ROAD DELAY SOLUTIONS

Proposed Section 75W

Modification to MP06_0225

Hanson Land

Eastern Creek Business Park Stage 3

Traffic Impact Report

Prepared for...

FRASERS PROPERTY

February 2016
Reference: 20140257

DOCUMENT STATUS

Document D:\Documents\Frasers\Hanson\Report\Hanson land Report.docx

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Signed ……

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Date 15 February 2016……

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ABSTRACT

Road Delay Solutions Pty Ltd has been engaged by *Frasers Property* to undertake investigation into the traffic implications associated with the proposed modification to the Concept Plan and Project Approval MP06_0225 as outlined in the Section 75W Application.

The Section 75W application outlines modification to the Master Plan for the development of speculative warehouse and distribution complexes on a part portion of the parcel of land commonly known as 'Hanson Land', within the Eastern Creek Business Park Stage 3 (refer to *Figure 1*).

Formerly part of a larger land holding engaged in hard rock quarry operations, the site intended for development occupies a total land area of 105,175m^2 or 10.5175 ha.

It is proposed the parcel of land is to be subdivided into three (3) lots (refer to *Figure 2*) accommodating four (4) tenants in single level warehouse and distribution centres…

LOT 1

- *Two (2) warehouse and distribution facilities with a combined floor area of 16,940m^2, and*
- *Office space of 1,000m^2.*

LOT 2

- *A warehouse and distribution facility with a floor area of 32,287m^2, and*
- *Office space of 500m^2*

LOT 3

- *A warehouse and distribution facility with a floor area of 22,905m^2, and*
- *Office space of 750m^2.*

No retail activities are envisaged for the site, at this time.

The development footprint for the proposed warehouses is estimated to realise an overall site efficiency rate of some 55% and provide combined passenger vehicle car parking for 456 passenger vehicles, inclusive of dedicated motor cycle and disabled spaces. Heavy vehicle layover is proposed on the the hardstand aprons associated with each lot.

PLANNING

As part of the approval process, this *Traffic Impact Assessment* has been undertaken to address issues associated with the environmental requirements of the accompanying distribution warehouse DA.

Aspects of the environmental assessment requirements identified and to be addressed in this DA submission, include…

- *Strategic transport policy matters,*
- *Opportunities to minimise traffic on sensitive road frontages,*
- *Efficiency of new roads, including proposed access and circulation and car parking provisions,*
- *Intersection operational performance assessment and any necessary mitigation measures,*
- *Emergency and service vehicle accessibility,*
- *Integration with proposed infrastructure on the wider road network, as well as detailing the opportunities and constraints offered by alternative vehicular access points,*
- *Measures to promote public transport usage and influence mode share,*
- *Pedestrian and bicycle provisions, and*
- *Initiatives to reduce the reliance on private vehicle usage.*

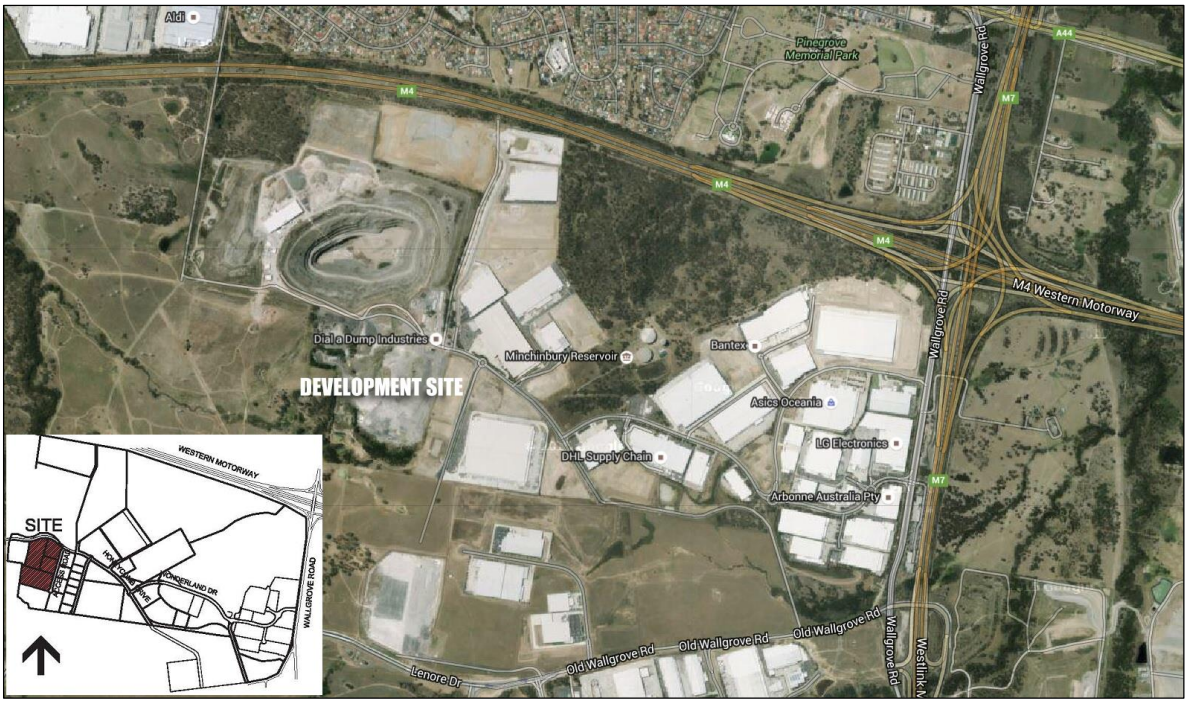
NSW Government Planning Strategies, pertaining to this development, have been articulated in the following documents and have served as a reference in preparing this report…

- *State Environmental Planning Policy (Western Sydney Employment Area,) 2009*
- *Metropolitan Strategy 'City of Cities', (2005),*
- *Action for Transport 2010 – an Integrated Transport Plan for Sydney,*
- *Shaping our Cities (1999).*
- *Shaping Western Sydney (1998),*
- *Action for Air (1999), and*
- *SEPP 66 –'Integration of Landuse and Transport'.*

LOCATION

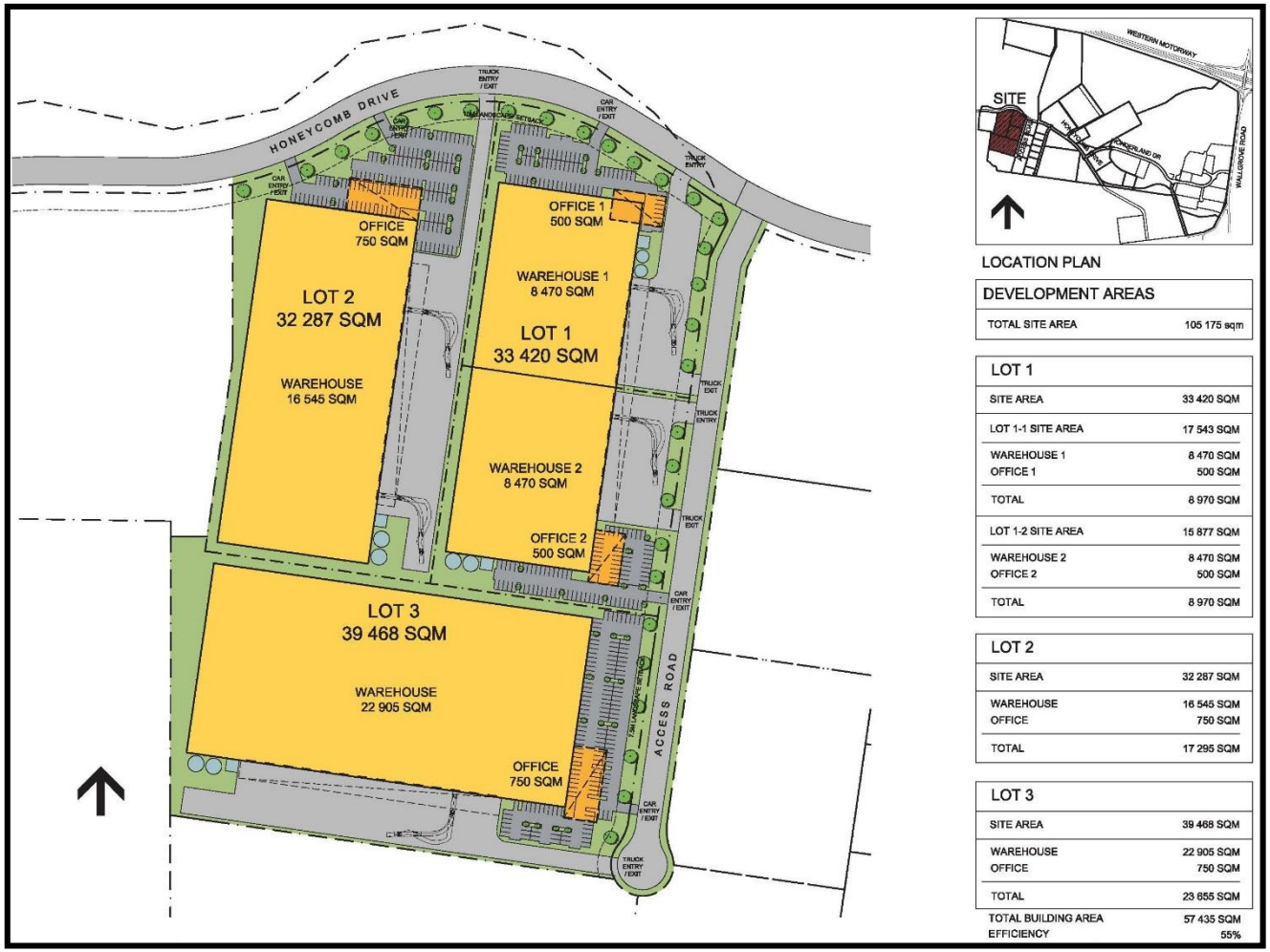
The site is located on Honeycomb Drive, within Stage 3 of the Eastern Creek Business Park and is generally bounded by Honeycomb Drive and the Hanson Quarry to the north, Grevillia Street to the east and currently vacant land to the south and west.

