MINCHINBURY EMPLOYMENT PARK CONCEPT PLAN APPLICATION

60 WALLGROVE ROAD, MINCHINBURY

Assessment of Traffic and Parking Implications

November 2009
Revision B

Reference 0922

TRANSPORT AND TRAFFIC PLANNING ASSOCIATES
Transportation, Traffic and Design Consultants
Suite 603, Level 6
282 Victoria Avenue
CHATSWOOD 2067
Telephone (02) 9411 5660
Facsimile (02) 9904 6622
Email: ttpa@ttpa.com.au

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1. INTRODUCTION

This report has been prepared for Afteron Limited to accompany a Concept Plan to NSW Department of Planning in order to facilitate future development of the Quarantine Station site, to be known as the Minchinbury Employment Park at 60 Wallgrove Road in Minchinbury (Figure 1).

The subject site is identified as one of ten precincts, which make up the Western Sydney Employment Hub. The convenient access provided by the Motorway route has acted to encourage the development of warehouse and distribution facilities, with established developments within the Minchinbury precinct while more recent development has focused on the former Sydney Wonderland site. The identification of the subject site for redevelopment recognises a continued demand for this type of land-use and the associated employment opportunities.

This application for Concept Plan approval is pursuant to Part 3A of the Environment Planning and Assessment Act and represents a framework, or planning guide, for the future development of the site. In order to assess the traffic implications of the potential development, three development scenarios have been prepared, which comprise:

* The Masterplan (small-medium Lot Subdivision)
* Option 2 – Medium Lot Subdivision
* Option 3 – Large Lot Subdivision

The range of Lot sizes indicated in these three scenarios provides a reliable range of traffic generation outcomes.

The purpose of this report is to:

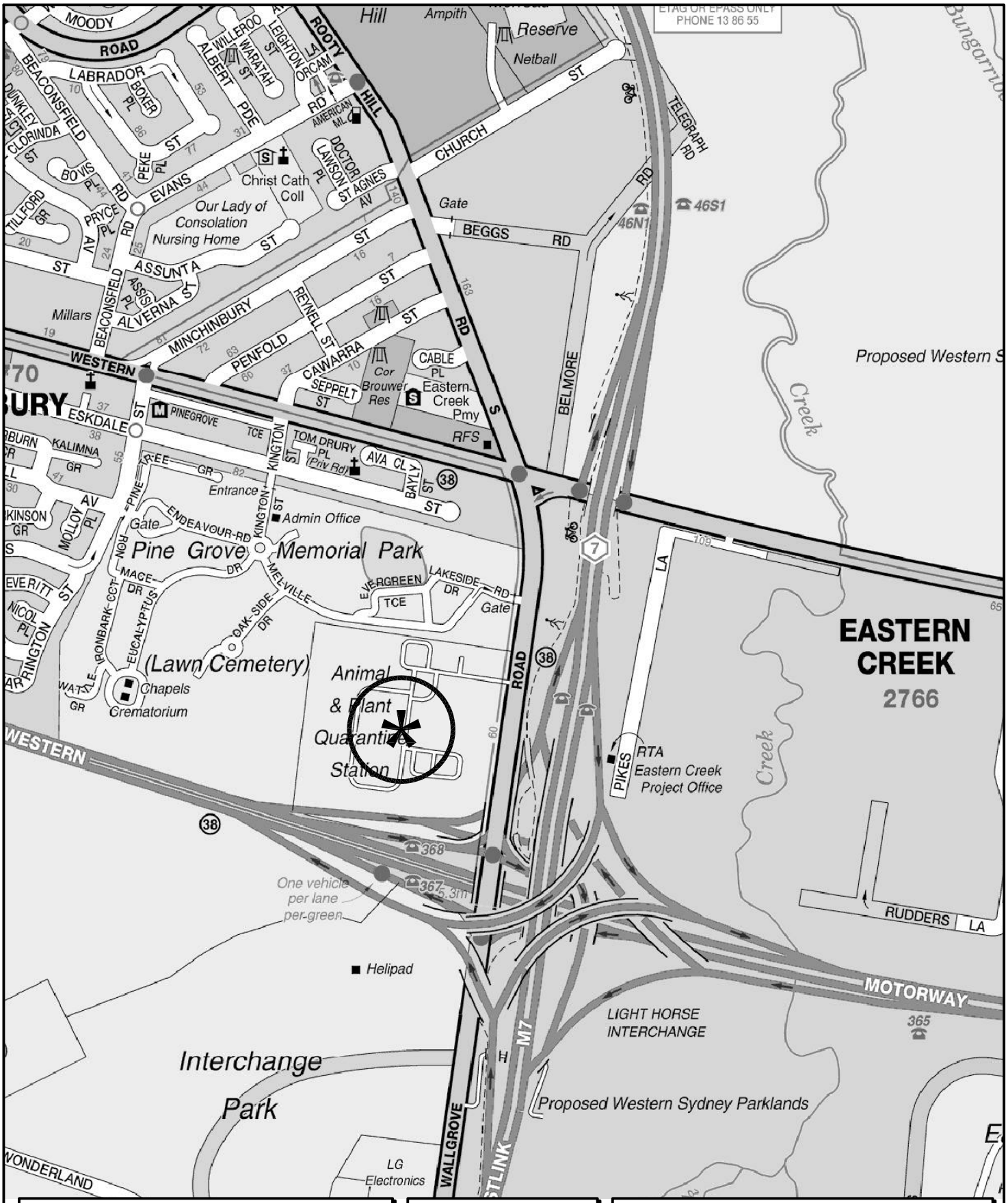
* describe the site and the proposed development scheme

