Construction Traffic Management Plan

Oakdale Industrial Estate
Section 75W Mod No. 5 to MP08_0065 & MP08_066

Reference: 12.250r01v3 TRAFFIX CTMP Report

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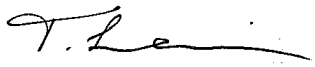
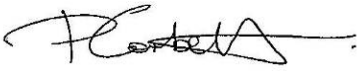
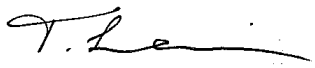
Document Verification

Job Number:	12.250
Project:	Oakdale Industrial Estate – CTMP for Section 75W Application
Client:	Goodman Property Services (Aust) Pty Ltd

Revision		Initials	Date	Signature
12.250r01v1	Prepared by:	TL	23/07/2012	
	Checked by:	GP	24/07/2012	
	Approved by:			
12.250r01v2	Prepared by:	PC	26/07/2012	
	Checked by:	GP	26/07/2012	
	Approved by:			
12.250r01v3	Prepared by:	TL	18/10/2012	
	Checked by:			
	Approved by:	TL	18/10/2012	

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Contents

Appendices

1. Introduction

1.1 Concept & Project Plan Approval

A Part 3A Concept Plan and concurrent Project Application was prepared in accordance with Division 3 of Part 3A of the Environmental Planning Assessment Act 1979. The Concept Plan application related to lands within the Oakdale Central Precinct and incorporated a total site area of 61.21ha. The Concept Plan application was approved on 2nd January 2009 and related to a net developable area of approximately 45.27ha. Project Plan approval was also granted for warehouse 1A and 2A at this time. This approval included the subdivision of the overall site, associated bulk earthworks the construction of a 260 metre long estate road.

A subsequent modification to the Concept Plan was approved on 4th November 2010, for amendments to the subdivision including a reduction in the number off estate roads from 4 to 1, changes to the subdivision to create 2 estate road allotments rather than 4 and a revised creek crossing. A modification to the Project Plan was also granted approval on 4th November 2010, for amendments to the approved building areas, changes to hardstand arrangement and redistribution of car parking spaces, a reduction in the number of estate roads from 4 to 1 and for changes to subdivision to create 2 estate road allotments rather than 4.

This current Section 75W application is discussed in more detail within the 75W Report, prepared by Urbis Pty Ltd. In summary, the modifications primarily relate to bulk earthworks, Stage 2 of the Estate Road and construction of a stormwater bio-diversity basin.

2. Implementation

The construction traffic management plan that is included in this report should be implemented taking due account of on-site conditions as will occur over the construction period. Accordingly, construction crew are expected to respond in a pro-active manner to ensure that the plan is implemented to maximum effect and with no obvious safety issues being overlooked. In particular, the following matters are considered noteworthy:

- All signs are to be placed where clear visibility is available;
- All barriers should be positioned to provide satisfactory clearances;
- Installations should be checked intermittently during the course of the day/s; and

It is emphasised that TRAFFIX is responsible for the preparation of this Plan only and not for its implementation, which is the responsibility of the project manager/builder.

3. Location and Site

The site is located within the south-western part of the Eastern Creek Precinct Plan area, to the west of Wallgrove Road on the alignment of Old Wallgrove Road, immediately south of the Sydney Water Supply Pipeline. The subject site is legally described at Lot 2 DP 120673 and is located within Precinct 8 of the Western Sydney Employment Area (WSEA). It has a total area of some 61 hectares.

Access to the site and surrounding lots is provided via Old Wallgrove Road.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**.