Figure 1: Location Context



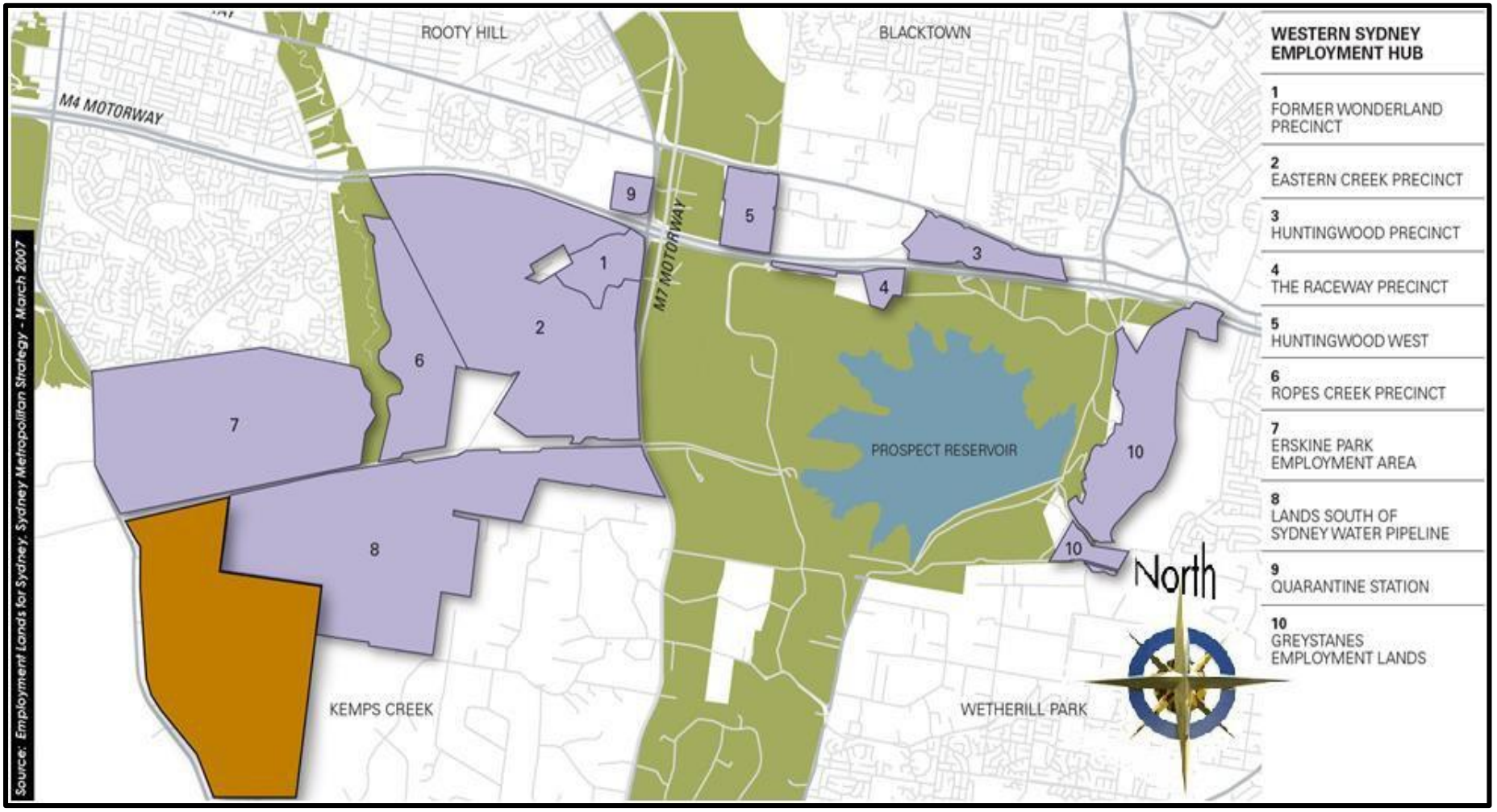
Source: Frasers Property, 2015

Figure 2: Proposed Master Plan



Source: Frasers Property, 2015

Figure 3 Western Sydney Employment Hub



THE MASTER PLAN

A detailed description of the proposed Section 75W application and Master Plan is provided in a separate submission, prepared by Frasers Property. The Master Plan footprint and proposed structure of the site is presented in *Figure 2*.

The development site occupies a total area of 105,175m^2 or 10.5175ha.

It is proposed the parcel of land is to be subdivided into three (3) lots (refer to *Figure 2*) accommodating four (4) tenant's in single level warehouse and distribution centres, consisting of…

LOT 1

- *Site area of 33,420m^2,*
- *Two (2) warehouse and distribution facilities with a combined floor area of 16,940m^2,*
- *Office space, including staff amenities, totalling 1,000m^2, and*
- *168 parking spaces.*

LOT 2

- *Site area of 32,287m^2,*
- *A warehouse and distribution facility with a floor area of 32,287m^2,*
- *Office space, including staff amenities, of 500m^2, and*
- *137 parking spaces.*

LOT 3

- *Site area of 39,468m^2,*
- *A warehouse and distribution facility with a floor area of 22,905m^2,*
- *Office space, including staff amenities, of 750m^2, and*
- *151 parking spaces.*

The proposed Master Plan footprint for the proposed warehouse provides combined car parking capacity for 456 passenger vehicles, inclusive of dedicated motor cycle and disabled spaces. Heavy vehicle layover will be catered for within the hardstand aprons for each lot.

The site is intended for general retail commodity warehousing and distribution. No manufacturing or '*direct to public*' retail sale operations are envisaged on the site at this time, with acceptance sought for 24 hour, seven (7) days a week operation.

Adopting an employee rate of 1 staff member per 250m², the following yields are anticipated.

Table 1 Master Plan Component Schedule

Lot	Site Area (m^2)	Warehouse Floor Area (m^2)	Office Floor Area (m^2)	Parking	Employee Rate (per 250m^2 of Warehouse GFA)	Employees	Approx. Site Efficiency
1.1	33,420	8,470	500	79	1	34	51.1%
1.2		8,470	500	89	1	34	56.5%
2	32,287	16,545	750	137	1	67	53.6%
3	39,468	22,905	750	151	1	92	59.9%
TOTALS	**105,175**	**56,390**	**2,500**	**456**			**55%**

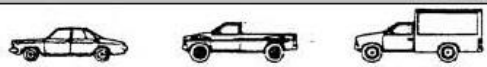
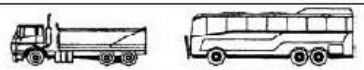
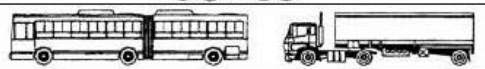
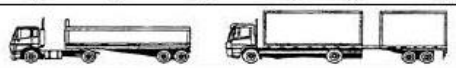
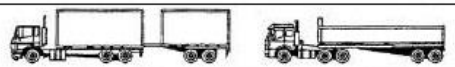
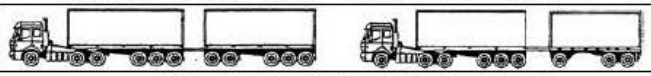
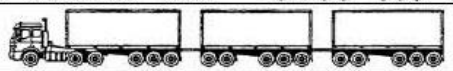
ACCESS

Passenger cars and heavy vehicles are proposed to access the site at multiple, dedicated, locations from Honeycombe Drive to the north and the internal access road to the east.

