TRAFFIC IMPACT ASSESSMENT REPORT

FOR A

PROPOSED NEW GARDEN RETAIL CENTRE

AT

127 COSGROVE ROAD

STRATHFIELD SOUTH

Ref. 15167r

May 2016

Prepared By

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1.0 INTRODUCTION

Transport and Urban Planning Pty Ltd has been engaged by BN Group Pty Ltd to provide a Traffic Impact Assessment Report for a proposed garden centre retail development at 127 Cosgrove Road Strathfield South.

The proposed development will consist of a large garden retail sales shop with several associated shops including a café, a pool shop, a pet shop and a fruit and vegetable shop. It will make adaptive reuse of a heritage building on the site, known as the Tarpaulin Shed.

The site is shown on **Figures 1** and **2**.

This report contains an assessment of current and future traffic conditions, taking into account the expected traffic generation and impact of the development. The report is arranged as follows;

- Section 2 describes the site and its location;
- Section 3 details the development proposal, including its access, parking and traffic generation;
- Section 4 reviews the surrounding road system;
- Section 5 identifies the traffic impacts of the proposal on the surrounding road network;
- Section 6 provides conclusions.

This assessment has been undertaken in accordance with the provisions of State Environmental Planning Policy Infrastructure, the RMS Guide to Traffic Generating Developments and planning instruments adopted by Strathfield Council.

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FIGURE 1

GARDEN CENTRE, ENFIELD
CNR COSGROVE RD & PUNCHBOWL RD

SITE LOCATION

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FIGURE 2

GARDEN CENTRE, ENFIELD
CNR COSGROVE RD & PUNCHBOWL RD

SUBJECT SITE

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2.0 THE SITE AND LOCATION

The site is on the western side of Cosgrove Road, at the corner of Punchbowl Road, Strathfield South. The site is in the south east corner of the former Enfield railway marshalling yards, which is now developed as the Enfield Intermodal Logistics Centre (ILC). It is 2.4km west of Campsie and 13kms south west of the Sydney CBD.

Vehicular access to the site is from Cosgrove Road, which provides a good, direct traffic link to the Hume Highway to the north, and Punchbowl Road to the south. The site is generally rectangular, with approximate frontages of 195 metres to Cosgrove Road, and 70 metres to Punchbowl Road.

The site is currently occupied by an old, dilapidated heritage industrial building, known as the Tarpaulin Shed. This building is approximately 117m x 45m and is planned to be adaptively reused as a large covered gardening retail centre. Current vacant land to the south, west and north of the building will be used for outdoor display and sale of plants, car parking and a depot for bulk landscaping materials.

To the north and west of the site is the Enfield ILC; to the east and southeast is residential housing; and to the south west is an industrial estate.

3.0 DEVELOPMENT PROPOSAL

The proposed use of the site will involve the following:

3.1 Proposed Use

The development will be a garden retail centre, comprised of the following:

- Garden store, including indoor and outdoor areas, café, and gardening hardware. GFA 5,670sqm.

- Three associated stores:

  - Fruit and vegetables: GFA 1,150sqm
  - Pool Shop: GFA 185sqm
  - Pet Shop: GFA 500sqm

- Total Shopping GFA: 7,505sqm

- An outdoor bulk landscape depot;
- Car parking for 216 cars, including 8 spaces for the disabled;
- A two space loading dock catering for articulated vehicles including B-doubles.

3.2 Hours of Operation

The proposed garden centre is planned to operate during the following hours:

- Nursery, café, pet shop, pod shop: 7am to 6pm, 7 days
- Fruit and veg shop: 7am to 9pm, 7 days

3.3 Staffing

Total numbers of staff will be 75.

3.4 Delivery Truck Volumes and Routes

3.4.1 Truck Volumes

The development will generate heavy vehicle trips. These will be for the delivery of materials, plants and other goods that will be sold on site. From information supplied by the client and from information from other similar developments, the proposal is expected to generate up to the following numbers and types of delivery truck trips on a peak day.

TABLE 3.1

DAILY TRUCK VOLUMES

Development Element	SRV/MRV/HRV	Articulated
Garden Centre, incl café, hardware, bulk materials	14 per day	1 per day
Fruit/vegetables, pool and pet shops	12 per day	Nil
Totals:	26 per day	1 per day

SRV: Small Rigid Vehicle; MRV: Medium Rigid Vehicle; HRV: Heavy Rigid Vehicle
Articulated: Semi trailer or B-double.

All truck trips will occur during normal operating hours on weekdays only.

The total heavy vehicle generation per weekday is expected to be 27 trucks attending the site, generating 54 trips (27 in, 27 out). These trips are expected to be evenly distributed between 7am and 4pm, which equates to 6 truck trips per hour (3 in, 3 out).

3.4.2 Truck Routes

Figure 3 shows the expected routes that delivery trucks will use, and an estimate of each routes percentage use. All trucks are expected to leave the site by the same route they arrived. The roads used will be examined in detail in Section 4.

Current B-double approved routes include Cosgrove Road, but require that B-doubles only enter between 6am and 7pm, and must do so via a right turn from Hume Highway and exit only via a right turn to Punchbowl Road. Any B-double servicing the site will be required to comply with these restrictions.

Due to the good road access the site enjoys, truck traffic generated by the development will quickly dissipate onto the surrounding classified road network.

3.5 Light Vehicle Traffic

Trip generation information is available from the RMS Guide to Traffic Generating Developments (2002) and RMS Technical Direction 2013/04a. This information includes survey data from various types of development across NSW. In addition, the client operates a similar sized garden centre with associated stores in Milperra, and has supplied recent hourly sales volumes on a peak weekend day, which can be used to validate RMS trip generation rates.

RMS Guidelines do not include trip rates for a garden centre. The proposed development has characteristics which places its trip generation between that of a shopping centre, a bulky goods store and a hardware/building supplies store. However, it would generate significantly fewer trips than a shopping centre, because the surveyed shopping centres included supermarkets which are very high trip generators. It is much more similar in size and likely to use a hardware/building supply store or a bulky goods store.

RMS Technical Direction 2013/04a includes survey trip generation data from a 2009 study (Trip Generation and Parking Generation Surveys, Bulky Goods and Hardware Stores, Hyder Consulting for RMS, May 2009). The data for metropolitan centres shows the following trip generation rates:

Development Type	Trip Generation per 100sqm GFA			
	AM Peak Hour	Site Peak Generation	PM Peak Hour	Weekend Site Peak Generation
Hardware and Building Supplies	1.68	4.03	2.70	5.91
Bulky Goods	Nil	2.44	1.01	3.75

Note that the site peak generation does not coincide with the road network peak hours.

The actual sales volumes from a similarly sized garden centre development in Milperra shows up to 193 transactions per hour (12-1pm Sunday). Assuming 193 transactions equals 193 customer vehicles attended the site that hour, the site peak trip generation was 386 trips (193 in, 193 out) which equates to a trip generation rate of approximately 5/100sqm GFA. This rate is close to the Hardware and Buildings Supplies rate above for peak weekend operation.

