 2.5 metre shared path for both pedestrians and cyclists. This would provide an essential link to encourage the uptake of alternative transport modes from private vehicles.

Finally, the provision of appropriate cycle facilities – and specifically cycle storage areas/lockers and shower facilities – is to be considered for each of the detailed DAs, will further encourage the use of the existing networks and will assist in the reduction of private vehicle trips for the journey to work.
7 Design Commentary

7.1 Relevant Design Standards

The access, car park and loading areas for developments within OEE will have to be designed to comply with the following relevant Australian Standards:

- AS2890.1 for car parking areas;
- AS2890.2 for commercial vehicle loading areas;
- AS2890.6 for accessible (disabled) parking.

7.2 Estate Access Road

For the purpose of developing the initial stage of OEE, vehicular access will be provided to/from OWR, and to/from the broader sub-regional road network thereafter as provided for under current planning provisions, and further to the completion of key road network infrastructure. It is again noted that there is no reliance on the SLR to appropriately accommodate the trip generation of OEE. Notwithstanding, it is noted that the Site could accommodate a future connection to the SLR.

The proposed ‘New Estate Road’ would have a design profile consistent with similar roads provided in the wider Oakdale Estate, with a road reserve of 23 metres and a carriageway width of 15.5 metres, providing two lanes in either direction. All roadways and intersections will be designed in accordance with Austroads, to accommodate the maximum sized vehicles (B-double trucks) accessing the Site. The typical road cross sections, produced by AT&L for the Civil Infrastructure Report, are provided in Figure 14 and Figure 15.

![Figure 14: Proposed Estate Road Typical Cross Sections](image-url)
Figure 15: Proposed Estate Road Typical Cross Sections

7.3 Internal Design Aspects

It is expected that future Conditions of Consent for all individual development applications within the OEE will require that site access points, internal driveways, service and circulation areas be designed to provide compliance with the relevant Australian Standards. Future design assessments are also expected to include swept path analysis of all critical movements, using computer generated models of design vehicles in accordance with Austroads and Australian Standards.
8 Conclusions

The key findings of this Traffic Impact Assessment are:

- The DCP would guide the future development of the Oakdale East Industrial Estate which consists of approximately 32 hectares of land, located within the WSEA. OEE comprises the fourth and last stage of the development of the broader Oakdale Industrial Estate.

- A number of traffic and transport assessments have been undertaken that have informed the delivery of infrastructure within the WSEA and these assessments include the traffic impacts resulting from the broader Oakdale Estate including OEE.

- The Site is estimated to generate at 336 vehicles per hour, based on the trip rate of 21 trips per hectare over a two-hour peak period adopted by the GHD 2012 Report and OWR Extension Report. This is less than the assumed base traffic generation assessments that informed the broader infrastructure works (generally estimated at 872 vehicles per hour for the OEE based on the GHD studies).

- Importantly, the traffic generation total assumed for OEE by GHD was based on a forecast developable area of 83 hectares. Now that more detailed site planning has been completed, it has been determined that the OEE (subject to the DCP) will only provide approximately 32 hectares of development area; this represents a 62% decrease over the area assumed by the GHD analysis, hence the reduction in forecast trip generation.

- The assessment of a trip generation that is equal to or less than that previously assigned to OEE means that the conclusions and recommendations of the detailed background traffic and transport assessments of key sub-regional intersections remain entirely relevant and valid. Accordingly, the future intersections within the WSEA will operate as outlined and documented in the GHD Report and other Sub-Regional traffic assessments.

- It is proposed that the minimum car parking rates (1 space per 300m² GFA) for the OEE be based on the RMS Guide to Traffic Generating Developments rates for warehouse developments. To provide flexibility, it is recommended that these rates be set as a minimum requirement such that additional car parking (commensurate with Council’s DCP rate of 1 space per 100m² GFA) may be provided, if desired by future tenants. This is consistent with the approach to the Other Oakdale Estates.

- Car parking for other permitted uses are to be consistent with Fairfield City Council parking rates.

- The New Estate Road and its intersection with OWR along with the site access, internal configuration of the car park and loading areas for each development, would be required to comply with the relevant requirements of Austroads and the relevant Australian Standards.
It is therefore concluded that the development of the Oakdale East Industrial Estate development is supportable on traffic planning grounds, to be guided by the suitable controls of the DCP. The DCP would ensure appropriate car parking is provided and the internal configuration would provide for safe and efficient access for the developments within OEE.

The extensive traffic modelling undertaken for planning of the WSEA illustrates that the traffic impacts of the development can be readily accommodated by the existing/planned road network in the vicinity of the Site. Given the reduction in developable area provided for by the DCP compared with that assessed by the GHD studies (83 hectares vs 32 hectares) the OEE impact on the road network is likely to be reduced over that assumed in the GHD studies.

Thus, the main objective of this report, which is to illustrate that the land covered by the DCP area is consistent with the previous studies undertaken and the conclusions drawn from those studies remain valid, has been achieved.
Appendix A
SIDRA Performance Measures & Level of Service Explanatory Note
SIDRA Performance Output & Level of Service

SIDRA intersection modelling outputs a range of performance measures, in particular:

- **Degree of Saturation (DOS)** – The DOS is defined as the ratio of demand (arrival) flow to capacity. The DOS is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity, above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity). As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. It is usual to attempt to keep DOS to less than 0.9, with satisfactory intersection operation generally achieved with a DOS below 0.8.

- **Average Vehicle Delay (AVD)** – Delay represents the difference between interrupted and uninterrupted travel times through an intersection and is measured in seconds per vehicle. Delays include queued vehicles accelerating and decelerating from/to the intersection stop lines, as well as general delays to all vehicles travelling through the intersection. The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection’s Level of Service (see below). For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.

- **Level of Service (LOS)** – This is a comparative measure that provides an indication of the operating performance, based on AVD. For signalised and roundabout intersections, LOS is based on the average delay to all vehicles, while at priority controlled intersections LOS is based on the worst approach delay. The following table provides a recommended baseline for assessment as per the RMS Guidelines to Traffic Generating Developments (2002):

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Average Delay per Vehicle (sec/veh)</th>
<th>Traffic Signals, Roundabout</th>
<th>Give Way and Stop Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>less than 14</td>
<td>Good operation</td>
<td>Good operation</td>
</tr>
<tr>
<td>B</td>
<td>15 to 28</td>
<td>Good with acceptable delays &amp; spare capacity</td>
<td>Acceptable delays &amp; spare capacity</td>
</tr>
<tr>
<td>C</td>
<td>29 to 42</td>
<td>Satisfactory</td>
<td>Satisfactory, but accident study required</td>
</tr>
<tr>
<td>D</td>
<td>43 to 56</td>
<td>Operating near capacity</td>
<td>Near capacity &amp; accident study required</td>
</tr>
<tr>
<td>E</td>
<td>57 to 70</td>
<td>At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode</td>
<td>At capacity, requires other control mode</td>
</tr>
<tr>
<td>F</td>
<td>More than 70</td>
<td>Unsatisfactory and requires additional capacity.</td>
<td>Unsatisfactory and requires other control mode or major treatment.</td>
</tr>
</tbody>
</table>