Passenger vehicles will have access will be to secure parking locations. Heavy vehicle entries and exits will be through gated driveways designed to cater for vehicle classes 1 through 10 (refer to *Figure 4* for vehicle classifications).

Fire fighting vehicle access and circulation is to be designed around the perimeter of each lot.

Figure 4: AUSTROADS Vehicle Classification Chart

Level 1	Level 2		Level 3	AUSTROADS Classification		
Length (indicative)	Axles and Axle Groups		Vehicle Type			
Type	Axles	Groups	Typical Description	Class	Parameters	Typical Configuration
	LIGHT VEHICLES					
Short up to 5.5m		1 or 2	**Short** Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	d(1) ≤ 3.2m and axles = 2	
	3, 4 or 5	3	**Short - Towing** Trailer, Caravan, Boat, etc	2	groups = 3 d(1) ≥ 2.1m, d(1) ≤ 3.2m, d(2) ≥ 2.1m and axles = 3, 4 or 5	
	HEAVY VEHICLES					
Medium 5.5m to 14.5m	2	2	**Two Axle Truck or Bus**	3	d(1) > 3.2m and axles = 2	
	3	2	**Three Axle Truck or Bus**	4	axles = 3 and groups = 2	
	> 3	2	**Four Axle Truck**	5	axles > 3 and groups = 2	
Long 11.5m to 19.0m	3	3	**Three Axle Articulated** Three axle articulated vehicle, or Rigid vehicle and trailer	6	d(1) > 3.2m, axles = 3 and groups = 3	
	4	> 2	**Four Axle Articulated** Four axle articulated vehicle, or Rigid vehicle and trailer	7	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 4 and groups > 2	
	5	> 2	**Five Axle Articulated** Five axle articulated vehicle, or Rigid vehicle and trailer	8	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 5 and groups > 2	
	≥ 6	> 2	**Six Axle Articulated** Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3	
Medium Combination 17.5m to 36.5m	> 6	4	**B Double** B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6	
	> 6	5 or 6	**Double Road Train** Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6	
Large Combination Over 33.0m	> 6	> 6	**Triple Road Train** Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6	

Light to medium trucks (class 3-5)

Heavy Trucks (class 6-9)

B-doubles (class 10-11)

Definitions:

Group: Axle group, where adjacent axles are less than 2.1m apart

Groups: Number of axle groups

Axles: Number of axles (maximum axle spacing of 10.0m)

d(1): Distance between first and second axle

d(2): Distance between second and third axle

ROAD NETWORK

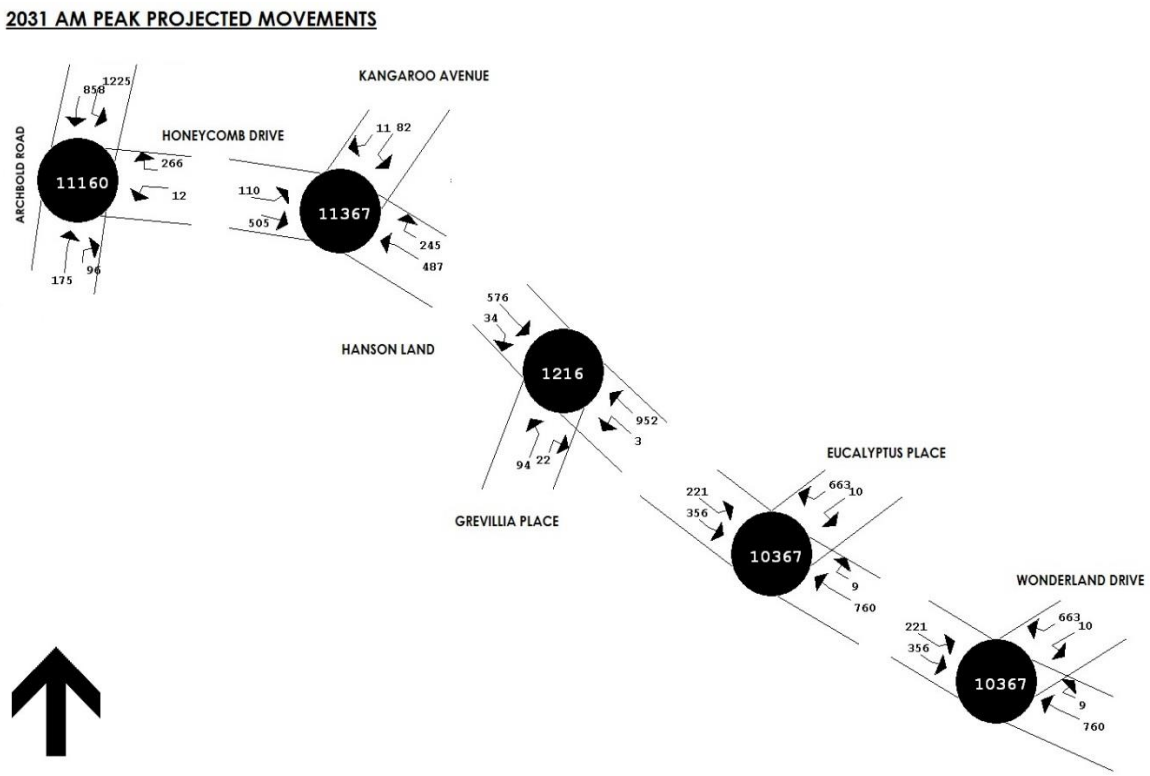
The Eastern Creek Precinct is located within the region known as the *Western Sydney Employment Hub*, to the southwest of the M4 Motorway interchange with the M7 Motorway, as shown in *Figure 3*.

The M4 and M7 Motorways, Wallgrove Road and Great Western Highway provide the major arterial links to and from the Eastern Creek Precinct, supplemented by Old Wallgrove Road, the Erskine Park Link Road and Archbold Road, with planned connections onto Old Wallgrove Road and Archbold Road.

Both heavy vehicle and passenger car access to the development site is proposed from Honeycombe Drive to the north and the internal access road to the east, as shown in *Figure 2*.

This report utilises projected traffic flow information taken from strategic modelling of the Eastern Creek Precinct for the future year 2031. The future projected turn movements, modelled and utilised in this study, are presented in *Figures 5* and 6.