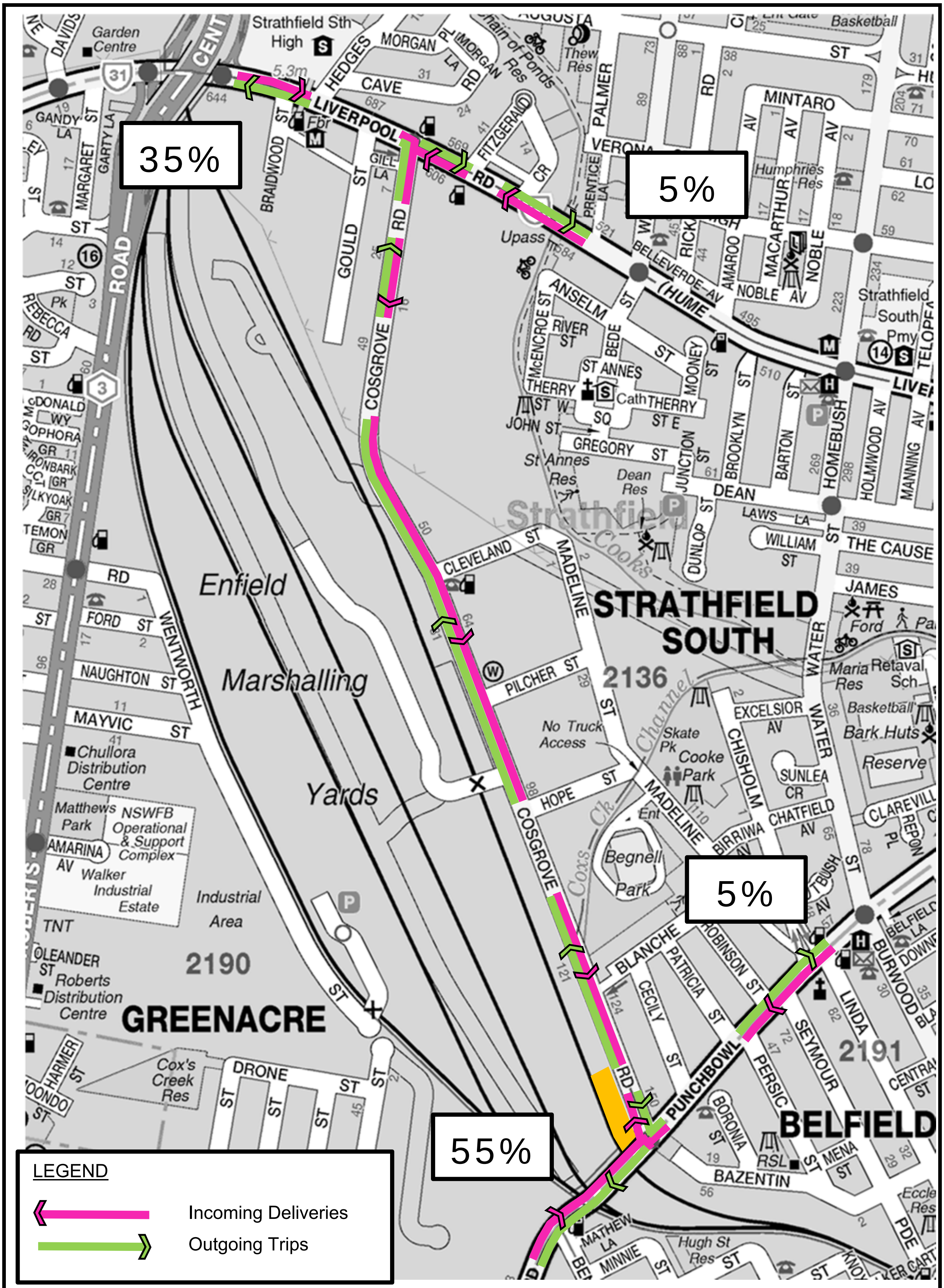

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FIGURE 3

GARDEN CENTRE, ENFIELD
CNR COSGROVE RD & PUNCHBOWL RD

TRUCK ROUTES

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It is therefore concluded that the RMS trip generation rates for Hardware and Building Supplies stores should be used for the proposed development.

The trips expected to be generated are:

AM Peak Hour - 7,505sqm x 1.68/100 = 126 trips
PM Peak Hour - 7,505sqm x 2.70/100 = 202 trips

These trips are expected to be split on a 60/40 basis, with 60% of AM trips in and 40% out; and 40% of PM trips in and 60% out. Therefore the trip volumes will be:

	In	Out	Total
AM Peak Hour Trips	76	50	126
PM Peak Hour Trips	81	121	202

The centre will be located on the corner of Cosgrove Road and Punchbowl Road, and will also have direct access to Hume Highway to the north. A review of the likely customer catchment area for the proposal indicates that 70% of customers will come from Punchbowl Road, and will be evenly split to the east and west along Punchbowl Road. From the Hume Highway, the remaining 30% will also be split evenly to the east and west. These volumes will be assigned to the existing road layout for intersection modelling in Section 5.

3.6 Site Access

The development includes construction of a new driveway on the Cosgrove Road frontage, for use by customers and service vehicles. The driveway location is at the northern end of the site in order to maximise its separation from the traffic signals at Cosgrove Road and Punchbowl Road.

The access has been specifically designed for the largest vehicle which may use it, in this case a B-double. **Appendix 1** shows the swept paths of large trucks, including a B-double, verifying they can enter the site in a forward direction, use the loading dock, turn around on site and leave in a forward direction. This arrangement is fully in accordance with AS2890.2-2002.

It is also noted that currently B-doubles are only permitted to use Cosgrove Road in a southbound direction, requiring right turn into and out of the site only. The swept path diagrams in **Appendix 1A** verifies this can be achieved satisfactorily.

3.7 Parking and Internal Arrangements

The internal traffic arrangements for both commercial delivery vehicles and public customer delivery vehicles has been designed fully in compliance with the requirements of AS289.1-2004 and AS2890.2-2002. This includes grades, aisle widths, space dimensions, clearances and manoeuvring room.

The eight parking spaces for the disabled have been designed fully in accordance with AS2890.6-2009.

A total of 216 car parking spaces are proposed. Strathfield Council DCP2005 Part 1 provides Council's code for parking facilities. It refers to the RMS Guide to Traffic Generating Developments, and generally uses the RMS parking rates for various development types. The DCP does not include a parking rate for a garden centre. It does have a rate for retail shops of 6.2 spaces per 100sqm of GFA which is in line with the RMS Guide for shopping centres below 10,000sqm GLFA.

However, reference to Section 5.7.1 of the RMS Guide shows that this rate anticipates the shopping centre would include a mix of retail categories including high parking generators such as supermarkets. This rate would clearly not apply to a garden centre.

The RMS Guide provides retail component rates for shopping centres, which states for stores such as furniture, electrical and department stores (such as David Jones), the rate would be 24 spaces per 1,000sqm GLFA, and for faster trade stores such as Target, K-Mart, the rate would be 40 spaces per 1,000sqm GLFA. (The GFA of the subject proposal of 7,505sqm is expected to equate to approximately 6,750sqm GLFA).

It is reasonable to adopt the average of the above rates which would suggest a peak parking demand rate of 32 spaces per 1,000sqm GLFA. For this site, 32 x 6,750 / 1,000 equals 216 spaces.

The information on sales transactions from the similar Milperra garden centre indicates that on a peak weekend day, up to 193 transactions occurred in one hour. Given the short duration parking turnover nature of the business, this indicates up to 193 cars per hour would park on the site, equivalent to a parking demand rate of 28.6 spaces per 1,000sqm GLFA. This surveyed rate is lower than the above 32 spaces per 1,000sqm. It should also be noted that it is generally accepted that a car park should be designed to accommodate the 85th percentile of its use, rather than its highest peak demand. It is also noted that the quoted RMS parking rates include provision for staff car parking.

The proposed provision of 216 parking spaces for the subject proposal equates to a rate of 32 spaces per 1,000sqm GLFA. This rate exceeds the rate that is required at the similar Milperra centre, and is at the midpoint of the RMS Guide rates for slow and fast trade stores. Accordingly, it is assessed that the provision of 216 parking spaces will satisfactorily meet the parking demand of the development.

4.0 SURROUNDING ROAD NETWORK

4.1 Cosgrove Road

Cosgrove Road is a Regional Road which runs generally north/south between the Hume Highway 2km north of the subject site, and Punchbowl Road. At the site it has a 12.8 metre wide carriageway between kerbs, with unrestricted parking permitted along both sides. It carries one traffic lane in each direction, divided by a broken centre line. It has footpaths 3.6 metres wide on both sides, including a concrete footpath along the eastern side.

The road is generally straight and level, with a slight downgrade to the north. It has a well maintained bitumen surface, good delineation and good lighting. It has a 60km/h speed limit.

Due to its good connectivity to classified roads to the north and south and due to a large industrial area along both sides of most of its length, Cosgrove Road carries moderate volumes of traffic, including a higher than average percentage of heavy vehicles. Its intersections at Punchbowl Road and the Hume Highway are controlled by traffic signals.

4.2 Punchbowl Road

Punchbowl Road is a classified Main Road under the control of the RMS. It forms part of the arterial road network in the region. It runs southwest/northeast between Punchbowl, 3km to the southwest, and Georges River Road about 1km to the northeast. Punchbowl Road provides a good connection between the subject site and the A3 (King Georges Road and Roberts Road), 1.7km to the south west of the site.

Near the site, Punchbowl Road consists of four lanes of traffic divided by a concrete median, plus a right turn lane and a left turn lane into Cosgrove Road. The road is in good condition, with generous lane widths, good delineation and lighting. It has a 60km/h speed limit.

4.3 Hume Highway

Hume Highway, also known as Liverpool Road, forms part of the A22, a major arterial road in Sydney's road network. It is a classified Main Road under the control of the RMS. It runs east west past Cosgrove Road, and is built to high urban arterial road standards. It carries six traffic lanes divided by a concrete median and is in good condition, with good delineation, lighting and alignment. It has a 60km/h speed limit and carries high traffic volumes.

Hume Highway provides a good connection from Cosgrove Road to the north via Centenary Drive and west to Sydney's greater western suburbs.

4.4 Key Access Intersections

The subject site has two key access intersections which provide access to the surrounding classified road network. These are;

- Cosgrove Road/Punchbowl Road
- Cosgrove Road/Hume Highway

Both intersections are controlled by traffic signals. The current and future signal operation will be modelled in Section 5 of this report to assess the traffic impact of the proposed development.

5.0 TRAFFIC IMPACT OF THE PROPOSAL

5.1 Traffic Volumes

Intersection traffic counts were carried out at the two key intersections mentioned in Section 4.4 on 6 and 7 October 2015. Count data is included in **Appendix 2**. **Figure 4** shows the existing AM and PM peak hour volumes at the intersections.

To assess the traffic impact of the development proposal at each intersection, SIDRA modelling of the intersections' performance will be carried out for their current traffic volumes. Then the forecast additional traffic generated by the development will be added and the SIDRA modelling will be carried out again to determine the post-development operation of each intersection.

The additional peak hour traffic volumes are shown on **Figure 5**. Adding these volumes to the existing volumes produces the predicted future volumes shown on **Figure 6.**

Finally, modelling of the intersections performance with the cumulative impact of the traffic generated by the full operation of the ILC and the proposed development will be carried out. The ILS commenced operation in early 2015 and its current usage is low compared to its planned and approved usage.

The Enfield ILC Project Approval included traffic movement forecasts, which are documented in the 'Traffic Impact Assessment, Intermodal Logistics Centre, Enfield – Transport Working Paper, dated 5 July 2005, by SKM.' Section 4 of that report details the forecast future traffic volumes that will be generated by the ILC when in full operation, and provides AM and PM peak hour trip distributions onto the surrounding road network in Tables 4-4 and 4-5. The additional volumes on Cosgrove Road, south of Hume Highway were forecast to be:

	AM Peak Hour	PM Peak Hour
Northbound:	1	84
Southbound:	55	3

There was no forecast additional traffic on Cosgrove Road near Punchbowl Road due to the configuration of the ILC access intersection at Cosgrove Road. The modelling of the intersection of Cosgrove Road and Hume Highway for this cumulative development scenario will be analysed in Section 5.3.2.