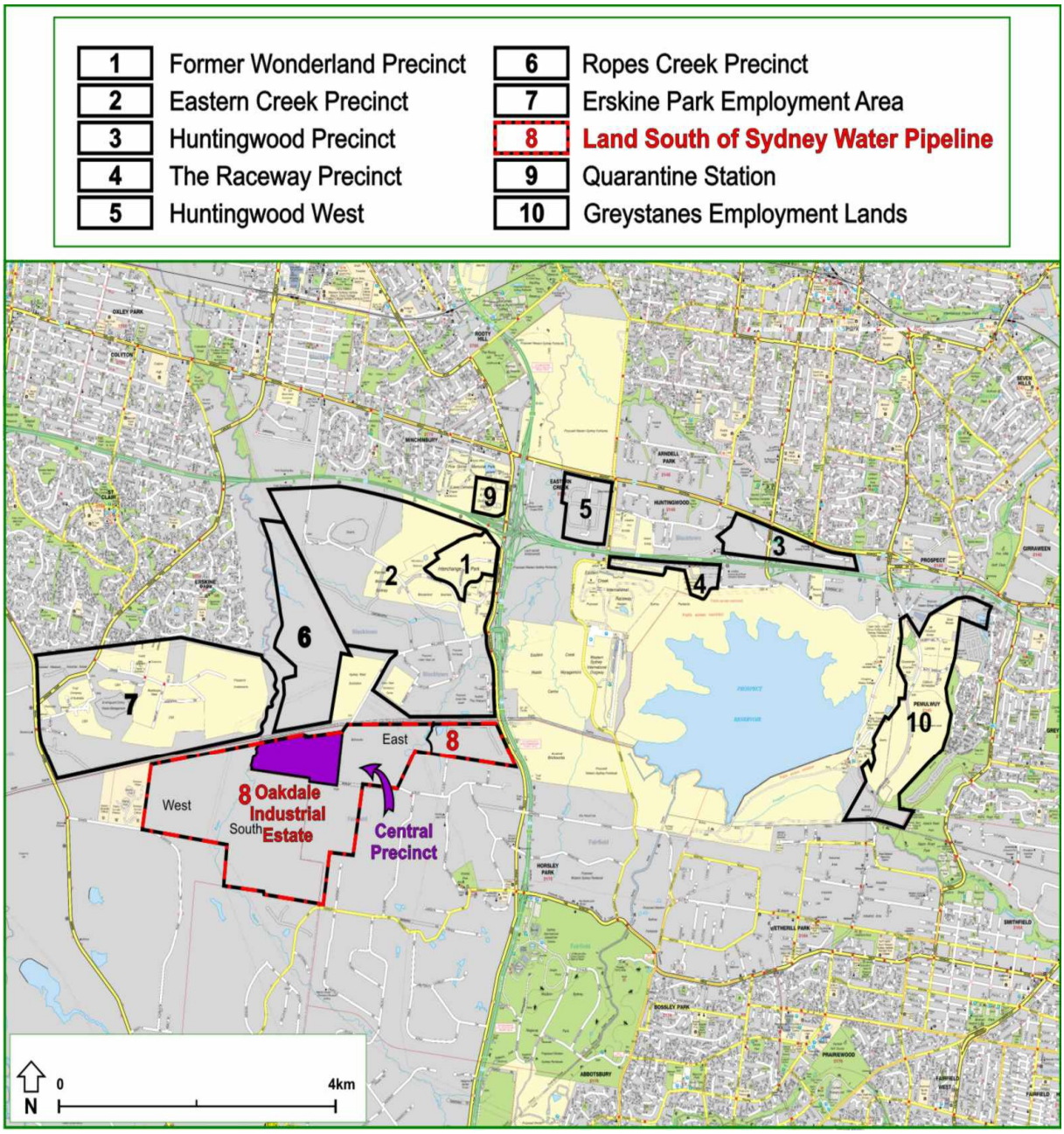


Figure 1: Location Plan With Respect to Overall WSEA

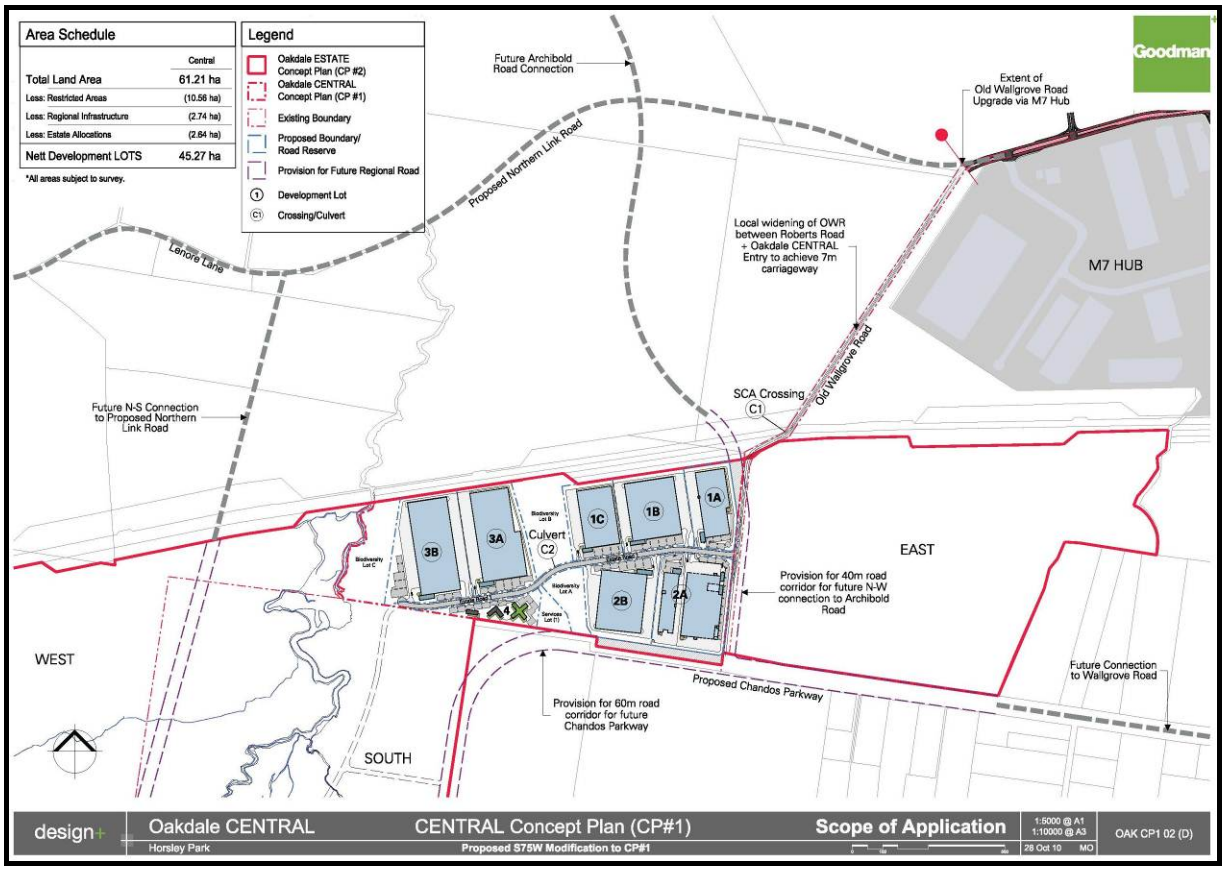


Figure 2: Indicative Site Plan

4. Existing Traffic Conditions

4.1 Road Network

The road hierarchy in the vicinity can be described as follows:

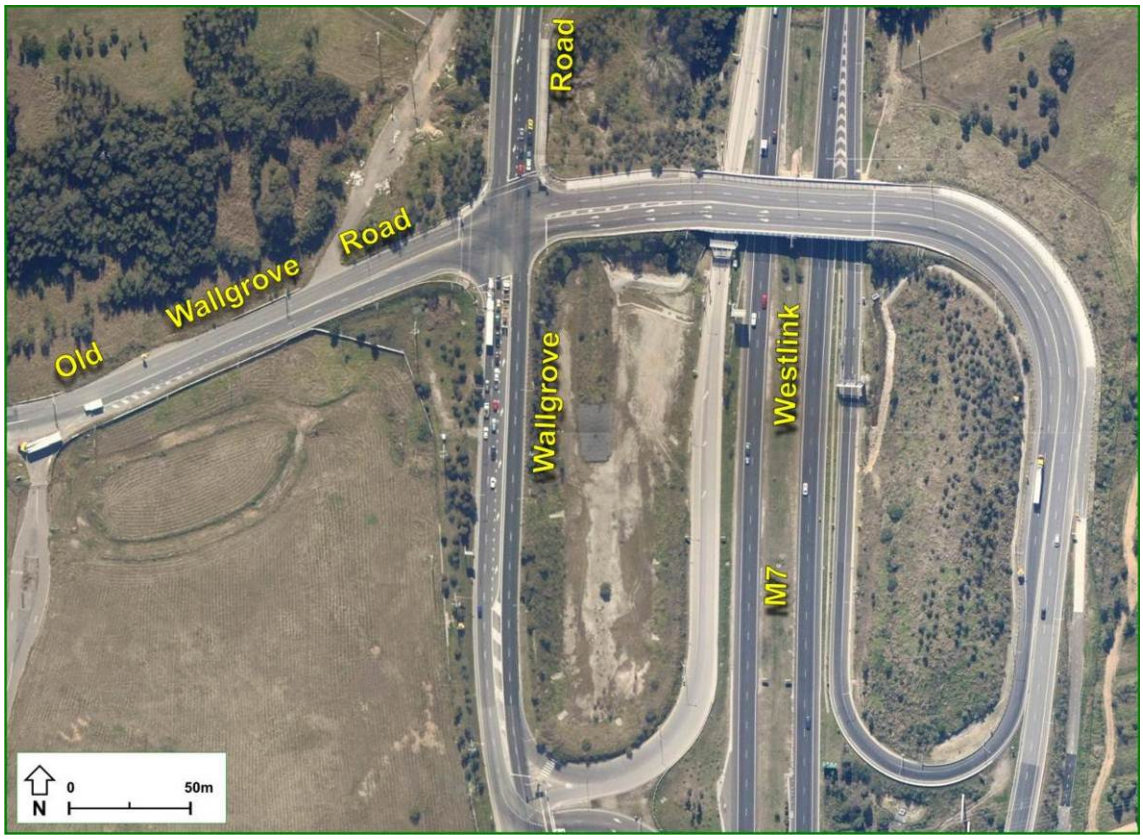
- M7 Motorway: a major arterial road that provides Sydney with a key orbital connection between numerous radial arterial roads including the M4 and M5 motorways to the north and south, respectively;
- Wallgrove Road: a classified road (MR 515) that runs in a north-south direction to the east of the site. It historically carried in the order of 31,500 vehicles per day (vdp), however this has reduced to approximately 25,750vpd with the completion of the M7 Motorway. The approved Northern Link Road will form a linkage with Wallgrove Road connecting with Lenore Lane/Mamre Road in the west.
- Old Wallgrove Road: a local road that runs in an east-west direction to the north of the site. It provides localised access to the industrial land within the M7 Business Hub and surroundings. It is identified as a future sub-arterial road within the Stage 3 Eastern Creek Precinct Plan.
- Estate Road: a local road that runs in an east-west direction and forms the primary access to the Central Precinct.
- Northern Link Road: a major new road currently under construction by the Roads & Maritime Services (RMS). This road is to eventually provide a link between Erskine Park in the west and Wallgrove Road in the east. This is discussed further below.