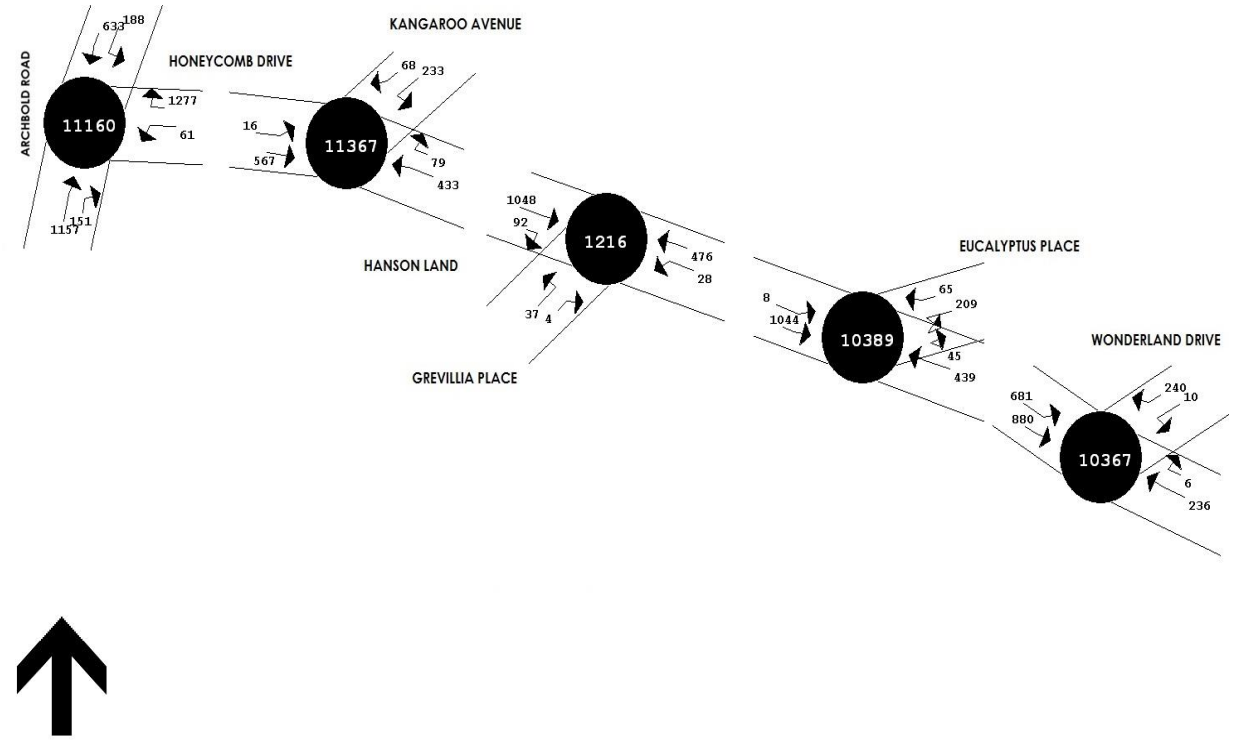
Figure 5: Year 2031 AM Projected Vehicle Movements



Source: Year 2031 AM Peak Blacktown LGA Model, Road Delay Solutions, 2016

Figure 6: Year 2031 PM Projected Vehicle Movements

2031 PM PEAK PROJECTED MOVEMENTS



Source: Year 2031 AM Peak Blacktown LGA Model, Road Delay Solutions, 2016

TRAFFIC IMPACTS

Preliminary investigations into the traffic impacts associated with the Eastern Creek Precinct developments were undertaken by...

- *'Erskine Park Link Road' – Review of Environmental Factors, NSW Roads and Traffic Authority, August 2010*
- *'Eastern Creek Precinct Study', ARUP/Sims Varley Traffic Systems, 2005, and*
- *'Eastern Creek TMAP', SKM, 2005*
- *'Erskine Park Link Road', RMS/PB 2010,*
- *'Southern Link Road Network – Strategic Transport Assessment', AECOM, 2011*
- *'Old Wallgrove Road Traffic Modelling Study', GHD, 2012*

The overall population within the Blacktown LGA is projected to increase from the 2006 Census estimation of 271,000 to 500,000 persons by the year 2036. A corresponding and proportionate employment growth is anticipated.

While the 2006 Census reported some 98,300 jobs, LGA wide, the projected increase in the Eastern Creek Precinct alone, by the Year 2036, is anticipated to yield some 26,800 employment opportunities.

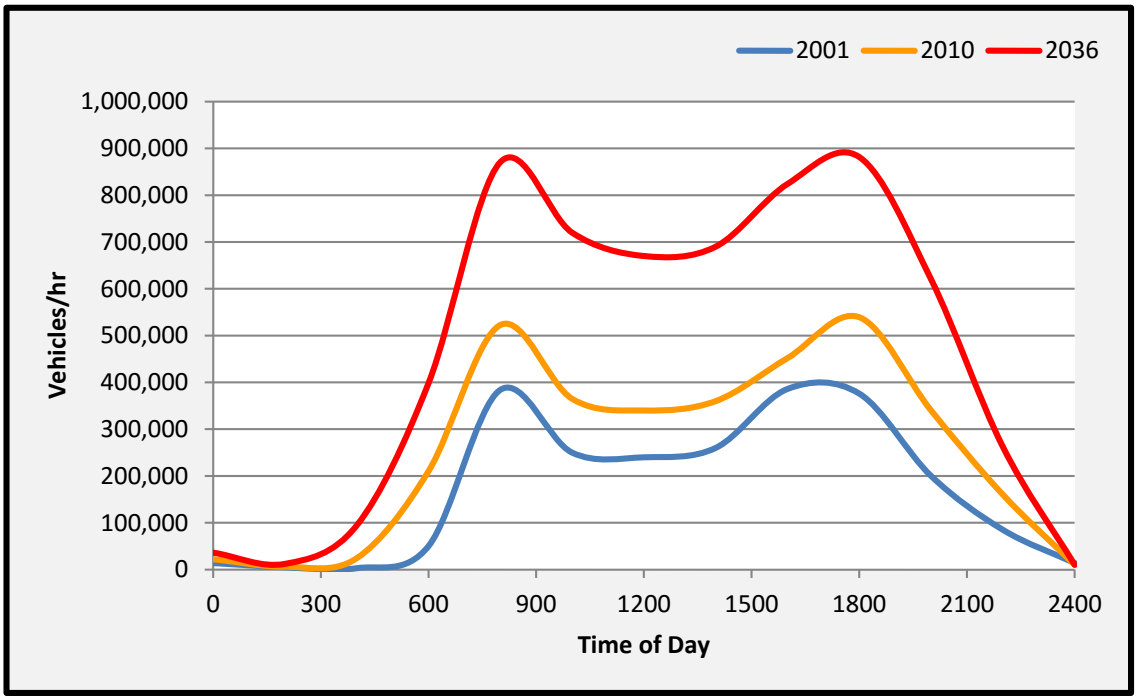
To align the road network usage with the projected population and employment increases, this assessment has adopted the findings of the current (2015) EMME/2 model developed by the *RMS* for the proposed *Erskine Park* link road and calibrated to the *Sydney Strategic Travel Model* (STM), as reported in the *Traffic & Transport Technical Paper*[1], by Parsons Brinckerhoff, July 2010.

The 2031 Netanal model has adopted a vast majority of the *RMS*'s EMME/2 trip patterns, but with significantly disaggregated zone generations, in accordance with the urban renewal planning and projected growth within the Eastern Creek Precinct, Blacktown and Penrith LGA's, to better reflect realistic vehicle generation rates from the identified growth areas and diverse land uses.

[1] '*Erskine Park Link Road – Review of Environmental Factors*', NSW Roads and Traffic Authority, August 2010

With the anticipated population of 500,000 within the Blacktown LGA by the year 2036, the projected level of vehicle trips on the Sydney Metropolitan road network, reported from the 2036 Netanal model, by time of day, is presented in *Figure 7*.

Figure 7: Projected Sydney Region Peak Hour Travel Demand



Source: Road Delay Solutions, Netanal Model 2016

The vehicle growth, reported from the year 2031 Netanal model, has been utilised to assess the internal road network within the Eastern Creek Precinct. Consideration of the external, arterial, road network, has been taken, directly, from the *Traffic and Transport Technical Paper*, prepared for the RMS by Parsons Brinckerhoff in 2010. The arterial road network as modelled includes…

- *Erskine Park Link Road,*
- *Archbold Road extension to Old Wallgrove Road, and*
- *The planned Southern Link Road, south of the water pipeline, between Bakers Lane and Wallgrove Road, as reported[2] by AECOM in 2011*

[2] '*Southern Link Road Network – Strategic Transport Assessment*', AECOM, 2011

Generation rates utilised in the *ARUP* report of 2005 were preliminary, while the trip generation rates prescribed by *SKM*, formed the basis for the *TMAP* and planning undertaken for the Precinct, including the Stage 3 and 4 developments of the Eastern Creek Industrial Parks. The same vehicle generation rates have been employed in the individual developer agreements which embody the *TMAP* and are considered a suitable basis for assessment.

Strategically, government authorities have adopted a generation rate of 15 vehicles per developable hectare per hour, as a broad approach to future warehouse based developments.

The generation rates adopted in the fore mentioned studies are marginally lower than those prescribed in the *RMS*'s publication, '*Guide to Traffic Generating Developments*'.

Given that any future DA(s) for the lots within the proposed Master Plan will follow a prescribed path of consultation and referral between authorities and government agencies, the trip generation rate adopted for this Section 75W Application follows the *RMS* guide, as shown in *Table 2*.

Based on the *RMS* guide, the entire site will generate 2,507 vehicle trips daily, with 668 vehicle trips, including heavy vehicles trips, occurring during the morning and evening commuter peak periods, combined.