5.2 SIDRA Analysis

SIDRA was initially developed by the Australian Road and Research Board during the 1970's. It has continued to be developed and used for traffic analysis throughout Australia and internationally. SIDRA is endorsed in the RMS Guide to Traffic Generating Developments (Section 4.2.2, page 4-3) to determine measures of effectiveness of intersection operation.

SIDRA modelling calculates the intersection's operation and produces outputs to assess intersection capacity and efficiency. The key SIDRA outputs are Degree of Saturation, Average Delay and Level of Service (LoS). Table 5.1 shows for each Level of Service, the range of Average Delay to vehicles using the intersection and a description of operational efficiency. Levels of Service range from "A" (Good Operation) to "E" (at capacity).

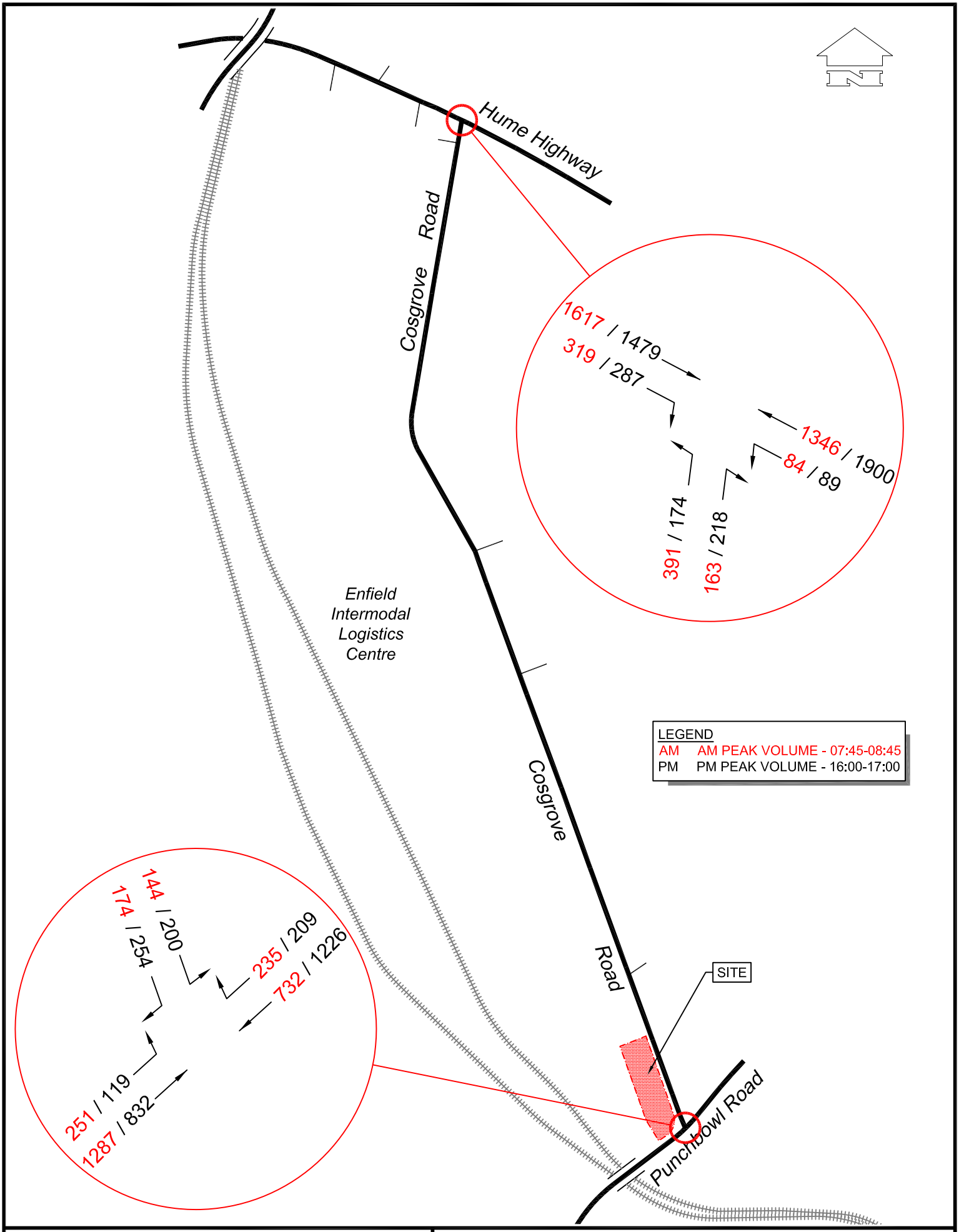

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FIGURE 4

GARDEN CENTRE, ENFIELD
CNR COSGROVE ROAD & PUNCHBOWL ROAD

EXISTING TRAFFIC VOLUMES

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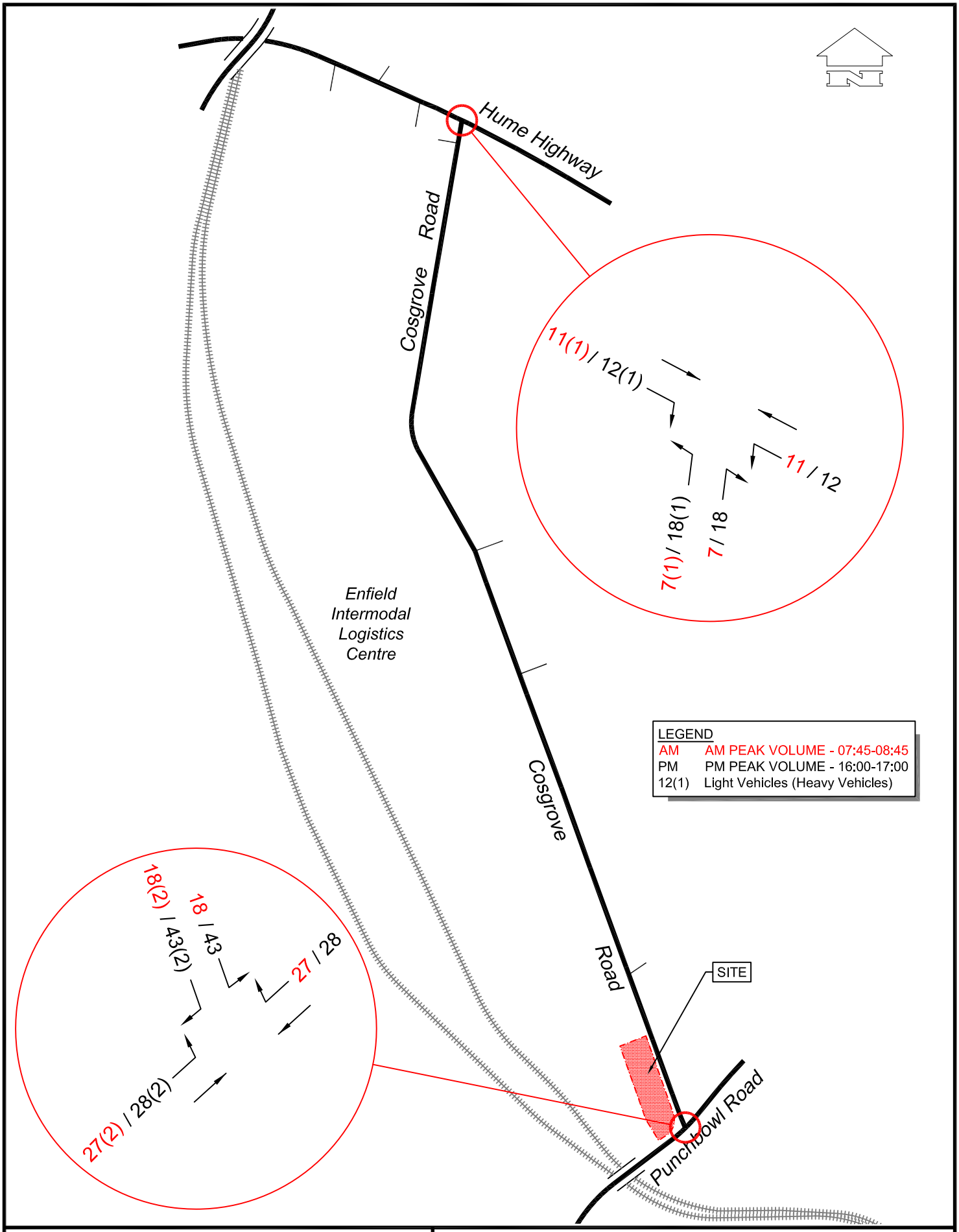