* describe the road network serving the site and the prevailing traffic conditions

* assess the adequacy of the proposed parking provision

* assess the potential traffic implications

* assess the suitability of the proposed vehicle access, internal circulation and servicing arrangements.



LEGEND

LOCATION

FIG 1

2. PROPOSED DEVELOPMENT SCHEME

2.1 SITE AND CONTEXT

The development site (Figure 2) currently accommodates the Sydney Quarantine Station, which is operated by Australian Quarantine and Inspection Service (AQIS). The site occupies an area of 21.8Ha and is located on the north-west corner of the M4 Motorway and Wallgrove Road, which at this location runs adjacent and parallel to the M7 Motorway. The area surrounding the site is somewhat dominated by the Light Horse Interchange, which connects all directions of the M4 and M7 Motorways in a typical three level 'Stack Interchange' arrangement. The site is bounded to the north and west by the Pine Grove Memorial Park Cemetery.

Other significant development in the area surrounding the site includes the established Minchinbury Industrial Estate to the west of the existing residential area adjoining the Cemetery and the extensive development of the former Wonderland site to the south of the M4 Motorway.

The site is well located in relation to the arterial road network with convenient access to the M4 and M7 Motorways and the arterial routes of Wallgrove Road and the Great Western Highway.

2.2 DEVELOPMENT PROPOSAL

The development proposal is for Concept Plan approval for an employment park which will be used for light industrial, warehousing and distribution centres, and similar purposes, The constraints and opportunities presented by the site, for example the protection of flora and fauna, the boundary set-back requirements and the vehicle access limitations, have assisted in the determination of the potential developable area and potential development yield for the site.

LEGEND

N

SITE

FIG 2

In order to assess the traffic implications of the potential use of the site, three development scenarios have been prepared, which comprise:

* Option 1 – Small-Medium Lot Subdivision 17.39Ha = 86,900m^2 floor area
* Option 2 – Medium Lot Subdivision 18.02Ha = 90,100m^2 floor area
* Option 3 – Large Lot Subdivision 19.16Ha = 95,800m^2 floor area

Concept plans of these scenarios are provided on the drawings prepared by EDAW AECOM Pty Ltd, which accompany the application and are reproduced in part overleaf.

Legend

Site boundary

Legend

Site boundary

Legend

Site boundary

3. ROAD NETWORK AND TRAFFIC CONDITIONS

3.1 ROAD NETWORK

The road network serving the site (Figure 3) comprises:

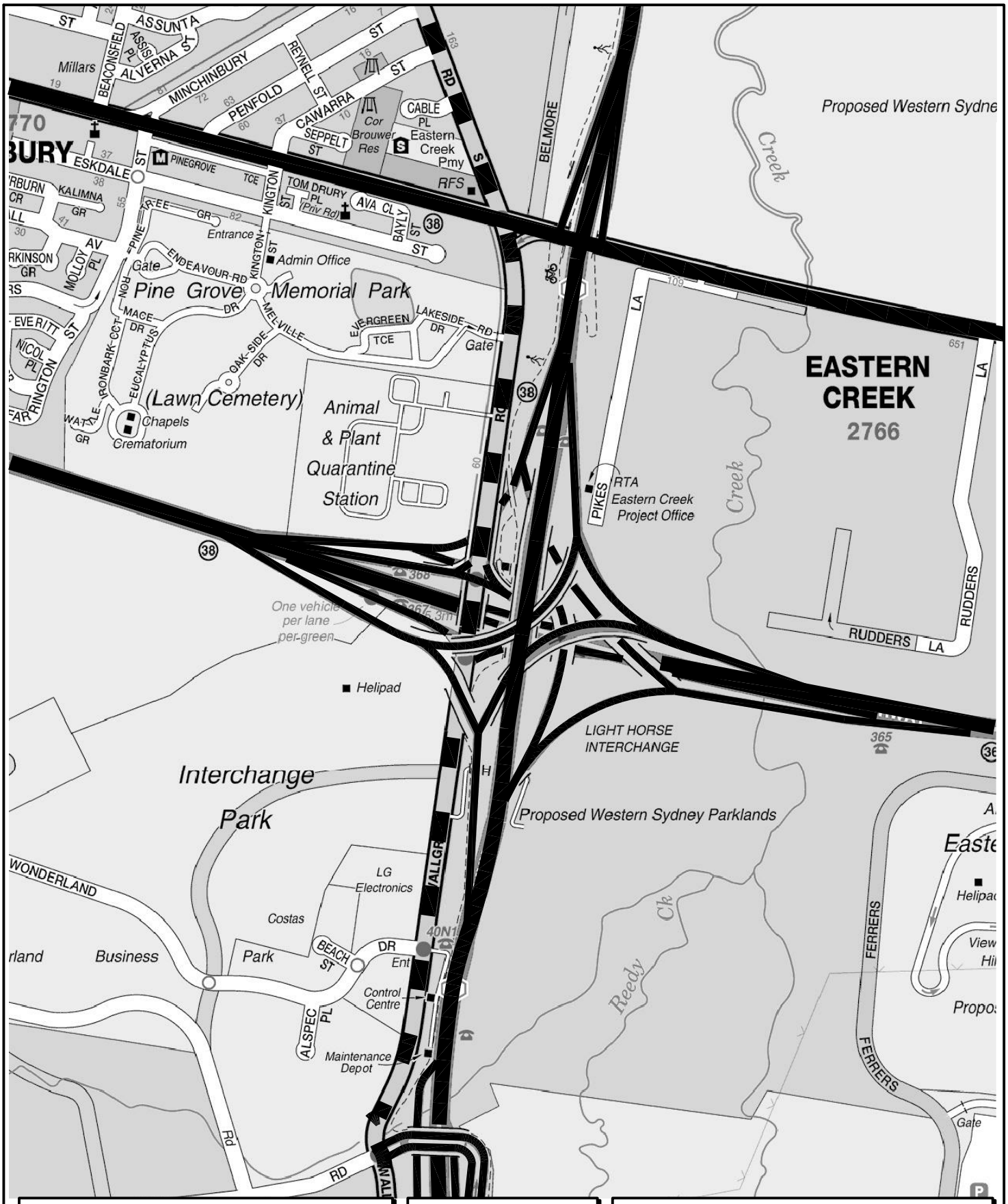
- *Westlink M7* – a privately owned and operated Motorway, which forms part of the Sydney Orbital Route and connects between the South-Western Freeway at Prestons and the M2 Motorway at Seven Hills

- *M4 Motorway* – a State Road and major arterial route connecting between Sydney and the Blue Mountains crossing

- *Great Western Highway* – a State Highway and arterial route connecting between Sydney and Penrith

- *Wallgrove Road* – a State Road and sub-arterial route connecting between the Great Western Highway and Elizabeth Drive

The site is currently served by an access intersection Wallgrove Road adjacent to the northern property boundary. The southern boundary of the site, the only other boundary with road frontage, is bounded by the M4 eastbound exit ramps, which intersects with Wallgrove Road and divides to form the M7 north and southbound connection ramps. Wallgrove Road has a straight and level alignment along the site frontage and comprises three north bound lanes and two southbound lanes divided by a central median. The southbound lanes are supplemented by a right turn lane and an acceleration lane, which form part of a seagull intersection serving the site access.



LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR

ROAD NETWORK

FIG 3

3.2 ROAD GEOMETRY AND TRAFFIC CONTROLS

The principal existing traffic controls on the road system in the vicinity of the site (Figure 4) comprise:

* The extensive 'Stack Interchange' (Light Horse Interchange) connecting the M4 and M7 Motorways, which provides for all turning movements/directions.

* The traffic signals at the intersection of Wallgrove Road and the Great Western Highway to the north of the site

* the traffic signals at the Wallgrove Road and M4 ramp intersections to the south of the site. There are two separate intersection serving the eastbound and westbound ramps. The left turn movements are facilitated by unsignalised and large radius slip roads.