Generally, the morning peak hour generation can be split in the ratio 85/15 between inbound and outbound trips respectively, while the evening peak hour trips can be split 15/85, as shown...

- → 334 vehicle trips during the morning peak = 284 inbound, 50 outbound, and
- → 334 vehicle trips during the evening peak = 50 inbound, 284 outbound.

The traffic generation, pertaining to the operational requirements of the development, have been based on the known operational characteristics of comparable facilities and adhere to the RMS *Guide to Traffic Generating Developments*.

Passenger car, or commuter trips, will primarily occur during the morning and evening peak periods and constitute some 80% of the development's peak hour generation (268vph).

Heavy vehicle movements will predominantly occur during business and off peak hours with only an average of some 20% of Class 3 to Class 10 heavy vehicle truck movements envisaged during the morning and evening peaks (66vph, respectively).

Table 2: RMS Traffic Generation Rates

Master Plan Component	Area (m^2)	Daily RTA Trip Rate (*per 100m^2 GFA*)	Daily Generation (*vpd*)	Peak Hour RTA Trip Rate (*per 100m^2 GFA*)	Peak Hour Generation (*vph*)
Warehouse 1.1	8,470	4	339	0.5	43
Office 1.1	500	10	50	2	10
Warehouse 1.2	8,470	4	339	0.5	43
Office 1.2	500	10	50	2	10
Warehouse 2	16,545	4	662	0.5	83
Office 2	750	10	75	2	15
Warehouse 3	22,905	4	917	0.5	115
Office 3	750	10	75	2	15
TOTALS	**58,890**		**2,507**		**334**

NB: No retail operations are envisaged at the site.

Intersection analysis of the surrounding road network has been undertaken, wholistically from the site for the projected year 2031 demand, to adequately accommodate the development within the context of the Eastern Creek Precinct.

Extensive modelling has been undertaken by a number of major infrastructure consultancies, including the RMS, of the Eastern Creek Precinct, which has included the Lenore Drive connection to Old Wallgrove Road. Linking Lenore Lane to Old Wallgrove Road, the corridor will significantly impact the operational performance of Old Wallgrove Road and more broadly the Eastern Creek Precinct, by introducing further traffic generations from industrial lands to the north, south and west.

Detailed operational intersection analyses have been undertaken utilising the computer based program, SIDRA. Turn movements from the year 2031 Netanal models have been exported and utilised in the operational modelling.

Honeycombe Drive is to be classified an industrial collector road, with a regulated speed limit of 70km/h, within the road hierarchy of the Eastern Creek Precinct. It is envisaged that with the growth of heavy vehicle movements along the corridor, a

reduced speed limit will result along Honeycombe Drive. *Figure 10* depicts an indicative layout of the internal road hierarchy.

Currently, Honeycombe Drive is a public, local, corridor servicing the requirements of the reduced, operational Hansen Quarry and the current completed developments within the Eastern Creek Precinct, Stages 3 and 4.

The modelling of Honeycombe Drive suggests that the volume of traffic, projected in the year 2031, and the interaction between local traffic and the associated development vehicle generations, will result in a satisfactory level of service during the morning and evening peak commuter periods, as evidenced in *Table 3*.