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FIGURE 5

GARDEN CENTRE, ENFIELD
CNR COSGROVE ROAD & PUNCHBOWL ROAD

ADDITIONAL TRIPS

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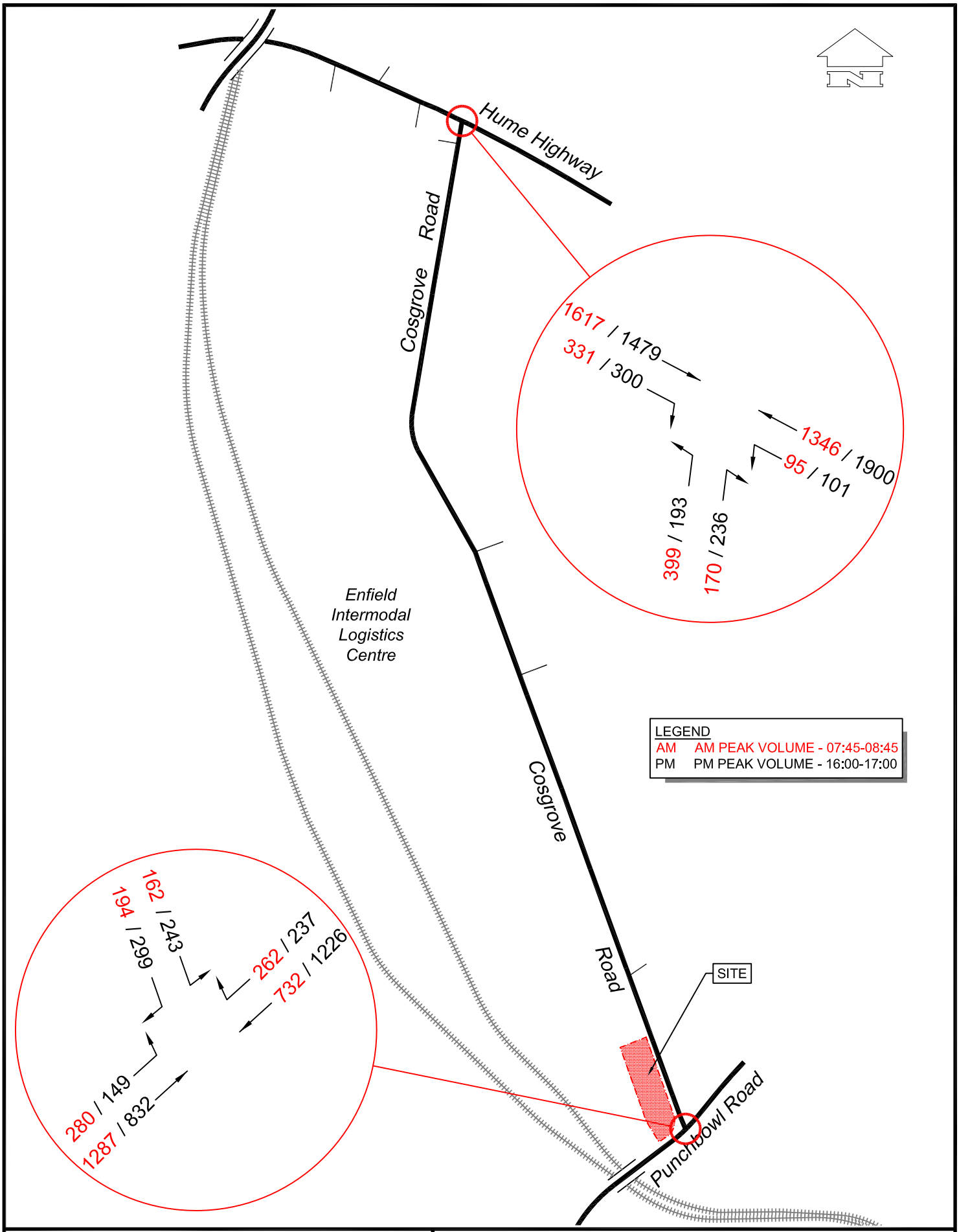

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FIGURE 6

GARDEN CENTRE, ENFIELD
CNR COSGROVE ROAD & PUNCHBOWL ROAD

FUTURE TRAFFIC VOLUMES

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TABLE 5.1

LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS

Level of Service	Average Delay (seconds/vehicle)	Traffic Signals
A	<14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity, incidents will cause excessive delays

Source: Table 4.2 RTA Guide to Traffic Generating Developments October 2002

Degree of Saturation (DoS) is the ratio of demand flow to capacity, or volume/capacity (v/c). For intersections controlled by traffic signals, satisfactory operation is indicated by a DoS of up to about 0.9. Full saturation is 1.

5.3 SIDRA Results

The results of the SIDRA modelling for the intersections are shown in the following tables. Copies of the full SIDRA outputs are attached as **Appendix 3**.

5.3.1 Cosgrove Road and Punchbowl Road

TABLE 5.2

Period	Existing			With Development		
	DoS	Avg Delay	LoS	DoS	Avg Delay	LoS
AM Peak Hour	0.761	20.2	B	0.795	21.6	B
PM Peak Hour	0.634	21.4	B	0.720	23.9	B

The above results show that this intersection currently operates at a Level of Service (LoS) B in both peaks. (Good, with acceptable delays and spare capacity.)

With the additional development generated traffic, it will experience only a marginal change in operation and will remain at LoS B in both peaks.

5.3.2 Cosgrove Road and Hume Highway

TABLE 5.3

Period	Existing			With Development		
	DoS	Avg Delay	LoS	DoS	Avg Delay	LoS
AM Peak Hour	0.750	20.0	B	0.726	20.7	B
PM Peak Hour	0.820	22.9	B	0.836	25.6	B

The above results show that this intersection currently operates at a Level of Service (LoS) B in both peaks. (Good, with acceptable delays and spare capacity.)

With the additional development generated traffic, it will experience only a marginal change in operation and will remain at LoS B in both peaks.

The following results show the forecast future performance of the intersection for the cumulative growth scenario of the Enfield ILC in full operation, as detailed in Section 5.1.

TABLE 5.4

Period	With Development and Full ILC Operation		
	DoS	Avg Delay	LoS
AM Peak Hour	0.769	21.7	B
PM Peak Hour	0.882	28.1	B

This analysis shows that in the AM peak hour, the intersection will operate with a slight increase in degree of saturation and average delay, while the increase in the PM peak will be moderate. The Level of Service will continue to be B (good with acceptable delays and spare capacity) in both AM and PM peak hours. These results are assessed as showing the traffic impact of the development in the cumulative growth scenario will be acceptable.

5.4 Summary of Traffic Impacts

The preceding analysis shows that this development will be a moderate generator of traffic during peak hours (up to 202 vehicle trips per peak hour).

No key access intersection will experience more than a minor traffic impact from the additional development generated traffic, and the Levels of Service at each intersection in the AM and PM peak period will remain unchanged.

It is therefore concluded that the proposed development will have an acceptable traffic impact and there is no requirement for funding or provision of any new traffic capacity roadworks.

6.0 CONCLUSION

This Traffic Impact Assessment has been carried out on a proposed garden centre with auxiliary shops at 127 Cosgrove Road, Strathfield South. The proposal involves the adaptive re-use of the Tarpaulin Shed, a heritage industrial building on the corner of Cosgrove Road and Punchbowl Road.

The truck and car traffic generation of the proposal has been identified. All truck movements will occur on weekdays and will total up to 27 truck trips per day. The AM and PM peak hour truck movements are expected to be up to 6 trips. The proposal will generate 126 and 202 car trips in the weekday AM and PM peak hours respectively. Overall the proposed development is assessed as a moderate traffic generator.

The proposal includes two loading bays suitable for articulated vehicles. All trucks will be able to enter and leave the site in a forward direction. The truck access circulation and service area is designed in accordance with AS2890.2.

The site will have 216 parking spaces including 8 spaces for the disabled. The car parking and access arrangements are assessed as satisfactory and are in accordance with AS2890.1 and the RMS Guidelines for Traffic Generating Developments.

The key access intersections of Cosgrove Road with Punchbowl Road and with Hume Highway have been modelled using SIDRA computer simulation software. The forecast additional peak hour traffic generated by the centre was added to the existing surveyed traffic volumes to produce future AM and PM peak hour models. Neither of the key intersections will experience more than a minor increase in delay, and the Levels of Service at each intersection will remain unchanged.

A further modelling analysis of the cumulative growth scenario, including forecast traffic generated by the full operation of Enfield ILC, was carried out. This also showed the key access intersection of Cosgrove and Hume Highway would continue to operate at Level of Service B (good with acceptable delays and spare capacity). The traffic impact of the proposed development is therefore assessed as acceptable. There is no requirement for funding or provision of any road improvement works.

In summary, the proposed garden centre is assessed as having good access to the surrounding road network and will have an acceptable impact on surrounding roads. The proposed accesses to the site for light and heavy vehicles are suitable for their proposed use and all vehicles will be able to enter and leave in a forward direction. There are satisfactory internal parking and servicing areas. The proposal will be fully in accordance with AS2890.1, AS2890.2 and AS2890.6.