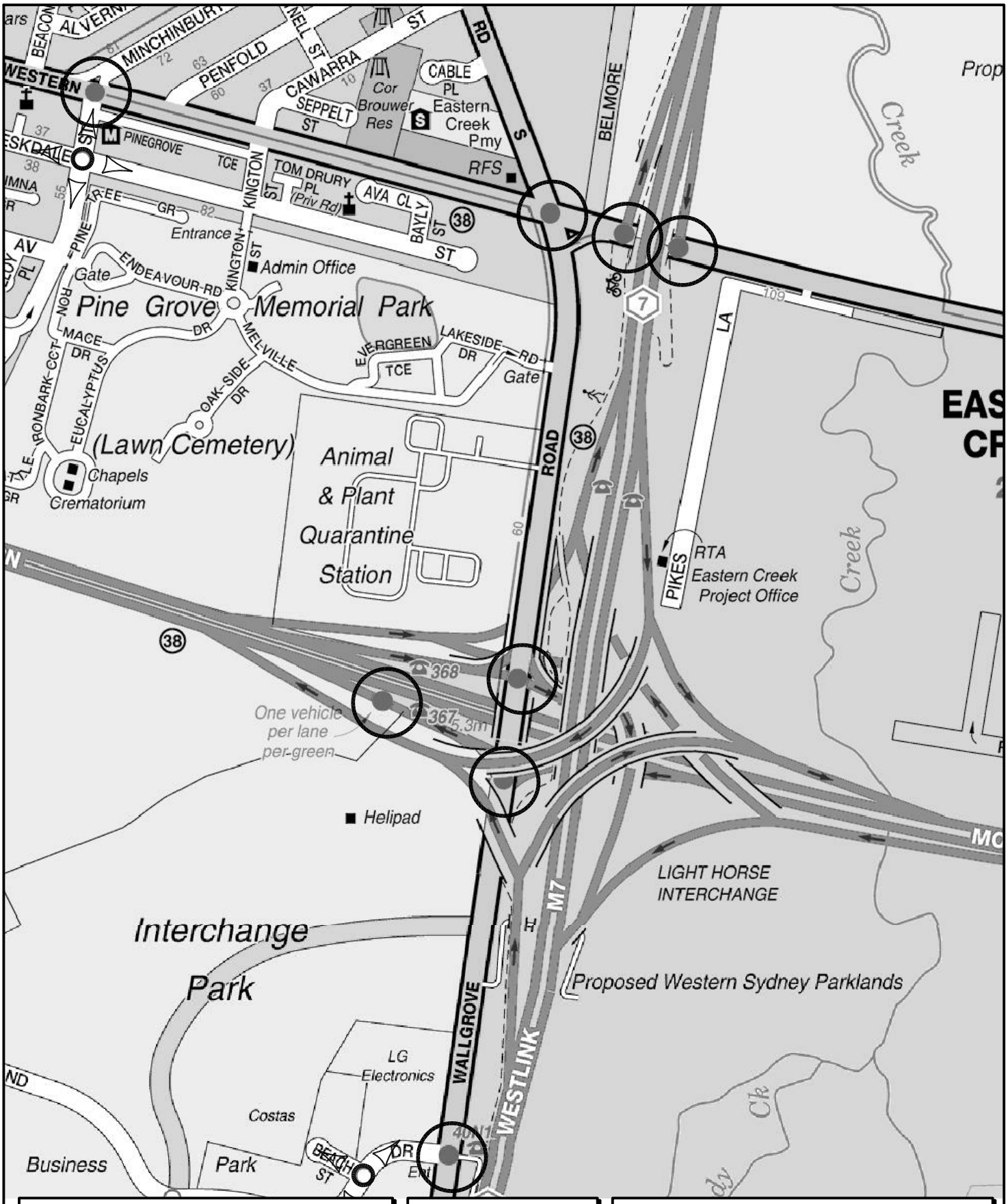
* the Seagull intersection arrangement, which currently forms the site access intersection with Wallgrove Road

* the approved 'B Double' truck routes along Wallgrove Road, the Great Western Highway and the Motorways.

3.3 TRAFFIC CONDITIONS

An indication of the traffic conditions on the road system serving the site is provided by data published by the RTA and surveys undertaken for this study. The data published by the RTA is expressed in terms of Annual Average Daily Traffic (AADT) and the most recent recorded volumes are provided in the following:

Location	AADT
Wallgrove Road	35,981
Great Western Highway	27,254



LEGEND

- TRAFFIC SIGNAL CONTROL
- ROUNDABOUT
- RESTRICTED TURNING MOVEMENT

N

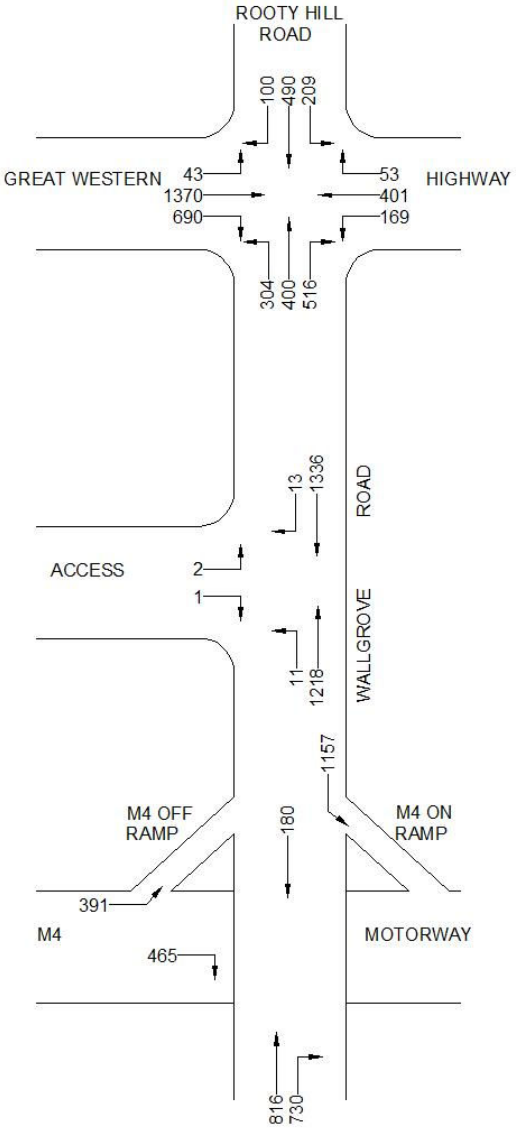
TRAFFIC CONTROLS

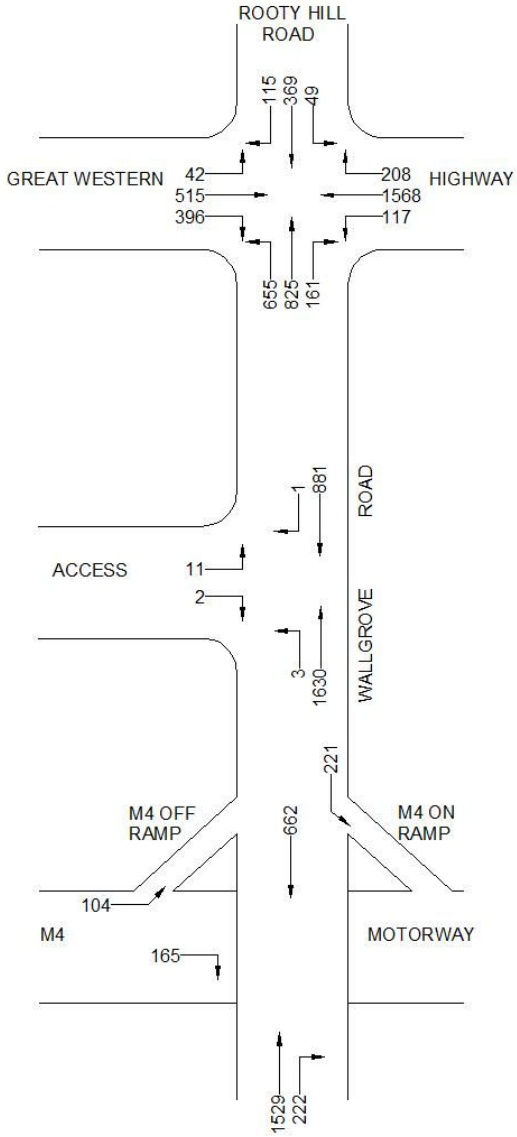
FIG 4

Details of the existing morning and afternoon traffic flows at the three key intersections serving the site have been collected through manual count surveys at the intersections of:

* Site access / Wallgrove Road
* Wallgrove Road / Great Western Highway
* Wallgrove Road / M4 eastbound exit and entry ramps

The traffic movement volumes are summarised in the following diagrams:





The operational performance of the access intersection has been analysed using the SIDRA software and the results of that assessment are provided in the following table, while the criteria for interpreting the SIDRA output is provided overleaf.

	AM Peak	PM Peak
Level of service	C	C
Degree of Saturation	0.86	0.83
Av Vehicle Delay	25.9	24.8

In order to assess the section of Wallgrove Road in the vicinity of the site, the three key intersections have been modelled using the SCATES software and the results of that assessment are provided in the following table.

Wallgrove Road / Great Western Highway	AM Peak	PM Peak
Level of service	C	C
Degree of Saturation	0.68	0.760
Av Vehicle Delay	31.6	32.9

Wallgrove Road / Site Access	AM Peak	PM Peak
Level of service	NA	NA
Degree of Saturation	NA	NA
Av Vehicle Delay	NA	NA

Wallgrove Road / M4 Eastbound Ramps	AM Peak	PM Peak
Level of service	A	A
Degree of Saturation	0.67	0.59
Av Vehicle Delay	12.3	14.0

The results indicate that the intersection currently operates quite satisfactorily during the peak traffic periods.