Figure 8: Eastern Creek Precinct 2031 AM Peak Projected Volumes

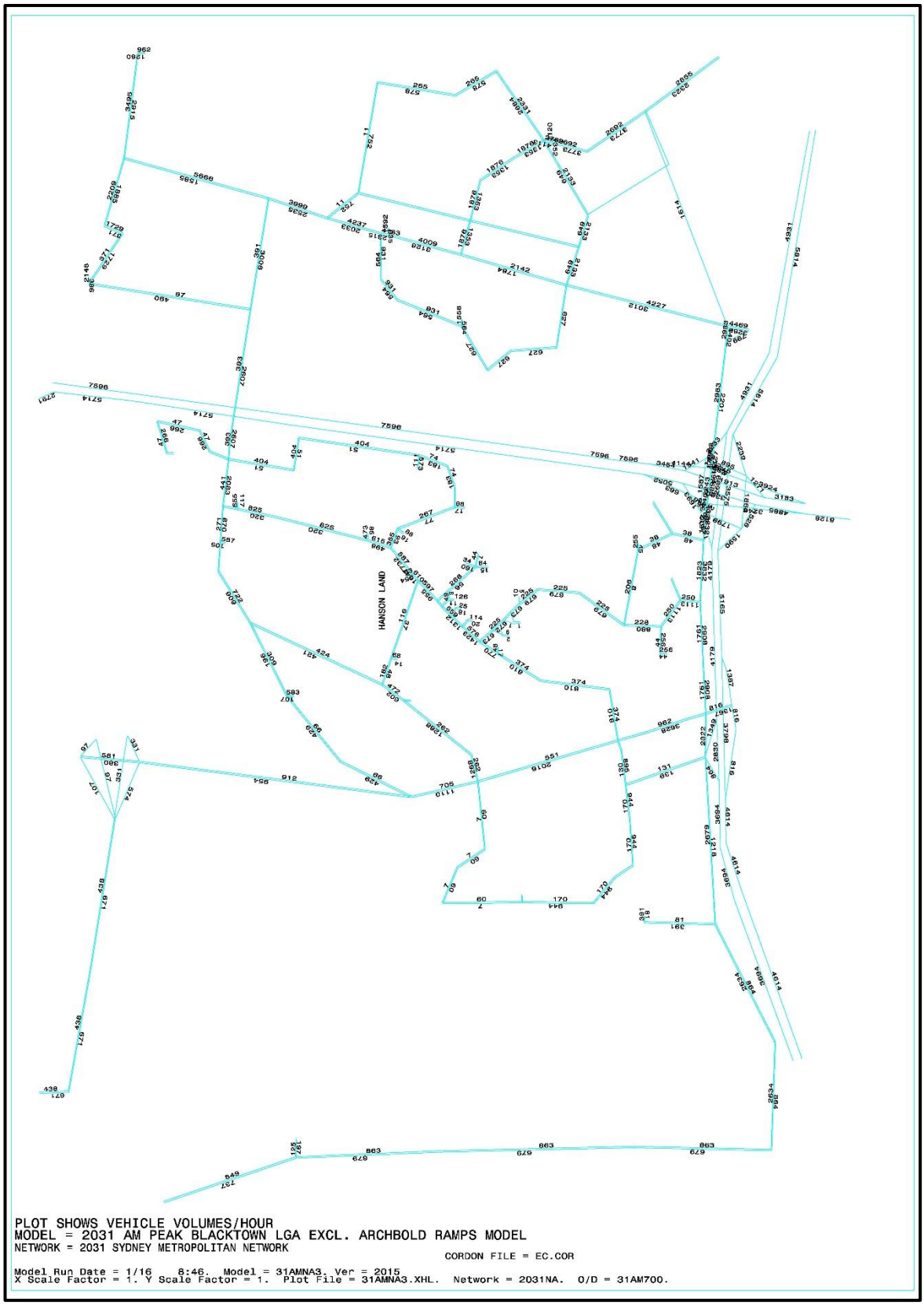


Figure 9: Eastern Creek Precinct 2031 PM Peak Projected Volumes

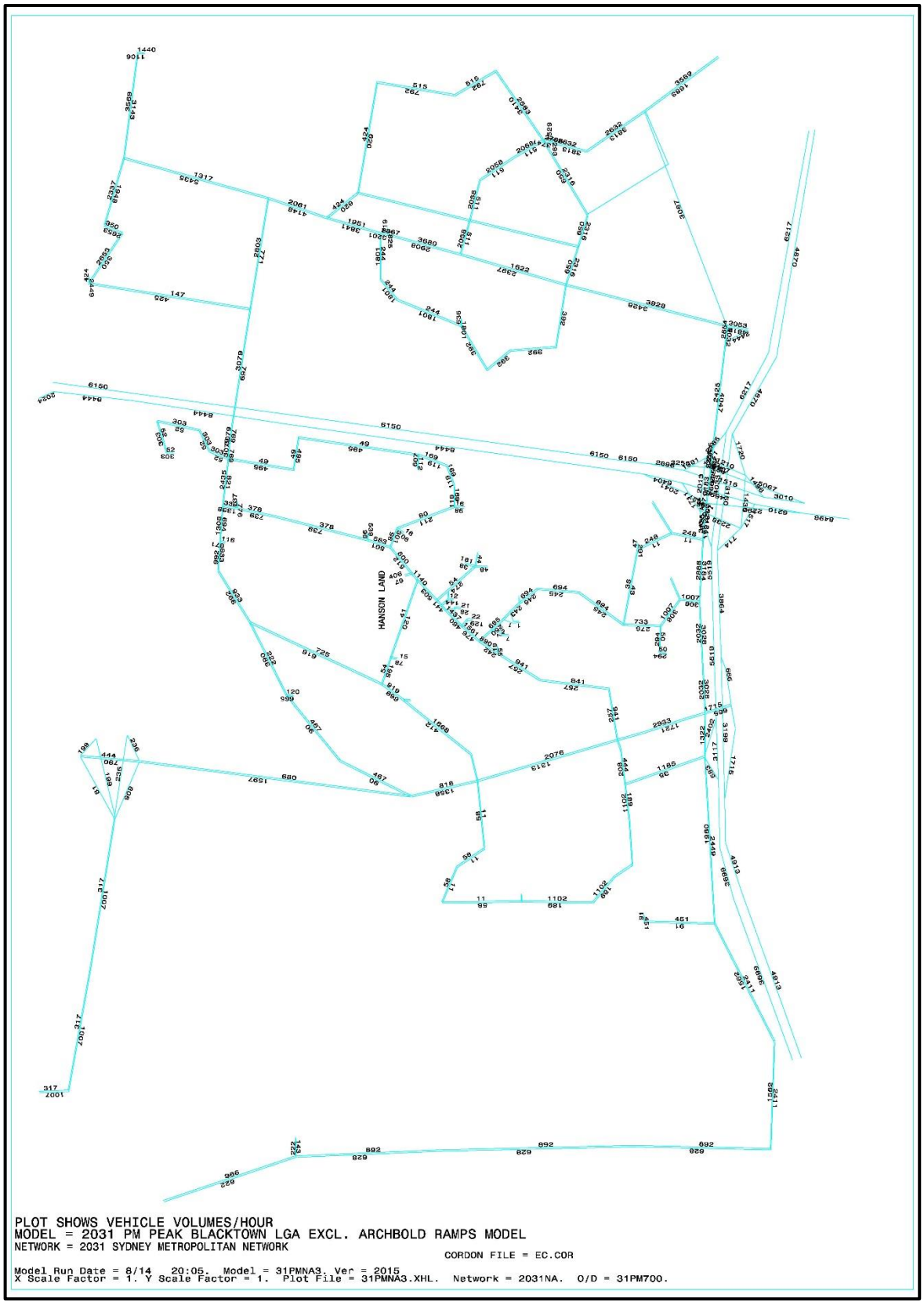
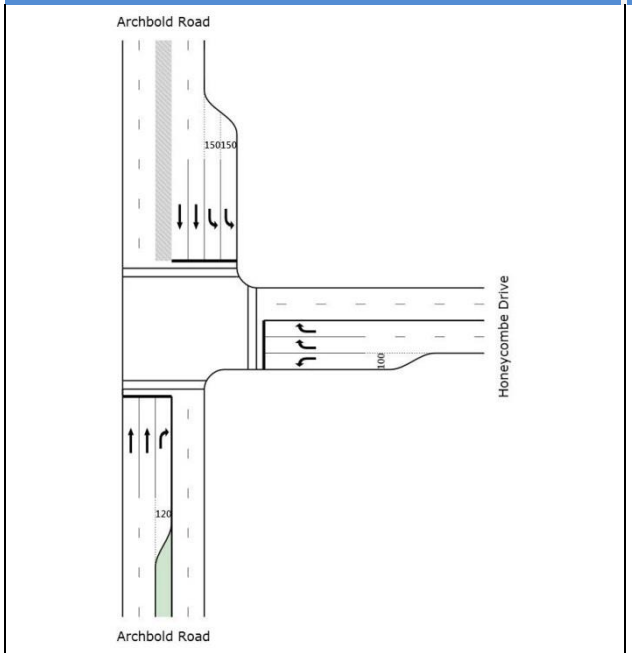
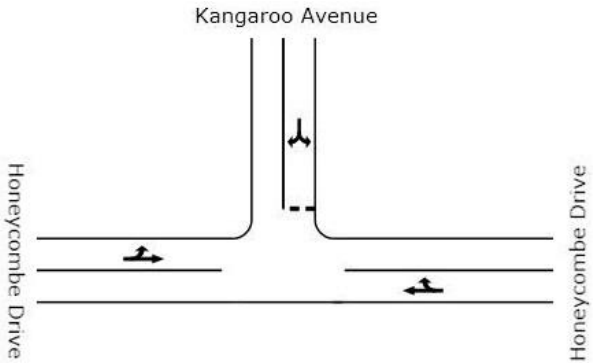
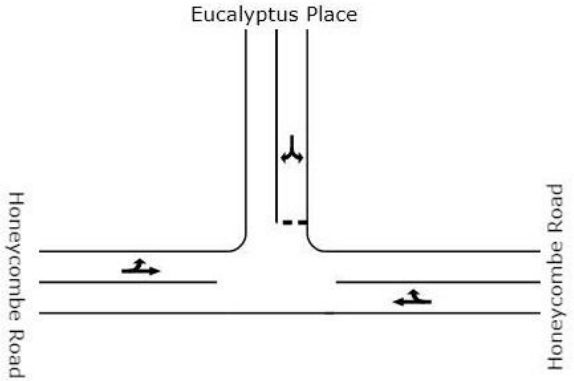
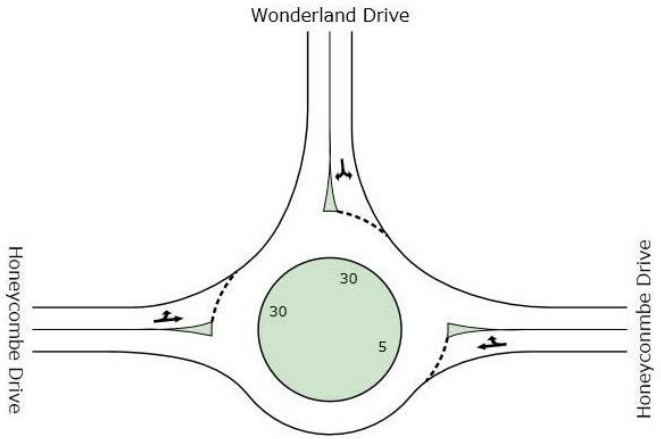
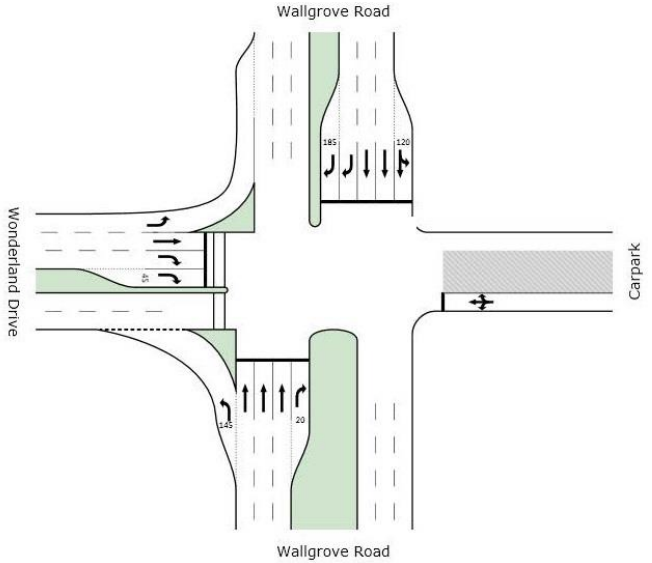