APPENDIX 1A

GARDEN CENTRE, ENFIELD
CNR COSGROVE ROAD & PUNCHBOWL ROAD

TURNPATH - 25m B-DOUBLE

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APPENDIX 1B

GARDEN CENTRE, ENFIELD

CNR COSGROVE ROAD & PUNCHBOWL ROAD

TURNPATH - 19m ARTICULATED

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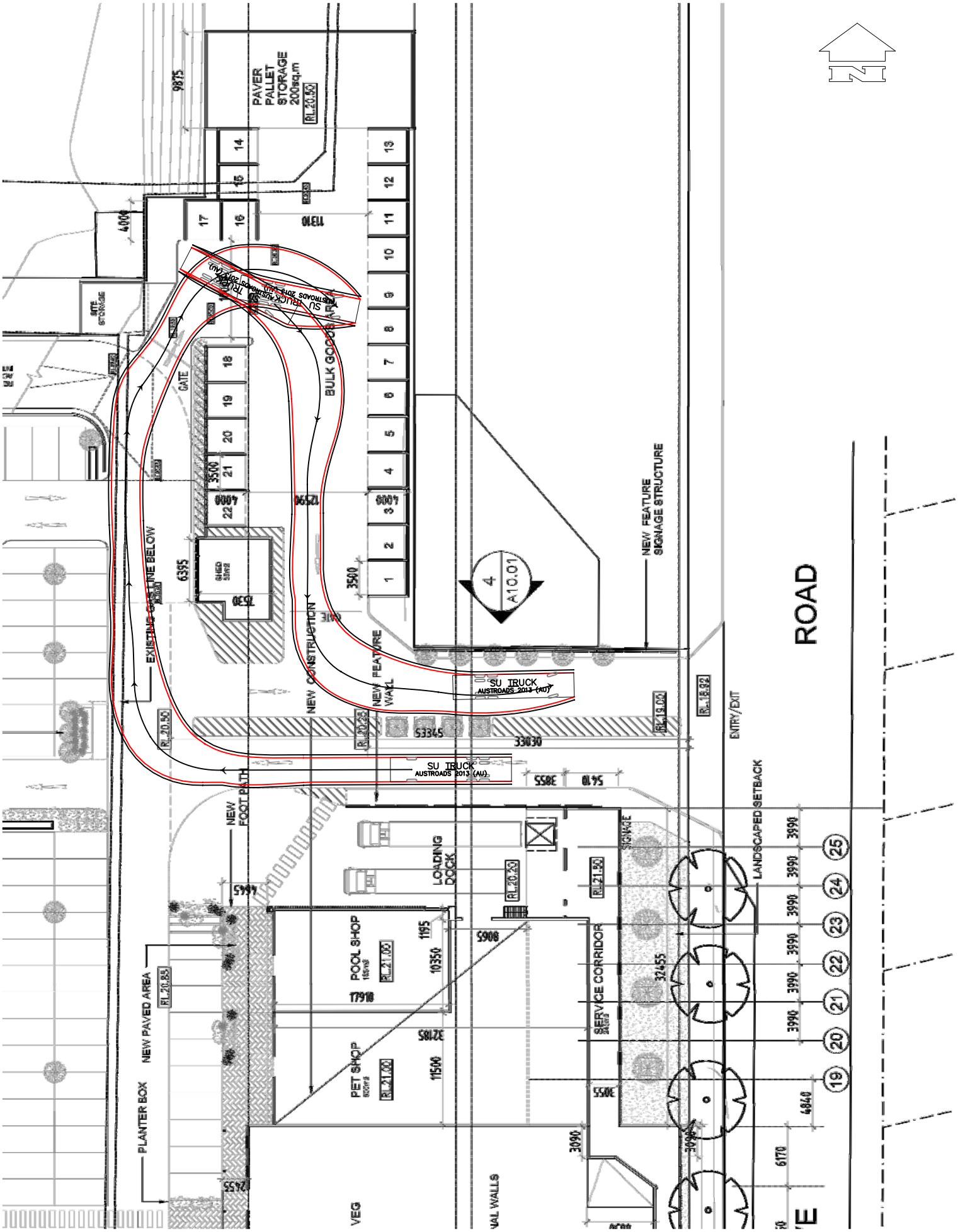

APPENDIX 1C

GARDEN CENTRE, ENFIELD
CNR COSGROVE ROAD & PUNCHBOWL ROAD

TURNPATH - 12.5m HEAVY RIGID VEHICLE

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APPENDIX 2

TRANSPORT & URBAN PLANNING PTY LTD
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AM DATA

Site : **Cosgrove Rd at Hume Hwy (Liverpool Rd), Strathfield. 15167**
Day/Date : **Wednesday 7 Oct 2015** **TCS No 1088**
Weather : Fine

Light Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOT**
0700 - 0715	342	66	65	16	14	192	**695**
0715 - 0730	378	89	64	28	8	242	**809**
0730 - 0745	376	80	85	46	15	329	**931**
0745 - 0800	432	85	77	45	14	257	**910**
0800 - 0815	389	67	91	32	22	346	**947**
0815 - 0830	405	58	78	38	25	343	**947**
0830 - 0845	337	74	110	48	22	357	**948**
0845 - 0900	334	59	85	27	23	358	**886**
Per End	**2993**	**578**	**655**	**280**	**143**	**2424**	**7073**

Heavy Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOT**
0700 - 0715	14	10	10	2	1	7	**44**
0715 - 0730	23	10	14	1	0	5	**53**
0730 - 0745	18	7	13	3	3	10	**54**
0745 - 0800	16	13	4	0	0	8	**41**
0800 - 0815	13	7	13	0	1	8	**42**
0815 - 0830	8	8	12	0	0	13	**41**
0830 - 0845	17	7	6	0	0	14	**44**
0845 - 0900	16	6	12	0	1	11	**46**
Per End	**125**	**68**	**84**	**6**	**6**	**76**	**365**

Combined

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOT**
0700 - 0715	356	76	75	18	15	199	**739**
0715 - 0730	401	99	78	29	8	247	**862**
0730 - 0745	394	87	98	49	18	339	**985**
0745 - 0800	448	98	81	45	14	265	**951**
0800 - 0815	402	74	104	32	23	354	**989**
0815 - 0830	413	66	90	38	25	356	**988**
0830 - 0845	354	81	116	48	22	371	**992**
0845 - 0900	350	65	97	27	24	369	**932**
Per End	**3118**	**646**	**739**	**286**	**149**	**2500**	**7438**

Light Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Hourly	**T**	**R**	**L**	**R**	**L**	**T**	**TOT**
0700 - 0800	1528	320	291	135	51	1020	**3345**
0715 - 0815	1575	321	317	151	59	1174	**3597**
0730 - 0830	1602	290	331	161	76	1275	**3735**
0745 - 0845	1563	284	356	163	83	1303	**3752**
0800 - 0900	1465	258	364	145	92	1404	**3728**

Heavy Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Hourly	**T**	**R**	**L**	**R**	**L**	**T**	**TOT**
0700 - 0800	71	40	41	6	4	30	**192**
0715 - 0815	70	37	44	4	4	31	**190**
0730 - 0830	55	35	42	3	4	39	**178**
0745 - 0845	54	35	35	0	1	43	**168**
0800 - 0900	54	28	43	0	2	46	**173**

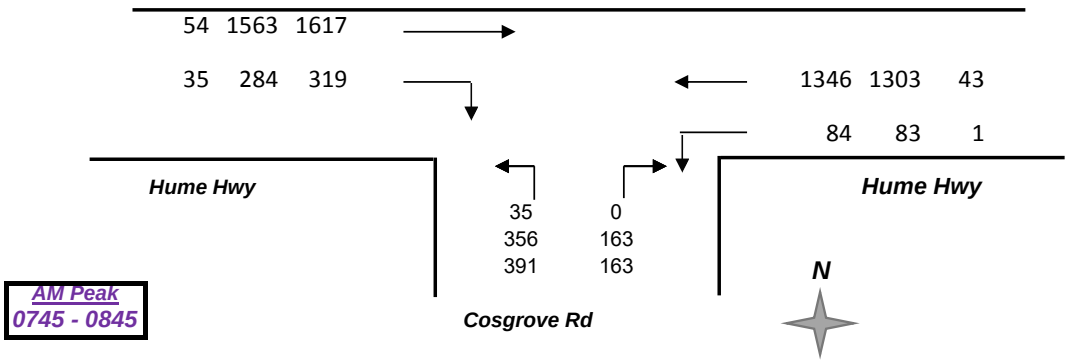
Combined

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Hourly	**T**	**R**	**L**	**R**	**L**	**T**	**TOT**
0700 - 0800	1599	360	332	141	55	1050	**3537**
0715 - 0815	1645	358	361	155	63	1205	**3787**
0730 - 0830	1657	325	373	164	80	1314	**3913**
0745 - 0845	1617	319	391	163	84	1346	**3920**
0800 - 0900	1519	286	407	145	94	1450	**3901**

Peds

	WEST	SOUTH	EAST	
Time Per	*Hume Hwy*	*Cosgrove Rd*	*Hume Hwy*	**TOT**
0700 - 0715	0	0	2	**2**
0715 - 0730	1	0	0	**1**
0730 - 0745	0	0	1	**1**
0745 - 0800	0	0	2	**2**
0800 - 0815	0	1	2	**3**
0815 - 0830	0	0	1	**1**
0830 - 0845	1	0	1	**2**
0845 - 0900	0	0	0	**0**
Per End	**2**	**1**	**9**	**12**

Peak Hour	*Hume Hwy*	*Cosgrove Rd*	*Hume Hwy*	**TOT**
0745 - 0845	**1**	**1**	**6**	**8**



AM Peak
0745 - 0845

TRANSPORT & URBAN PLANNING PTY LTD
Ph: 02 9545 1411

PM DATA

Site : **Cosgrove Rd at Hume Hwy (Liverpool Rd), Strathfield. 15167**
Day/Date : **Wednesday 7 Oct 2015** **TCS No 1088**
Weather : Fine

Light Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Time Per	T	R	L	R	L	T	TOT
1530 - 1545	234	58	125	36	20	479	**952**
1545 - 1600	244	68	120	21	15	450	**918**
1600 - 1615	262	47	118	31	14	415	**887**
1615 - 1630	329	59	99	34	17	450	**988**
1630 - 1645	355	71	103	42	22	481	**1074**
1645 - 1700	367	75	91	38	26	507	**1104**
1700 - 1715	336	56	126	41	24	440	**1023**
1715 - 1730	408	70	115	37	15	433	**1078**
Per End	**2535**	**504**	**897**	**280**	**153**	**3655**	**8024**