The Northern Link Road' (currently under construction and identified for completion in 2013) will provide a connection between Lenore Lane in the west and Old Wallgrove Road to the east. As part of the Northern Link Road proposal, a traffic impact assessment was undertaken by Maunsell Australia which estimated that the link would need to accommodate in the order of approximately

2,000 vph during peak periods. The assessment identified the need for the construction of the Mini Link Road, connecting with Old Wallgrove Road in addition to upgrades to the existing intersection of Old Wallgrove Road and Wallgrove Road. This is also documented in the Parsons Brinckerhoff report dated July 2010 (and entitled "*Erskine Park Link Road Concept Plan Approval, Review of Environmental Factors*") which was developed in consultation with the RMS and has therefore been utilised for the future modelling scenarios within this report.

4.2 Key Intersections

The key intersection in the vicinity of the site is shown below and provides an understanding of the existing road geometry and alignment:



Source: Near Map

Figure 3: Intersection of Old Wallgrove Road / Wallgrove Road

It can be seen from **Figure 3** that Old Wallgrove Road generally carries two lanes of traffic in either direction and is separated by a median at the intersection. This intersection will accommodate the main entry and exit movements associated with the proposed works.

4.3 Existing Intersection Analysis

For the purposes of the assessment of traffic impacts of this development, surveys have been undertaken at the most critical intersection nearest the site, being the intersection of Wallgrove Road with Old Wallgrove Road immediately north-east of the site. These surveys were undertaken between 6.30-9.00 AM and 3.30-6.30 PM.

The performance of this intersection has been analysed using the SIDRA computer program to determine its performance characteristics under existing traffic conditions based on these surveys. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

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

A summary of the modelled results are provided below. Reference should also be made to the SIDRA outputs provided in **Appendix B** which provide detailed results for individual lanes and approaches.

Table 1: Intersection Performance: AM and PM Peak Hour

Intersection Description	Control Type	Model	Period	Degree of Saturation	Intersection Delay	Level of Service
Wallgrove Rd/ Old Wallgrove Rd	Signals	Without Development	AM	1.034	88.8	F
			PM	0.627	31.2	C

It can be seen from Table 1 that the intersection operates unsatisfactorily under the existing 'base case' scenario, with a level of service F during the AM peak period. This has been identified and the existing layout is proposed to be upgraded in line with the construction of the approved 'Northern Link Road'. Further analysis relating to the generation of the proposed construction works and its effect on the road network is provided in Section 7.1.

4.4 Existing Mid-Block Capacity Analysis

A mid-block capacity assessment has been undertaken on Old Wallgrove Road. Traffic Counts were undertaken over a weekly period (1st November 2011- 7th November 2011) between the Sydney Water Pipeline and the Coles - Myer Distribution Centre. The volume/capacity ratio assessment is premised on the assumption that a ratio of less than 80% demonstrates an acceptable outcome. The mid-block capacity analysis is based on the 'Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis' and the results of the assessment are provided in Table 2 below:

Table 2: Existing Mid-Block Capacity Analysis (V/C Ratio) – Old Wallgrove Road

Peak Period	Southbound (in)			Northbound (out)		
	Vol veh/hr	Capacity (veh/hr)	Max V/C	Vol veh/hr	Capacity (veh/hr)	Max V/C
AM	125	734	17%	134	702	20%
PM	118	767	15%	77	670	11%

It is evident from Table 2 that there is presently sufficient spare midblock capacity within the network. Based on the maximum V/C ratio attained, Old Wallgrove Road in the vicinity of the site currently operates at only 20% of its potential capacity. This however does not take into account the impacts associated with the Northern Link Road currently under construction, however this is unlikely to have any significant impact on these ratios.

5. Overview of Proposed Works

The construction period is expected to occur over 10-12 month period and incorporate the following key activities.

- Construction of Stage 2 of the Estate Road to allow access to Lots 1B, 1C and 2B.
- Bulk and fill earthworks incorporating cut to fill and imported filling to:
    - Construct the Estate Road extension
    - Construct the bio diversity basin, and
    - Raise the level of Lot 1C to match the pad level of Lot 1B.
- Construction of earth retaining walls to the perimeter of 1C
- Import fill to the north eastern portion of Biodiversity Lot A.

5.1 Importation of Fill

A total of 286,800 tonnes of imported fill material is required for the above works. This fill will be delivered by 25 tonne tippers over a period of 143 days. This equates to 10 trucks (20 movements) per hour over an 8 hour working day.

5.2 Road Base Material Delivery

A further 10,560 tonnes of road base and sub-base material is also required during road construction which equates to a further 422 trucks. Road construction is anticipated to occur over a 4 month period, with the delivery of material expected over a 3-4 week period during this time.

In this regard, it is expected that there will be an average of 23 trucks per day for road base material delivery. However, delivery of this material is expected to occur post delivery of the fill material such that this will not be cumulative to the critical fill importation stage. Following delivery of the road base, a further 1,050 tonnes of asphalt will be required which equates to 88 trucks.

5.3 Stormwater and Retaining Structures

The proposed stormwater works include an estimated 1,600 metres of trenches and up to 50 culverts. This is expected to require a total of 136 (56 for pipe delivery, 17 for culverts and 63 for pipe bedding) trucks assuming up to 12 pipe sections or 3 culverts per truck.

Up to 1,590 tonnes of keystone blocks will be required for the erection of retaining walls which will be delivered on 12 tonne HIAB trucks. This equates to a further 133 truck deliveries although these are spread over several weeks and also occur after the more critical fill importation.

5.4 Summary of Truck Numbers

A summary of the above truck numbers is provided in Table 3 below.