CRITERIA FOR INTERPRETING RESULTS OF SIDRA AND SCATES ANALYSIS

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good	Good
'B'	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
'C'	Satisfactory	Satisfactory but accident study required
'D'	Operating near capacity	Near capacity and Accident Study required
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
'F'	Unsatisfactory and requires additional capacity	Unsatisfactory and requires other control mode

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below, which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route).

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

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals**[1] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

[1] *the values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs*

3.4 PUBLIC TRANSPORT

Public transport services in the vicinity of the site are provided by the 'Busways' bus route 738, which runs along Wallgrove Road past the site and linking Mount Druitt, Rooty Hill stations to Eastern Creek and Horsley Park.

4. TRAFFIC

The traffic generation associated with the three development scenarios has been determined with reference to Section 3 of the Roads and Traffic Authority Guidelines for Traffic Generating Developments.

The rate for warehouse developments is contained in Section 3.10 Industry, which makes a clear distinction between Warehouses and Factories, which involve very different employment densities in relation to the floor area.

The Guidelines specify peak hour traffic generation rates for warehouse developments of 0.5 vehicle trips per hour, per 100m^2 of Gross Floor Area, while the office component has a generation rate of 2.0 vehicle trips per hour, per 100m^2 of Gross Floor Area.

The peak hour traffic activity associated with the three development scenarios is presented in the following table. It is noted that the existing Quarantine Station involves a minor traffic generation; therefore this has not been deducted from the ultimate traffic generation figures.

The table overleaf provides a summary of the Lot areas along with the building floor areas based on the assumption that the developable area within each Lot will be 50% of the Lot area, which will be further divided so that the Warehouse component represents 85% of the building, while the remaining 15% would comprise the ancillary office. It is typical that the office component would be disregarded in terms of traffic generation where the floor area is less than 20% of the total building area. However, for the purposes of providing a robust assessment, the office component has been included in the traffic generation calculations.

* Option 1 – Small-Medium Lot Subdivision 17.39Ha = 86,900m^2 floor area
  - Warehousing = 73,865m^2
  - Office = 13,035m^2

* Option 2 – Medium Lot Subdivision 18.02Ha = 90,100m^2 floor area
  Warehousing = 76,585m^2
  Office = 13,515m^2

* Option 3 – Large Lot Subdivision 19.16Ha = 95,800m^2 floor area
  Warehousing = 81,430m^2
  Office = 14,370m^2

The following table summarises the calculation used to convert the floor areas in to the traffic generation based on the following rates, adopted from the RTA Guidelines, and distribution assumptions.

The Guidelines specify the following relevant peak hour traffic generation rates:

Warehouse = 0.5 vehicle trips per hour, per 100m^2 of Gross Floor Area
Office = 2.0 vehicle trips per hour, per 100m^2 of Gross Floor Area

The traffic generated by the site has been distributed to represent 80% arrivals during the morning peak, and 80% departures during the Evening peak.

Scenario 1	Morning Peak		Evening Peak	
	Entering	Exiting	Entering	Exiting
	504	126	126	504

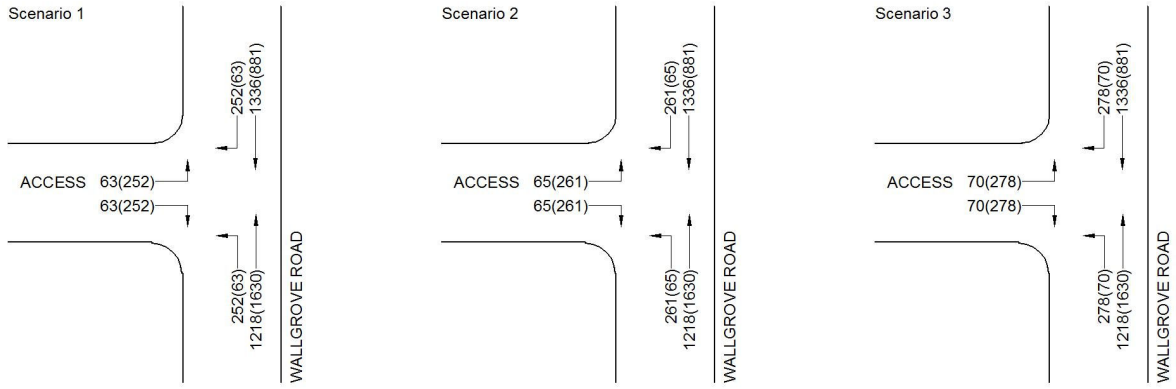
Scenario 2	Morning Peak		Evening Peak	
	Entering	Exiting	Entering	Exiting
	523	131	131	523

Scenario 3	Morning Peak		Evening Peak	
	Entering	Exiting	Entering	Exiting
	556	139	139	556

The traffic movements associated with the Quarantine Station did not provide a sufficiently large sample on which to base a north-south distribution, however a

review of the existing traffic volumes along Wallgrove Road indicates a very balanced split between north and south movements. On this basis the traffic associated with the future development scenarios has been distributed 50% north and south during the preparation of the intersection modelling.