Heavy Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Time Per	T	R	L	R	L	T	TOT
1530 - 1545	4	1	7	2	0	11	**25**
1545 - 1600	8	4	6	0	2	18	**38**
1600 - 1615	7	10	8	1	4	10	**40**
1615 - 1630	6	7	7	0	2	14	**36**
1630 - 1645	3	4	5	1	1	11	**25**
1645 - 1700	4	2	6	0	0	10	**22**
1700 - 1715	4	6	7	1	1	8	**27**
1715 - 1730	2	3	2	0	0	10	**17**
Per End	**38**	**37**	**48**	**5**	**10**	**92**	**230**

Combined

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Time Per	T	R	L	R	L	T	TOT
1530 - 1545	238	59	132	38	20	490	**977**
1545 - 1600	252	72	126	21	17	468	**956**
1600 - 1615	269	57	126	32	18	425	**927**
1615 - 1630	335	66	106	34	19	464	**1024**
1630 - 1645	358	75	108	43	23	492	**1099**
1645 - 1700	371	77	97	38	26	517	**1126**
1700 - 1715	340	62	133	42	25	448	**1050**
1715 - 1730	410	73	117	37	15	443	**1095**
Per End	**2573**	**541**	**945**	**285**	**163**	**3747**	**8254**

Light Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Hourly	T	R	L	R	L	T	TOT
1530 - 1630	1069	232	462	122	66	1794	**3745**
1545 - 1645	1190	245	440	128	68	1796	**3867**
1600 - 1700	1313	252	411	145	79	1853	**4053**
1615 - 1715	1387	261	419	155	89	1878	**4189**
1630 - 1730	1466	272	435	158	87	1861	**4279**

Heavy Veh

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Hourly	T	R	L	R	L	T	TOT
1530 - 1630	25	22	28	3	8	53	**139**
1545 - 1645	24	25	26	2	9	53	**139**
1600 - 1700	20	23	26	2	7	45	**123**
1615 - 1715	17	19	25	2	4	43	**110**
1630 - 1730	13	15	20	2	2	39	**91**

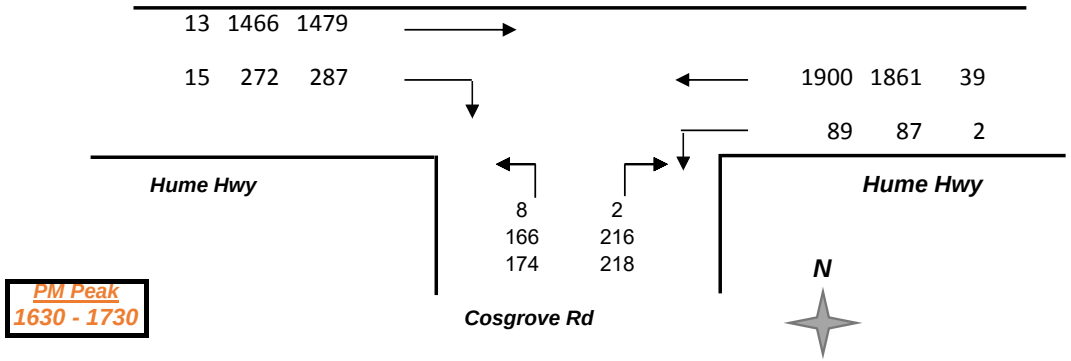
Combined

	WEST		SOUTH		EAST		
	Hume Hwy		*Cosgrove Rd*		*Hume Hwy*		
Hourly	T	R	L	R	L	T	TOT
1530 - 1630	1094	254	490	125	74	1847	**3884**
1545 - 1645	1214	270	466	130	77	1849	**4006**
1600 - 1700	1333	275	437	147	86	1898	**4176**
1615 - 1715	1404	280	444	157	93	1921	**4299**
1630 - 1730	1479	287	455	160	89	1900	**4370**

Peds

	WEST	SOUTH	EAST	
Time Per	*Hume Hwy*	*Cosgrove Rd*	*Hume Hwy*	TOT
1530 - 1545	2	0	2	**4**
1545 - 1600	3	0	0	**3**
1600 - 1615	0	4	1	**5**
1615 - 1630	0	2	2	**4**
1630 - 1645	4	0	0	**4**
1645 - 1700	2	1	0	**3**
1700 - 1715	0	5	2	**7**
1715 - 1730	1	2	1	**4**
Per End	**12**	**14**	**8**	**34**

Peak Hour	*Hume Hwy*	*Cosgrove Rd*	*Hume Hwy*	TOT
1615 - 1715	**6**	**8**	**4**	**18**



PM Peak
1630 - 1730

TRANSPORT & URBAN PLANNING PTY LTD
Ph: 02 9545 1411

AM DATA

Site : Cosgrove Rd and Punchbowl Rd, Belfield. 15167
Day/Date : Tuesday 6 Oct 2015 **TCS No 915**
Weather : Fine

Light Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Time Per	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
0700 - 0715	50	305	25	19	142	48	**589**
0715 - 0730	58	300	28	22	150	52	**610**
0730 - 0745	62	305	30	21	155	56	**629**
0745 - 0800	78	313	27	25	159	59	**661**
0800 - 0815	51	319	26	30	163	51	**640**
0815 - 0830	60	317	34	46	192	71	**720**
0830 - 0845	41	306	37	46	190	50	**670**
0845 - 0900	50	312	27	35	176	45	**645**
Per End	**450**	**2477**	**234**	**244**	**1327**	**432**	**5164**

Heavy Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Time Per	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
0700 - 0715	5	3	2	4	6	2	**22**
0715 - 0730	7	4	3	6	5	1	**26**
0730 - 0745	6	4	3	7	8	1	**29**
0745 - 0800	6	14	4	7	11	1	**43**
0800 - 0815	3	8	5	6	6	2	**30**
0815 - 0830	8	9	2	6	6	1	**32**
0830 - 0845	4	1	9	8	5	0	**27**
0845 - 0900	6	5	2	3	5	2	**23**
Per End	**45**	**48**	**30**	**47**	**52**	**10**	**232**

Combined

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Time Per	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
0700 - 0715	55	308	27	23	148	50	**611**
0715 - 0730	65	304	31	28	155	53	**636**
0730 - 0745	68	309	33	28	163	57	**658**
0745 - 0800	84	327	31	32	170	60	**704**
0800 - 0815	54	327	31	36	169	53	**670**
0815 - 0830	68	326	36	52	198	72	**752**
0830 - 0845	45	307	46	54	195	50	**697**
0845 - 0900	56	317	29	38	181	47	**668**
Per End	**495**	**2525**	**264**	**291**	**1379**	**442**	**5396**

Light Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Hourly	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
0700 - 0800	248	1223	110	87	606	215	**2489**
0715 - 0815	249	1237	111	98	627	218	**2540**
0730 - 0830	251	1254	117	122	669	237	**2650**
0745 - 0845	230	1255	124	147	704	231	**2691**
0800 - 0900	202	1254	124	157	721	217	**2675**

Heavy Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Hourly	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
0700 - 0800	24	25	12	24	30	5	**120**
0715 - 0815	22	30	15	26	30	5	**128**
0730 - 0830	23	35	14	26	31	5	**134**
0745 - 0845	21	32	20	27	28	4	**132**
0800 - 0900	21	23	18	23	22	5	**112**

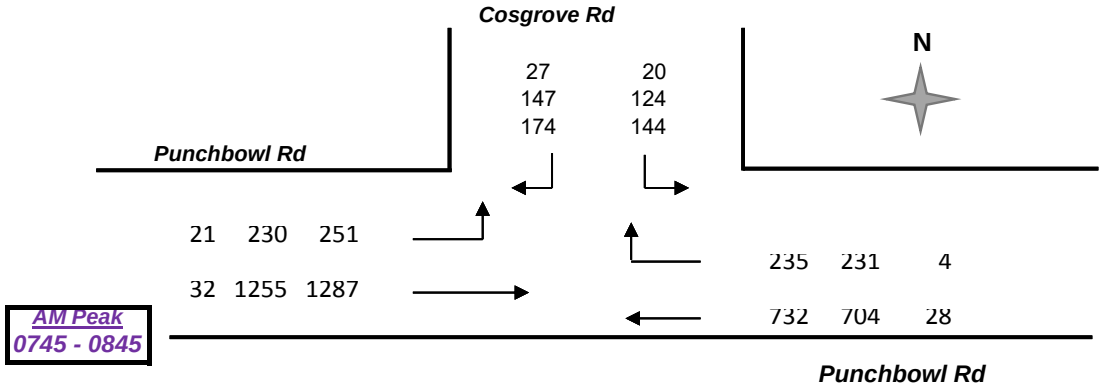
Combined

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Hourly	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
0700 - 0800	272	1248	122	111	636	220	**2609**
0715 - 0815	271	1267	126	124	657	223	**2668**
0730 - 0830	274	1289	131	148	700	242	**2784**
0745 - 0845	251	1287	144	174	732	235	**2823**
0800 - 0900	223	1277	142	180	743	222	**2787**