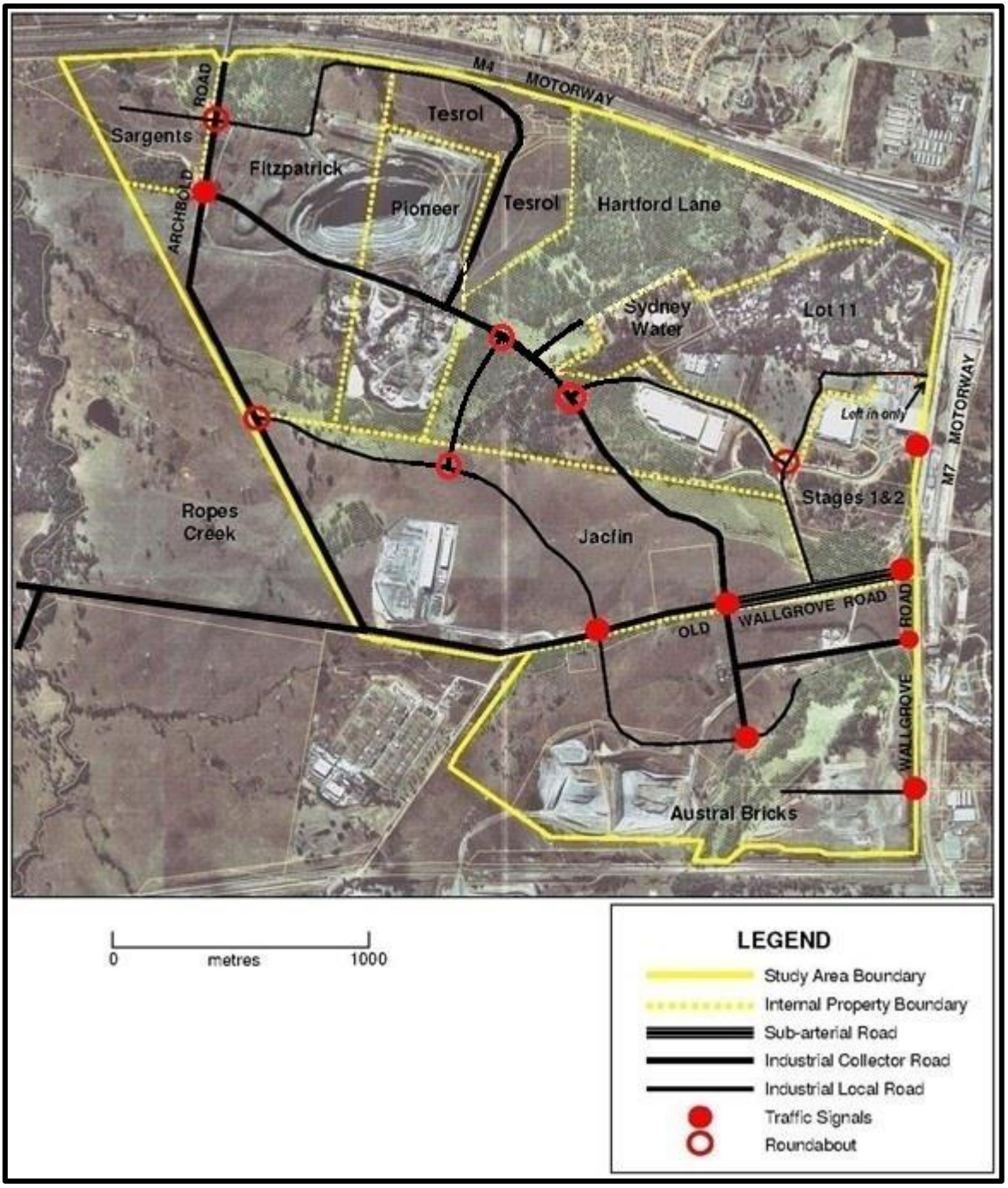
Table 3: Year 2031 Intersection Performance

Archbold Road and Honeycombe Drive						Honeycombe Drive and Kangaroo Avenue						Honeycombe Drive and Eucalyptus Place					
																	
AM			PM			AM			PM			AM			PM		
DS	AVD (secs)	LoS	DS	AVD (secs)	LoS	DS	AVD (secs)	LoS	DS	AVD (secs)	LoS	DS	AVD (secs)	LoS	DS	AVD (secs)	LoS
0.92	21.6	B	0.87	32.2	C	0.56	8.2	A	0.91	13.8	A	0.76	12.8	A	0.70	13.8	A

Honeycombe Drive and Wonderland Drive	Wallgrove Road and Wonderland Drive
	

AM			PM			AM			PM		
DS	AVD *(secs)*	LoS	DS	AVD *(secs)*	LoS	DS	AVD *(secs)*	LoS	DS	AVD *(secs)*	LoS
0.876	13	A	0.579	6	A	0.853	34.12	C	0.731	22.2	B

Figure 10: Indicative Eastern Creek Road Hierarcy



Source: 'Eastern Creek Precinct – Local Traffic Study, ARUP, 2005

PARKING

Passenger vehicle access for the speculative warehouses and offices will be catered for via dedicated laybacks on Honeycombe Drive and the internal access road.

The associated passenger vehicle parking for the site is based upon the RMS's document entitled '*Guide to Traffic Generating Developments*'. Under this guideline, the RMS require...

- **Warehouse** 1 space per 300m^2 of GFA, and
- **Office** 1 space per 40m^2 of GFA.

Concurrently, Blacktown City Council's Precinct Planning Controls require consideration of...

- **Warehouse** 1 space per 100m^2 of GFA for the first 7,500m^2, thence, 1 space per 200m^2 of remaining GFA, and
- **Office** – 1 space per 40m^2 of GFA.

Table 4: Indicative Parking Requirements by Land Use

Master Plan Component	GFA (m^2)	RMS Guide		Council	
		Rate	*Spaces*	*Rate*	*Spaces*
Warehouse 1.1	8,470	1/300m^2	29	1/200m^2	43
Office 1.1	500	1/40m^2	13	1/40m^2	13
Warehouse 1.2	8,470	1/300m^2	29	1/200m^2	43
Office 1.2	500	1/40m^2	13	1/40m^2	13
Warehouse 2	16,545	1/300m^2	56	1/200m^2	83
Office 2	750	1/40m^2	19	1/40m^2	19
Warehouse 3	22,905	1/300m^2	77	1/200m^2	115
Office 3	750	1/40m^2	19	1/40m^2	19
TOTALS	**58,890**		**255**		**348**

The parking requirements prescribed by the RMS and Council above, are indicative averages of warehouse development across the Metropolitan Area and within Blacktown LGA, respectively.

As outlined in the RMS guide, the prescribed rates should consider the particular requirements of the intended tenants and nature of business to be conducted.

The proposed Master Plan proposes employees and visitors have access to some 456 parking spaces. This allocation of parking spaces is commensurate with the projected traffic generation for the site, and meets the requirements prescribed by the RMS in the *'Guide to Traffic Generating Developments'* and is in accordance with *Blacktown City Council's DCP*.

CAR PARKING DESIGN

Refer to *Figure 2* which presents the proposed development parking layout, designed in accordance with AS2890.1-2004 (or better) and disabled parking in accordance with AS2890.6-2009. The interpretation of the standards to be employed in the proposed warehouse development are presented below…

- **Aisle Width** – 6.3m
- **Parking Bays** – With the exception of the allocated disabled parking bays, each bay should be 2.5m wide for employees and visitors with an additional 300mm for those spaces located adjacent to any side walls or obstructions. Each bay should be 5.4m deep.
- **Driveway Gradient for User Class 1, 1A or 2 (Long term parking)** – The proposed access for passenger vehicles must meet the required sight lines to pedestrian activity within the footway areas and comply with under carriage clearance and overhang requirements.

  The proposed accesses must cater for a sight triangle in excess of 2m by 2.5m upon departure to the road carriageway.
- **Space identification** – In accordance with Figure 3.1 of AS2890.6, each allocated disabled parking bay must be clearly identified by pavement marking and signposting.