Table 3: Total Projected Truck Numbers

Material / Purpose	No./ Area / Volume	Truck Size	Total No. Trucks
Importation of Fill	286,800 tonnes	25t tipper	11,472
Road Base and Sub-Base Material	10,560 tonnes	25t tipper	422
Asphalt	1,050 tonnes	12t bogie	88
Stormwater Pipes	667 pipes	12t hiab	56
Stormwater Culverts	50 culverts	12t hiab	17
Retaining Walls Keystone Blocks	1,590 tonnes	12t hiab	133
Pipe sand bedding / backfill	760 tonnes	12t bogie	63
Landscape topsoil, plants & materials	3,260 tonnes	25t truck	130
Total	n/a	n/a	12,381

It can be seen from above that the critical period for truck movements will occur during fill importation to the site which is expected to comprise the first stage of works.

5.5 Construction Workers

A maximum of up to 15 workers per day are expected to be on-site at any one time. Assuming a conservative average car occupancy of say 1.25 persons per vehicle results in a demand for up to 12 parking spaces. Dedicated on-site car parking will be provided as necessary to accommodate contractor parking during the various stages proposed.

6. Traffic Control Plans

6.1 Access and Pedestrian Control

All work areas will be appropriately fenced to prevent unauthorised pedestrian access to the site. This includes works to the Estate Road which does not experience any pedestrian movements in the vicinity of the proposed works. In this regard, detailed pedestrian detour or signage plans are not considered necessary at this stage.

6.2 Work Zone Requirements

No Work Zones are proposed or considered necessary at this stage. All work will be undertaken within the confines of the overall site.

6.3 Truck Routes

The proposed truck routes are shown in **Figure 4**, below. A copy of these routes should be provided to all drivers prior to attending the site.

These routes seek use the arterial road network as much as possible with the use of local streets only where required.