Peds

	WEST	NORTH	EAST	
Time Per	*Punchbowl R*	*Cosgrove Rd*	*Punchbowl R*	**TOT**
0700 - 0715	0	0	0	**0**
0715 - 0730	0	0	0	**0**
0730 - 0745	0	0	0	**0**
0745 - 0800	0	0	0	**0**
0800 - 0815	0	1	0	**1**
0815 - 0830	0	0	0	**0**
0830 - 0845	0	0	1	**1**
0845 - 0900	0	0	0	**0**
Per End	**0**	**1**	**1**	**2**

Peak Hour	*Punchbowl R*	*Cosgrove Rd*	*Punchbowl R*	TOT
0745 - 0845	**0**	**1**	**1**	**2**



TRANSPORT & URBAN PLANNING PTY LTD
Ph: 02 9545 1411

PM DATA

Site : Cosgrove Rd and Punchbowl Rd, Belfield. 15167
Day/Date : Tuesday 6 Oct 2015 **TCS No 915**
Weather : Fine

Light Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Time Per	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
1530 - 1545	27	138	55	62	277	63	**622**
1545 - 1600	24	195	53	47	282	41	**642**
1600 - 1615	21	181	60	65	281	56	**664**
1615 - 1630	26	193	53	67	299	47	**685**
1630 - 1645	24	217	48	59	308	52	**708**
1645 - 1700	25	226	33	50	320	45	**699**
1700 - 1715	25	181	46	60	274	49	**635**
1715 - 1730	28	205	46	61	283	43	**666**
Per End	**200**	**1536**	**394**	**471**	**2324**	**396**	**5321**

Heavy Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Time Per	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
1530 - 1545	7	2	5	2	2	3	**21**
1545 - 1600	6	3	2	2	3	1	**17**
1600 - 1615	3	6	0	3	5	3	**20**
1615 - 1630	5	3	1	3	4	2	**18**
1630 - 1645	7	4	3	4	3	2	**23**
1645 - 1700	8	2	2	3	6	2	**23**
1700 - 1715	5	1	5	1	1	2	**15**
1715 - 1730	2	2	2	2	3	3	**14**
Per End	**43**	**23**	**20**	**20**	**27**	**18**	**151**

Combined

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Time Per	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
1530 - 1545	34	140	60	64	279	66	**643**
1545 - 1600	30	198	55	49	285	42	**659**
1600 - 1615	24	187	60	68	286	59	**684**
1615 - 1630	31	196	54	70	303	49	**703**
1630 - 1645	31	221	51	63	311	54	**731**
1645 - 1700	33	228	35	53	326	47	**722**
1700 - 1715	30	182	51	61	275	51	**650**
1715 - 1730	30	207	48	63	286	46	**680**
Per End	**243**	**1559**	**414**	**491**	**2351**	**414**	**5472**

Light Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Hourly	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
1530 - 1630	98	707	221	241	1139	207	**2613**
1545 - 1645	95	786	214	238	1170	196	**2699**
1600 - 1700	96	817	194	241	1208	200	**2756**
1615 - 1715	100	817	180	236	1201	193	**2727**
1630 - 1730	102	829	173	230	1185	189	**2708**

Heavy Veh

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Hourly	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
1530 - 1630	21	14	8	10	14	9	**76**
1545 - 1645	21	16	6	12	15	8	**78**
1600 - 1700	23	15	6	13	18	9	**84**
1615 - 1715	25	10	11	11	14	8	**79**
1630 - 1730	22	9	12	10	13	9	**75**

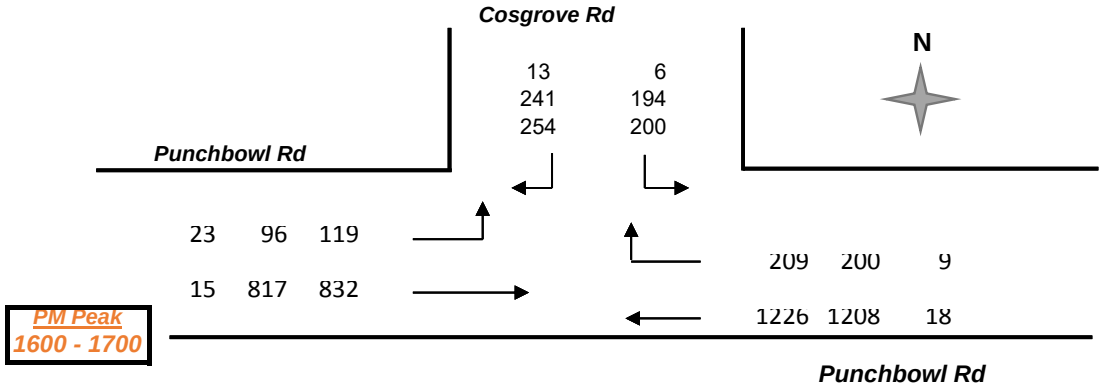
Combined

	WEST		NORTH		EAST		
	Punchbowl R		*Cosgrove Rd*		*Punchbowl R*		
Hourly	**L**	**T**	**L**	**R**	**T**	**R**	**TOT**
1530 - 1630	119	721	229	251	1153	216	**2689**
1545 - 1645	116	802	220	250	1185	204	**2777**
1600 - 1700	119	832	200	254	1226	209	**2840**
1615 - 1715	125	827	191	247	1215	201	**2806**
1630 - 1730	124	838	185	240	1198	198	**2783**

Peds

	WEST	NORTH	EAST	
Time Per	*Punchbowl R*	*Cosgrove Rd*	*Punchbowl R*	**TOT**
1530 - 1545	0	1	0	**1**
1545 - 1600	1	0	2	**3**
1600 - 1615	0	0	0	**0**
1615 - 1630	1	0	0	**1**
1630 - 1645	0	1	0	**1**
1645 - 1700	0	0	0	**0**
1700 - 1715	0	0	0	**0**
1715 - 1730	0	0	0	**0**
Per End	**2**	**2**	**2**	**6**

Peak Hour	*Punchbowl R*	*Cosgrove Rd*	*Punchbowl R*	TOT
1530 - 1630	**2**	**1**	**2**	**5**



MOVEMENT SUMMARY

Site: 1 [Punchbowl Rd & Cosgrove Rd. Existing AM]

Existing operation AM Peak
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
East: Punchbowl Rd (east)											
5	T1	771	3.8	0.279	4.8	LOS A	6.2	45.2	0.36	0.32	55.6
6	R2	247	1.7	0.538	37.5	LOS C	10.1	72.1	0.92	0.94	36.7
Approach		1018	3.3	0.538	12.8	LOS A	10.1	72.1	0.50	0.47	49.4
North: Cosgrove Rd											
7	L2	152	13.9	0.225	26.9	LOS B	4.9	38.1	0.70	0.75	40.6
9	R2	183	15.5	0.734	53.3	LOS D	9.2	73.0	1.00	0.88	31.6
Approach		335	14.8	0.734	41.4	LOS C	9.2	73.0	0.86	0.82	35.1
West: Punchbowl Rd (west)											
10	L2	264	8.4	0.252	10.5	LOS A	3.8	28.4	0.45	0.68	50.5
11	T1	1355	2.5	0.761	22.6	LOS B	27.7	198.3	0.87	0.79	43.8
Approach		1619	3.4	0.761	20.6	LOS B	27.7	198.3	0.80	0.77	44.8
All Vehicles		2972	4.7	0.761	20.2	LOS B	27.7	198.3	0.70	0.67	44.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Punchbowl Rd & Cosgrove Rd. Existing PM]

Existing operation PM Peak
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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
East: Punchbowl Rd (east)											
5	T1	1291	1.5	0.551	12.2	LOS A	18.3	129.4	0.63	0.57	50.0
6	R2	220	4.3	0.451	32.5	LOS C	8.8	63.7	0.88	0.85	38.5
Approach		1511	1.9	0.551	15.1	LOS B	18.3	129.4	0.67	0.61	47.9
North: Cosgrove Rd											
7	L2	211	3.0	0.224	19.4	LOS B	5.5	39.6	0.58	0.73	44.5
9	R2	267	5.1	0.630	39.8	LOS C	11.4	82.9	0.91	0.82	35.9
Approach		478	4.2	0.630	30.8	LOS C	11.4	82.9	0.76	0.78	39.2
West: Punchbowl Rd (west)											
10	L2	125	19.3	0.123	9.5	LOS A	1.6	13.1	0.35	0.64	50.8
11	T1	876	1.8	0.634	28.6	LOS C	17.8	126.3	0.89	0.78	40.8
Approach		1001	4.0	0.634	26.2	LOS B	17.8	126.3	0.82	0.76	41.9
All Vehicles		2989	3.0	0.634	21.4	LOS B	18.3	129.4	0.74	0.69	44.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Punchbowl Rd & Cosgrove Rd. Future AM]

With Development AM Peak
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Punchbowl Rd (east)											
5	T1	771	3.8	0.283	5.2	LOS A	6.5	46.8	0.38	0.33	55.3
6	R2	276	1.5	0.605	39.9	LOS C	11.4	80.6	0.94	0.97	35.8
Approach		1046	3.2	0.605	14.3	LOS A	11.4	80.6	0.53	0.50	48.3
North: Cosgrove Rd											
7	L2	171	12.3	0.245	26.4	LOS B	5.4	42.1	0.69	0.75	40.8
9	R2	204	14.9	0.795	54.8	LOS D	10.6	83.3	1.00	0.92	31.2
Approach		375	13.8	0.795	41.9	LOS C	10.6	83.3	0.86	0.84	34.9
West: Punchbowl Rd (west)											
10	L2	295	8.2	0.279	10.3	LOS A	4.0	29.6	0.46	0.69	50.6
11	T1	1355	2.5	0.776	24.2	LOS B	28.7	205.0	0.89	0.81	43.0
Approach		1649	3.5	0.776	21.7	LOS B	28.7	205.0	0.81	0.79	44.2
All Vehicles		3071	4.7	0.795	21.6	LOS B	28.7	205.0	0.72	0.70	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Punchbowl Rd & Cosgrove Rd. Future PM]