The projected movements are summarised in the following diagrams:

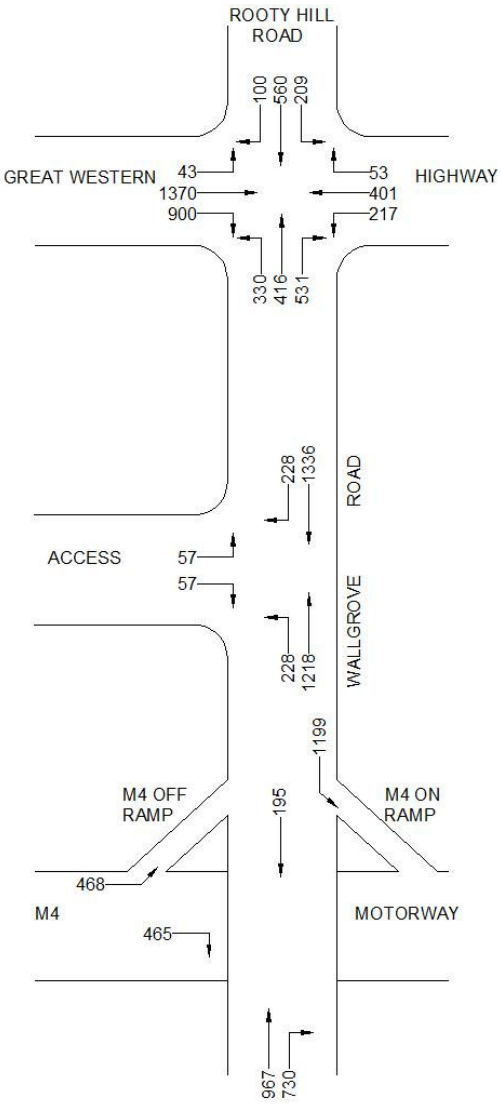


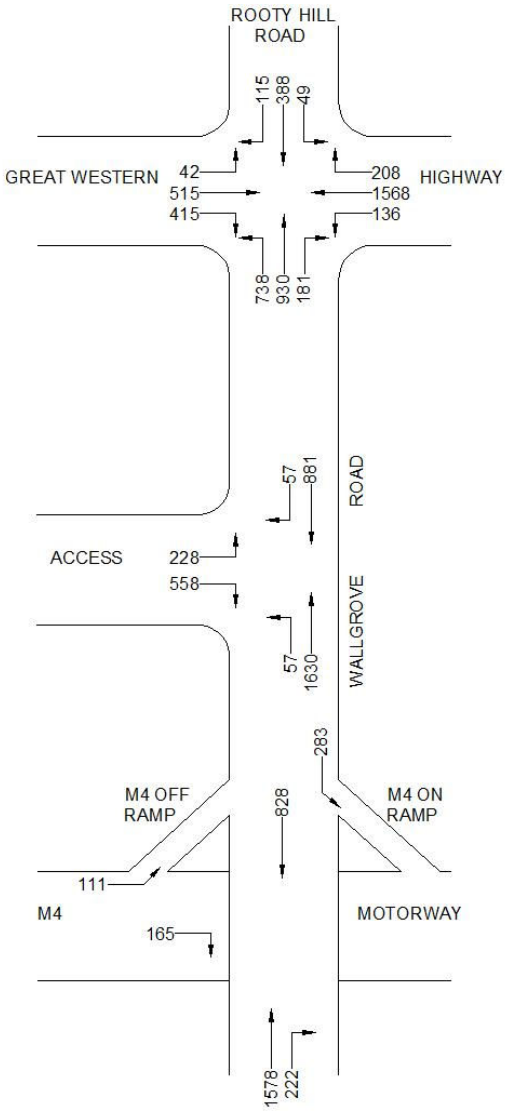
The traffic volumes associated with the worst-case development, in traffic terms this is represented by Scenario 3, indicating a total peak hour activity of 695 vehicle movements. This equates to a site generation rate of 36.5 vtph per Hectare. Surveys of similar existing developments, namely the Nexus Estate in Prestons and Anzac Road in Moorebank, reveal a present day traffic activity of 15 vtph per Hectare. This rate has been generally adopted by the RTA, Councils and other authorities as a realistic traffic generation rate for industrial development and forms the basis of modelling being undertaken for numerous projects across the metropolitan area. It is apparent that application of the RTA rates, on a building floor area basis, has indicated a doubling of the traffic activity, which provides a robust modelling outcome for this traffic analysis.