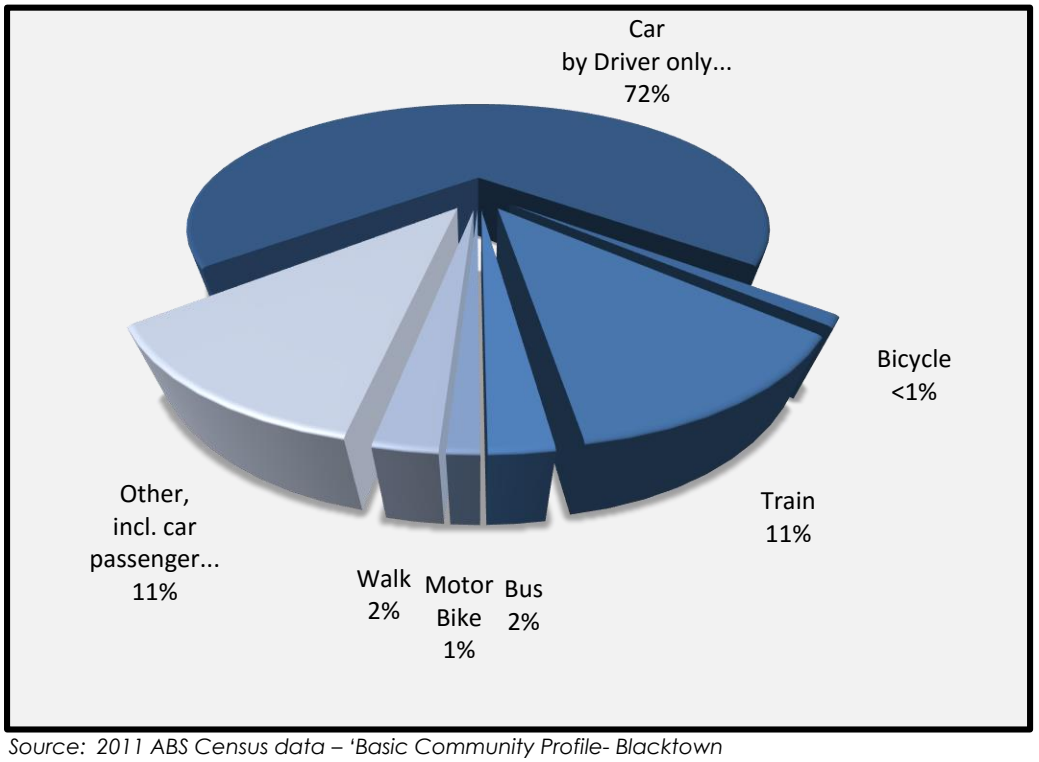
PUBLIC TRANSPORT

The Metropolitan Strategy, under the auspices of 'Draft SEPP 66 – Integration of Land Use and Transport', prescribes guiding provisions that aim to ensure the urban structure, building forms, land use locations, development design, subdivision and street layouts to help achieve the following planning objectives...

- *Improving accessibility to housing, employment and services by walking, bicycling and public transport,*
- *Improving the choice of transport and reducing the dependency on private vehicle usage,*
- *Moderating growth in the demand for travel and the distances travelled, especially by car,*
- *Support the efficient and viable operation of public transport services, and*
- *Providing for the efficient movement of freight.*

The provision seeks to influence mode choice made by community and business.

Figure 11: Blacktown LGA JTW Mode Share – Journey by Single Mode



Source: 2011 ABS Census data – 'Basic Community Profile- Blacktown

Car usage for Journey to Work (JTW) in Western Sydney is greater than compared with the Sydney Metropolitan Area average. The 2006 census data indicates that the overall mode split for the Blacktown LGA is 72% car driver, in the context of a single mode journey. This is, however, an area wide average and must not be taken to apply equally to all local precincts. Previous studies have identified a mode share, attributed to private vehicle usage, greater than 90%.

Public transport accessibility to Eastern Creek Precinct, within the Western Sydney Employment Hub, has been improved and is under further investigation at this time.

The State Government's has invested in 300 new buses across the state, which has resulted in 400 new jobs for bus drivers and 150 jobs in bus construction.

Commuter trips to the Eastern Creek Precinct will be improved with increased services along Route No.738 from Mount Druitt railway station to Old Wallgrove Road and Wonderland Drive.

Current bus services travel to and from Rooty Hill railway station and have been extended to serve the next stage of the Eastern Creek Business Park along Old Wallgrove Road and Roberts Road.

The service runs at 30 minutes intervals between 4.30am - 8.30am and 2.30pm - 5.30pm. The service structure is designed to accommodate the commencement and completion of varying shifts during the typical working week within the Eastern Creek Precinct.

No services are planned, at this time, along Honeycombe Drive. However, it is envisaged that with further development of the Eastern Creek Precinct and the prolongation of Archbold Road to Old Wallgrove Road, connectivity improvements would suggest future bus services may be introduced.

The government is yet to investigate a possible Western Sydney modal interchange within the precinct, incorporating a heavy rail spur connection to the Main West Rail Line as outlined in the *'Metropolitan Strategy'*. This initiative has the potential to influence the mode share of future freight movements to and from the precinct.

While investigations into the potential of heavy and light rail networks are ongoing and with recent improvements to bus services, no mode shift has been applied to the forecast peak hour generation rates, as calculated in Table 2.

PEDESTRIANS AND CYCLISTS

Under the guidelines prescribed by Blacktown City Council's DCP and the regional bike plan, all road reserves within the Eastern Creek Precinct should provide shared pedestrian and cycle paths within the road footway area.

No provision is required on the road carriageway under the current formation width guidelines for new development within the Eastern Creek Industrial Precinct.

CONCLUSION

In conclusion, the Master Plan of Speculative Warehouse facilities, as proposed on Hanson Land within Eastern Creek Stage 3, comply with the requirements set-out by Blacktown City Council and the RMS guidelines, with regard to traffic generating developments.

This report supports the Section 75W Applicastion by Frasers Property.

In support, the following issues are considered relevant...

- *The proposed Naster Plan and its associated traffic generation of 334vph, during the morning and evening peak commuter periods, respectively, will be capably managed on the planned road network within the Eastern Creek Precinct, as evidenced by the computer based mesoscopic and operational modelling,*

- *The proposed allocation of 348 parking spaces on site meets the requirements prescribed by the RMS in the 'Guide to Traffic Generating Developments' and Blacktown City Council's DCP. The allocation is considered acceptable in facilitating the proposed Master Plan, given the anticipated vehicle generation.*

APPENDIX A – PERFORMANCE INDICATORS

General

Intersection performance is best measured by the indicators of Level of Service (LoS), Average Vehicle Delay (AVD) and the Degree of Saturation (DS) during peak hours.

This is defined as the assessment of a qualitative effect of factors influencing vehicle movement through the intersection. Factors such as speed, traffic volume, geometric layout, delay and capacity are qualified and applied to the specific intersection control mode, as shown in Table 1.

The measure of average delay assessed for traffic signal operation is over all movements. For roundabouts and priority controlled intersections, the critical criterion for assessment is the movement with the highest delay per vehicle.

Table A1: Performance Indicators by Control Method

Intersection Control	Performance Measure [Unit]
Sign or Priority Control	→ Delay of critical movement(s) [seconds/vehicle] → Average Vehicle Delay [seconds/vehicle] → Queue length of critical movement(s) [metres]
Traffic Signal Control	→ Delay of critical movement(s) [seconds/vehicle] → Degree of Saturation [ratio of vehicles to capacity] → Average Vehicle Delay [seconds/vehicle] → Cycle Length [seconds] → Queue length of critical movement(s) [metres]
Roundabout Control	→ Delay of critical movement(s) [seconds/vehicle] → Degree of Saturation[ratio of vehicles to capacity] → Average Vehicle Delay [seconds/vehicle] → Queue length of critical movement(s) [metres]

Average Vehicle Delay (AVD)

The AVD is a measure of the operational performance of a road network or an intersection.

AVD is determined globally over a road network or within a cordon during an assignment model run. The AVD exhibited on comparable network models, for analogous peak periods, forms the basis of comparing the operational performance of the road network.

AVD is used in the determination of intersection Level of Service. Generally, the total delay incurred by vehicles through an intersection is averaged to give an indicative delay on any specific approach. Longer delays do occur but only the average over the peak hour period is reported.

Degree of Saturation (DS)

The DS of an intersection is usually taken as the highest ratio of traffic volume on an approach to the intersection compared with its theoretical capacity, and is a measure of the utilisation of available green time. The DS reported is generally of a critical movement through the intersection rather than the DS of the intersection unless equal saturation occurs on all approaches.

For intersections controlled by traffic signals, generally both queue length and delay increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its DS is kept below 0.875. When the DS exceeds 0.9, extensive queues can be expected.

Table A2: Qualified Level of Service by Control Method

LOS	AVD secs	Traffic Signals and Roundabout	Give Way and Stop Sign Priority Control
A	1 to 14	Good operation.	Good operation
B	14 to 28	Good operation with acceptable delays and spare capacity.	Good operation with acceptable delays and spare capacity.
C	28 to 42	Satisfactory.	Satisfactory but accident study and operational analysis required.
D	42 to 56	Operating near capacity.	Near capacity. Accident study and operational analysis required.
E	56 to 70	Unsatisfactory. Traffic signals incidence will cause excessive delays. Requires additional capacity. Roundabouts require alternative control mode.	At capacity. Requires alternative control mode.
F	>70	Unsatisfactory. Over capacity and unstable operation.	Over capacity. Unstable and unsafe operation.