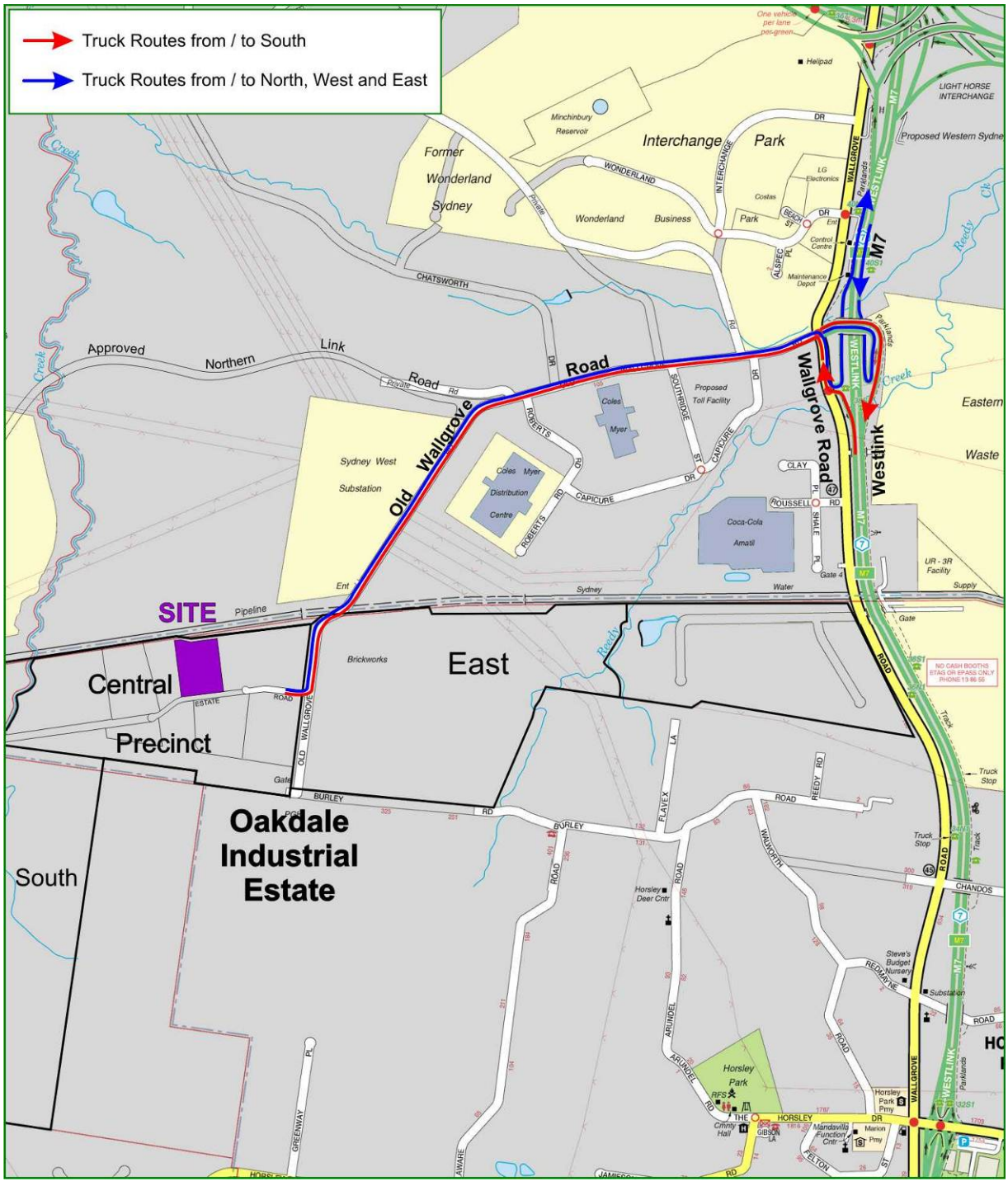


Figure 4: Proposed Truck Access Routes

7. Traffic Impacts

7.1 Intersection Performance during Construction

The peak truck movements will occur during importation of fill material at the commencement of the proposed works. This involves up to 20 truck movements per hour (10 trucks per hour) over an 8 hour day. For the purposes of this assessment it is assumed that truck arrivals will be divided equally between arriving and departing from each direction of the M7 motorway. The impact of this additional traffic on the existing intersection performance is summarised in Table 4, below.

Table 4: Intersection Performance: AM and PM Peak Hour

Intersection Description	Control Type	Model	Period	Degree of Saturation	Intersection Delay	Level of Service
Wallgrove Rd/ Old Wallgrove Rd	Signals	Existing	AM	1.034	88.8	F
			PM	0.627	31.2	C
	Signals	With Construction Traffic	AM	1.034	90.7	F
			PM	0.627	31.4	C
		Construction Traffic & New AM Cycle Time	AM	1.014	86.1	F

It is evident from Table 4 that the additional traffic proposed will have minimal impact on the critical intersection of Old Wallgrove Road / Wallgrove Road / M7 Ramps with no change to existing Levels of Service. Average delays during the critical AM peak will increase moderately, however this can readily be improved by increasing the cycle time at the intersection. In the event that the RMS was to not accept increasing the overall signal cycle time for any reason, then the moderate increase is still considered acceptable having regard for the limited duration over which these delays are likely to occur.

7.2 Mid-Block Capacity Analysis Results

In addition to the above intersection analysis, a mid-block capacity assessment has been undertaken on Old Wallgrove Road. Traffic Counts were undertaken over a weekly period (1st November 2011-7th November 2011) between the Sydney Water Pipeline and the Coles - Myer Distribution Centre. The volume/capacity ratio assessment is premised on the assumption that a ratio of less than 80% demonstrates an acceptable outcome. The mid-block capacity analysis is based on the 'Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis' and the results of the assessment are provided below:

Table 5: Mid-Block Capacity Analysis (V/C Ratio)

Intersection Description	Scenario	Peak Period	Eastbound			Westbound		
			Vol veh/hr	Capacity (veh/hr)	Max V/C	Vol veh/hr	Capacity (veh/hr)	Max V/C
Old Wallgrove Rd	Existing	AM	125	734	17%	134	702	20%
		PM	118	767	15%	77	670	11%
	Existing plus Construction Traffic	AM	135	713	19%	144	691	21%
		PM	128	745	17%	87	648	13%

It is evident from Table 4 that there is presently sufficient capacity to accommodate the traffic generated by the proposed development. Based on the maximum V/C ratio attained, Old Wallgrove Road currently operates at a maximum of only 20% of its potential capacity. This will increase to a maximum of 21% with the development traffic (10 veh/hr in eastbound and 10 veh/hr in westbound lanes) when taking into consideration the higher proportion of heavy vehicles during construction.

As such, the traffic generated by the proposed construction works can be readily accommodated within V/C ratios remaining well below the required threshold level.

8. Conclusions

In summary, the traffic impacts associated with construction traffic can be accommodated with minimal impact on the surrounding road network.

This report should be read in conjunction with other documentation prepared on behalf of Goodman Property Services (Aust) Pty Ltd relating to internal construction activities.

Appendix A

SIDRA Intersection Outputs

MOVEMENT SUMMARY

Site: Wallgrove / Old Wallgrove_AM-EX

Wallgrove Rd / Old Wallgrove Rd
Period: AM
Scenario: Existing
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wallgrove Rd											
1	L	152	27.0	0.961	81.4	LOS F	47.7	380.2	1.00	1.17	19.1
2	T	1094	12.7	0.961	72.0	LOS F	49.2	382.2	1.00	1.18	19.4
3	R	4	50.0	0.015	50.9	LOS D	0.2	2.0	0.82	0.66	25.4
Approach		1249	14.6	0.961	73.1	LOS F	49.2	382.2	1.00	1.18	19.4
East: M7 Ramps											
4	L	78	28.8	0.556	41.8	LOS C	4.4	39.5	0.98	0.79	28.6
5	T	89	43.7	0.973	72.1	LOS F	8.7	79.1	0.99	1.02	19.1
6	R	53	24.2	0.973	99.7	LOS F	8.7	79.1	1.00	1.14	16.4
Approach		220	33.8	0.973	68.0	LOS E	8.7	79.1	0.99	0.96	20.7
North: Wallgrove Rd											
7	L	155	26.1	1.034	122.7	LOS F	65.5	503.1	1.00	1.39	14.0
8	T	1204	7.1	1.034	113.7	LOS F	65.8	503.1	1.00	1.38	14.1
9	R	187	18.5	1.000[3]	56.6	LOS E	10.1	81.6	0.96	0.81	23.6
Approach		1545	11.8	1.034	107.7	LOS F	65.8	503.1	1.00	1.31	14.8
West: Old Wallgrove Rd											
10	L	67	77.4	0.242	47.3	LOS D	3.7	42.9	0.82	0.78	26.9
11	T	15	85.7	0.242	39.3	LOS C	3.7	42.9	0.84	0.66	26.7
12	R	44	72.2	0.242	59.1	LOS E	2.5	28.4	0.91	0.76	23.4
Approach		126	76.6	0.242	50.5	LOS D	3.7	42.9	0.85	0.76	25.5
All Vehicles		3141	17.0	1.034	88.8	LOS F	65.8	503.1	0.99	1.21	17.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P7	Across W approach	53	32.3	LOS D	0.1	0.1	0.73	0.73
All Pedestrians		106	43.2	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Wallgrove / Old Wallgrove_PM-EX