With Development PM Peak
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Punchbowl Rd (east)											
5	T1	1291	1.5	0.589	14.8	LOS B	20.2	143.0	0.70	0.63	48.3
6	R2	249	3.8	0.538	38.4	LOS C	10.1	72.9	0.91	0.92	36.3
Approach		1540	1.8	0.589	18.6	LOS B	20.2	143.0	0.73	0.68	45.8
North: Cosgrove Rd											
7	L2	256	2.5	0.252	17.5	LOS B	6.3	45.1	0.55	0.73	45.5
9	R2	315	5.0	0.720	38.4	LOS C	13.4	97.7	0.89	0.84	36.3
Approach		571	3.9	0.720	29.1	LOS C	13.4	97.7	0.74	0.79	40.0
West: Punchbowl Rd (west)											
10	L2	157	16.8	0.146	8.5	LOS A	1.5	12.3	0.34	0.64	51.6
11	T1	876	1.8	0.714	32.6	LOS C	19.0	135.3	0.94	0.83	39.1
Approach		1033	4.1	0.714	29.0	LOS C	19.0	135.3	0.85	0.80	40.6
All Vehicles		3143	2.9	0.720	23.9	LOS B	20.2	143.0	0.77	0.74	42.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Hume Hwy & Cosgrove Rd. Existing AM Peak]

Existing Operation AM Peak
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Cosgrove Rd											
1	L2	412	9.0	0.613	25.9	LOS B	14.4	108.5	0.74	0.80	41.1
3	R2	172	0.0	0.750	57.6	LOS E	9.2	64.1	1.00	0.87	30.5
Approach		583	6.3	0.750	35.2	LOS C	14.4	108.5	0.81	0.82	37.3
East: Hume Hwy (east)											
4	L2	88	1.2	0.656	32.5	LOS C	20.6	147.9	0.87	0.78	40.4
5	T1	1417	3.2	0.656	26.9	LOS B	20.8	149.3	0.87	0.77	41.5
Approach		1505	3.1	0.656	27.2	LOS B	20.8	149.3	0.87	0.77	41.4
West: Hume Hwy (west)											
11	T1	1702	3.3	0.598	5.8	LOS A	18.7	134.8	0.48	0.44	54.8
12	R2	336	11.0	0.557	33.1	LOS C	12.6	96.6	0.86	0.96	38.2
Approach		2038	4.6	0.598	10.3	LOS A	18.7	134.8	0.54	0.53	51.1
All Vehicles		4126	4.3	0.750	20.0	LOS B	20.8	149.3	0.70	0.66	44.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Hume Hwy & Cosgrove Rd. Existing PM Peak]

Existing Operation PM Peak
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Cosgrove Rd											
1	L2	183	4.6	0.244	26.7	LOS B	6.0	43.9	0.69	0.75	40.8
3	R2	229	0.9	0.820	58.5	LOS E	12.6	89.1	1.00	0.92	30.3
Approach		413	2.6	0.820	44.4	LOS D	12.6	89.1	0.86	0.85	34.2
East: Hume Hwy (east)											
4	L2	94	2.2	0.796	32.5	LOS C	31.0	220.8	0.92	0.85	40.4
5	T1	2000	2.1	0.796	26.9	LOS B	31.2	222.0	0.92	0.85	41.5
Approach		2094	2.1	0.796	27.1	LOS B	31.2	222.0	0.92	0.85	41.5
West: Hume Hwy (west)											
11	T1	1557	0.9	0.723	7.4	LOS A	28.8	203.0	0.54	0.50	53.5
12	R2	302	5.2	0.670	44.3	LOS D	13.1	95.7	0.95	1.00	34.3
Approach		1859	1.6	0.723	13.4	LOS A	28.8	203.0	0.61	0.58	49.0
All Vehicles		4365	1.9	0.820	22.9	LOS B	31.2	222.0	0.78	0.74	43.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Hume Hwy & Cosgrove Rd. Future AM Peak]

With Development AM Peak
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Cosgrove Rd											
1	L2	420	9.0	0.618	25.2	LOS B	14.5	109.4	0.73	0.79	41.4
3	R2	179	0.0	0.726	56.0	LOS D	9.4	65.7	1.00	0.86	30.9
Approach		599	6.3	0.726	34.4	LOS C	14.5	109.4	0.81	0.81	37.6
East: Hume Hwy (east)											
4	L2	100	1.1	0.677	33.4	LOS C	21.2	151.9	0.88	0.80	39.9
5	T1	1417	3.2	0.677	27.9	LOS B	21.3	153.5	0.88	0.79	41.0
Approach		1517	3.1	0.677	28.2	LOS B	21.3	153.5	0.88	0.79	40.9
West: Hume Hwy (west)											
11	T1	1702	3.3	0.605	6.3	LOS A	19.5	140.3	0.49	0.46	54.4
12	R2	348	10.9	0.581	34.3	LOS C	13.1	100.4	0.87	0.97	37.7
Approach		2051	4.6	0.605	11.0	LOS A	19.5	140.3	0.56	0.54	50.6
All Vehicles		4166	4.3	0.726	20.7	LOS B	21.3	153.5	0.71	0.67	44.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Hume Hwy & Cosgrove Rd. Future PM Peak]

With Development PM Peak
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total 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: Cosgrove Rd											
1	L2	203	4.7	0.259	25.6	LOS B	6.5	47.6	0.67	0.75	41.4
3	R2	248	0.8	0.836	58.8	LOS E	13.8	97.4	1.00	0.93	30.2
Approach		452	2.6	0.836	43.8	LOS D	13.8	97.4	0.85	0.85	34.4
East: Hume Hwy (east)											
4	L2	106	2.0	0.835	37.4	LOS C	34.1	242.9	0.95	0.92	38.3
5	T1	2000	2.1	0.835	31.8	LOS C	34.3	244.5	0.95	0.92	39.3
Approach		2106	2.0	0.835	32.0	LOS C	34.3	244.5	0.95	0.92	39.3
West: Hume Hwy (west)											
11	T1	1557	0.9	0.720	7.8	LOS A	28.8	202.9	0.55	0.51	53.2
12	R2	316	5.3	0.680	44.7	LOS D	13.6	99.2	0.95	1.00	34.1
Approach		1873	1.6	0.720	14.0	LOS A	28.8	202.9	0.62	0.59	48.6
All Vehicles		4431	1.9	0.836	25.6	LOS B	34.3	244.5	0.80	0.77	42.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Hume Hwy & Cosgrove Rd. Future AM Peak with ILC]

Cumulative Scenario with development and ILC full operation
AM Peak
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Cosgrove Rd											
1	L2	420	9.0	0.608	24.5	LOS B	14.2	107.3	0.71	0.79	41.8
3	R2	180	0.6	0.734	56.3	LOS D	9.5	66.7	1.00	0.86	30.8
Approach		600	6.5	0.734	34.0	LOS C	14.2	107.3	0.80	0.81	37.7
East: Hume Hwy (east)											
4	L2	129	2.4	0.708	34.6	LOS C	22.1	158.6	0.90	0.82	39.2
5	T1	1417	3.2	0.708	29.0	LOS C	22.3	160.6	0.90	0.81	40.5
Approach		1546	3.1	0.708	29.5	LOS C	22.3	160.6	0.90	0.81	40.4
West: Hume Hwy (west)											
11	T1	1702	3.3	0.769	7.4	LOS A	32.1	230.9	0.55	0.52	53.5
12	R2	377	10.3	0.615	35.1	LOS C	14.1	107.1	0.88	0.98	37.4
Approach		2079	4.6	0.769	12.4	LOS A	32.1	230.9	0.61	0.60	49.6
All Vehicles		4225	4.3	0.769	21.7	LOS B	32.1	230.9	0.75	0.71	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Hume Hwy & Cosgrove Rd. Future PM Peak with ILC]

Cumulative Scenario with development and ILC full operation
PM Peak
Signals - Fixed Time Isolated Cycle Time = 105 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Cosgrove Rd											
1	L2	247	3.8	0.307	25.4	LOS B	8.1	58.2	0.68	0.76	41.4
3	R2	293	1.1	0.882	62.2	LOS E	17.1	120.9	1.00	0.98	29.4
Approach		540	2.3	0.882	45.3	LOS D	17.1	120.9	0.85	0.88	33.9
East: Hume Hwy (east)											
4	L2	108	3.9	0.854	40.4	LOS C	35.8	255.4	0.97	0.96	37.1
5	T1	2000	2.1	0.854	34.8	LOS C	36.1	256.9	0.97	0.96	38.1
Approach		2108	2.1	0.854	35.1	LOS C	36.1	256.9	0.97	0.96	38.0
West: Hume Hwy (west)											
11	T1	1557	0.9	0.725	8.8	LOS A	29.5	208.2	0.58	0.54	52.4
12	R2	317	5.6	0.711	47.1	LOS D	14.0	102.9	0.97	1.02	33.4
Approach		1874	1.7	0.725	15.3	LOS B	29.5	208.2	0.65	0.62	47.8
All Vehicles		4522	2.0	0.882	28.1	LOS B	36.1	256.9	0.82	0.81	40.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.