Wallgrove Rd / Old Wallgrove Rd
Period: PM
Scenario: Existing
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wallgrove Rd											
1	L	31	75.0	0.621	36.6	LOS C	23.1	172.0	0.81	0.95	32.3
2	T	1038	3.4	0.621	26.2	LOS B	23.8	172.0	0.81	0.73	33.3
3	R	8	50.0	0.031	22.3	LOS B	0.2	1.9	0.63	0.69	38.1
Approach		1077	5.8	0.621	26.5	LOS B	23.8	172.0	0.81	0.73	33.3
East: M7 Ramps											
4	L	34	70.6	0.281	42.9	LOS D	1.7	19.1	0.94	0.75	28.5
5	T	24	70.4	0.491	55.0	LOS D	2.1	22.0	0.98	0.73	22.4
6	R	18	38.9	0.491	74.6	LOS F	2.1	22.0	1.00	0.74	20.2
Approach		76	63.0	0.491	54.2	LOS D	2.1	22.0	0.97	0.74	24.1
North: Wallgrove Rd											
7	L	173	9.9	0.564	33.8	LOS C	20.1	148.4	0.79	0.89	32.2
8	T	789	4.8	0.564	25.3	LOS B	20.7	150.8	0.79	0.70	33.6
9	R	120	36.1	0.470	25.7	LOS B	2.9	26.9	0.81	0.79	35.7
Approach		1082	9.1	0.564	26.7	LOS B	20.7	150.8	0.79	0.74	33.6
West: Old Wallgrove Rd											
10	L	373	9.5	0.627	44.1	LOS D	18.3	138.5	0.90	0.85	27.2
11	T	40	29.2	0.479	49.9	LOS D	7.3	58.8	0.95	0.77	23.6
12	R	94	13.6	0.479	58.3	LOS E	7.3	58.8	0.95	0.80	23.4
Approach		506	11.8	0.627	47.2	LOS D	18.3	138.5	0.91	0.84	26.1
All Vehicles		2741	9.8	0.627	31.2	LOS C	23.8	172.0	0.83	0.75	31.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	53.2	LOS E	0.2	0.2	0.94	0.94
P7	Across W approach	53	24.7	LOS C	0.1	0.1	0.64	0.64
All Pedestrians		106	39.0	LOS D			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Wallgrove / Old Wallgrove_AM-EX + Fill Trucks

Wallgrove Rd / Old Wallgrove Rd
Period: AM
Scenario: Existing + Imported Fill Trucks (20veh/hr)
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wallgrove Rd											
1	L	157	29.5	0.968	84.6	LOS F	48.7	391.0	1.00	1.18	18.6
2	T	1094	12.7	0.968	75.0	LOS F	50.6	392.7	1.00	1.20	18.9
3	R	4	50.0	0.015	50.9	LOS D	0.2	2.0	0.82	0.66	25.4
Approach		1255	15.0	0.968	76.1	LOS F	50.6	392.7	1.00	1.20	18.9
East: M7 Ramps											
4	L	78	28.8	0.579	42.6	LOS D	4.5	41.1	0.99	0.79	28.3
5	T	95	46.8	1.013	85.1	LOS F	9.9	91.4	1.00	1.07	17.1
6	R	53	24.2	1.013	118.7	LOS F	9.9	91.4	1.00	1.21	14.3
Approach		225	35.3	1.013	78.3	LOS F	9.9	91.4	0.99	1.00	18.8
North: Wallgrove Rd											
7	L	155	26.1	1.034	122.7	LOS F	65.5	503.1	1.00	1.39	14.0
8	T	1204	7.1	1.034	113.7	LOS F	65.8	503.1	1.00	1.38	14.1
9	R	187	18.5	1.000[3]	56.6	LOS E	10.1	81.6	0.96	0.81	23.6
Approach		1545	11.8	1.034	107.7	LOS F	65.8	503.1	1.00	1.31	14.8
West: Old Wallgrove Rd											
10	L	67	77.4	0.278	49.4	LOS D	4.0	47.0	0.84	0.79	26.3
11	T	20	89.5	0.278	41.0	LOS C	4.0	47.0	0.86	0.68	26.1
12	R	49	75.2	0.278	59.6	LOS E	2.8	32.9	0.92	0.76	23.3
Approach		137	78.4	0.278	51.9	LOS D	4.0	47.0	0.87	0.77	25.1
All Vehicles		3162	17.6	1.034	90.7	LOS F	65.8	503.1	0.99	1.22	16.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	54.2	LOS E	0.2	0.2	0.95	0.95
P7	Across W approach	53	32.3	LOS D	0.1	0.1	0.73	0.73
All Pedestrians		106	43.2	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Wallgrove / Old Wallgrove_AM-EX + Fill Trucks (New Cycle Time)

Wallgrove Rd / Old Wallgrove Rd
Period: AM
Scenario: Existing + Imported Fill Trucks (20veh/hr)
Signals - Fixed Time Cycle Time = 140 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wallgrove Rd											
1	L	157	29.5	0.937	77.6	LOS F	50.1	402.2	1.00	1.08	19.8
2	T	1094	12.7	0.937	68.0	LOS E	52.0	403.6	1.00	1.09	20.1
3	R	4	50.0	0.013	53.1	LOS D	0.2	2.2	0.79	0.67	24.7
Approach		1255	15.0	0.937	69.2	LOS E	52.0	403.6	1.00	1.08	20.1
East: M7 Ramps											
4	L	78	28.8	0.564	49.7	LOS D	5.4	48.7	0.98	0.79	25.9
5	T	95	46.8	0.985	87.4	LOS F	10.7	98.7	0.99	1.03	16.8
6	R	53	24.2	0.985	116.3	LOS F	10.7	98.7	1.00	1.15	14.6
Approach		225	35.3	0.985	81.1	LOS F	10.7	98.7	0.99	0.98	18.4
North: Wallgrove Rd											
7	L	155	26.1	1.014	115.7	LOS F	69.6	534.9	1.00	1.26	14.7
8	T	1219	7.1	1.014	106.8	LOS F	69.8	534.9	1.00	1.26	14.8
9	R	172	18.5	1.000[3]	62.1	LOS E	10.1	81.6	0.98	0.81	22.3
Approach		1545	11.8	1.014	102.7	LOS F	69.8	534.9	1.00	1.21	15.3
West: Old Wallgrove Rd											
10	L	67	77.4	0.322	60.5	LOS E	4.9	57.8	0.88	0.79	23.2
11	T	20	89.5	0.322	51.9	LOS D	4.9	57.8	0.89	0.71	23.0
12	R	49	75.2	0.322	71.0	LOS F	3.4	39.1	0.94	0.77	20.8
Approach		137	78.4	0.322	63.0	LOS E	4.9	57.8	0.91	0.77	22.2
All Vehicles		3162	17.6	1.014	86.1	LOS F	69.8	534.9	0.99	1.12	17.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	64.1	LOS F	0.2	0.2	0.96	0.96
P7	Across W approach	53	35.0	LOS D	0.1	0.1	0.71	0.71
All Pedestrians		106	49.6	LOS E			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Wallgrove / Old Wallgrove_PM-EX + Fill Trucks

Wallgrove Rd / Old Wallgrove Rd
Period: PM
Scenario: Existing + Fill Trucks
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Wallgrove Rd											
1	L	36	78.7	0.626	36.8	LOS C	23.2	174.2	0.82	0.95	32.2
2	T	1038	3.4	0.626	26.3	LOS B	24.1	174.2	0.82	0.73	33.2
3	R	8	50.0	0.033	22.7	LOS B	0.2	1.9	0.64	0.69	37.8
Approach		1082	6.3	0.626	26.6	LOS B	24.1	174.2	0.82	0.74	33.2
East: M7 Ramps											
4	L	34	70.6	0.316	43.4	LOS D	1.8	20.0	0.95	0.75	28.3
5	T	29	75.7	0.552	55.6	LOS D	2.4	25.1	0.98	0.75	22.3
6	R	18	38.9	0.552	75.3	LOS F	2.4	25.1	1.00	0.76	20.1
Approach		81	65.4	0.552	54.8	LOS D	2.4	25.1	0.97	0.75	23.8
North: Wallgrove Rd											
7	L	173	9.9	0.564	33.8	LOS C	20.1	148.4	0.79	0.89	32.2
8	T	789	4.8	0.564	25.3	LOS B	20.7	150.8	0.79	0.70	33.6
9	R	120	36.1	0.478	26.6	LOS B	3.0	27.6	0.83	0.80	35.2
Approach		1082	9.1	0.564	26.8	LOS B	20.7	150.8	0.79	0.74	33.5
West: Old Wallgrove Rd											
10	L	373	9.5	0.627	44.1	LOS D	18.3	138.5	0.90	0.85	27.2
11	T	45	37.4	0.509	49.4	LOS D	7.8	66.2	0.95	0.78	23.7
12	R	99	18.2	0.509	57.9	LOS E	7.8	66.2	0.95	0.81	23.6
Approach		517	13.6	0.627	47.2	LOS D	18.3	138.5	0.91	0.84	26.1
All Vehicles		2762	10.5	0.627	31.4	LOS C	24.1	174.2	0.83	0.76	31.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	52.3	LOS E	0.2	0.2	0.93	0.93
P7	Across W approach	53	24.7	LOS C	0.1	0.1	0.64	0.64
All Pedestrians		106	38.5	LOS D			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.