The traffic volumes associated with the Scenario 3, have been applied to the SIDRA analysis of the existing access intersection. The results indicate that while the intersection represents a generous geometry and high capacity for the existing use, the seagull arrangement does not satisfactorily accommodate the demands of the projected traffic movements; in particular the right turn movements to and from the access.

In this regard a concept traffic signal plan has been prepared and is included in Appendix A.

The introduction of traffic signals to this section of Wallgrove Road will inevitably involve stoppages to traffic on Wallgrove Road, where currently these movements have clear priority over the access movements. However, this section of Wallgrove Road is influenced heavily by the operation of the traffic signals at the Great Western Highway and M4 ramp intersections. In order to accurately assess the implications of introducing traffic signals, the three intersections must be modelled as a coordinated set of intersections. This will indicate the Level of Service provided by the route, and the impact thereon, as well as at the individual intersections. In this regard modelling has been undertaken using the SCATES software, which unlike SIDRA, has the ability to model a sequence of intersections. The traffic volumes resulting from the Scenario 3 development have been distributed and added to the existing volumes as summarised in the following diagram.





The results of the SCATES modelling are summarised in the following tables:

Wallgrove Road / Great Western Highway	AM Peak	PM Peak
Level of service	C	C
Degree of Saturation	0.72	0.81
Av Vehicle Delay	32.3	34.6

Wallgrove Road / Site Access	AM Peak	PM Peak
Level of service	A	B
Degree of Saturation	0.49	0.68
Av Vehicle Delay	12.4	24.3

Wallgrove Road / M4 Eastbound Ramps	AM Peak	PM Peak
Level of service	A	A
Degree of Saturation	0.70	0.63
Av Vehicle Delay	11.9	14.0

The results indicate that the intersections will continue to operate satisfactorily during the peak traffic periods.

5. PARKING ASSESSMENT

The site has been rezoned for employment generating development, which will likely result in the development of warehouse buildings with ancillary offices of various proportions depending upon the ultimate development plan. However, the three Scenarios prepared in relation to this study provide a suitable basis on which to establish the overall future parking outcome.

The parking provision rates have been adopted from the RTA Development Guidelines, which specify a minimum of 1 space per 300m^2 GFA for warehouse developments.

Assessment of the potential parking demands of the proposed development can be determined by application of this rate to the three Scenarios:

Scenario 1	-	Combined Floor area =	86,900m^2	@ 1 per 300m^2 =	290 spaces
Scenario 2	-	Combined Floor area =	90,100m^2	@ 1 per 300m^2 =	300 spaces
Scenario 3	-	Combined Floor area =	95,800m^2	@ 1 per 300m^2 =	319 spaces

As a comparison, reference is also made to the parking rates contained in Blacktown Council DCP Part E (development in the industrial zones), which are summarised in the following:

Factory, Warehouse & Bulk Storage	Buildings 7,500 sqm or less - 1 space per 75sqm GFA. Buildings greater than 7,500 sqm – GFA 1 space per 200 sqm GFA only for the area in excess of 7,500sqm where there is a specific end user which would not demand a higher rate and where employee parking is adequately catered for
Commercial/Office Component	1 space per 40sq.m GFA

The worst-case scenario, that all buildings are less than 7,500m^2, indicates the following parking provision required by the DCP:

Scenario 1	-	Warehouse Floor area	= 73,865m^2	@ 1 per 75m^2	=	985 spaces
		Office Floor area	= 13,035m^2	@ 1 per 40m^2	=	325 spaces
Scenario 2	-	Warehouse Floor area	= 76,585m^2	@ 1 per 75m^2	=	1,021 spaces
		Office Floor area	= 13,515m^2	@ 1 per 40m^2	=	338 spaces
Scenario 3	-	Warehouse Floor area	= 81,430m^2	@ 1 per 75m^2	=	1,086 spaces
		Office Floor area	= 14,370m^2	@ 1 per 40m^2	=	359 spaces

Scenario 3 represents the largest floor area and according to the DCP, would require an associated parking provision of 1,445 parking spaces, which at a rate of 25m^2 per space would occupy an area of 3.6 Hectares (ie 36,125m^2) of the site.

Studies of similar developments completed within the past few years indicate that parking rates higher than stipulated by the RTA, result in an oversupply of parking. Recent surveys undertaken at the Nexus Estate in Prestons revealed a peak usage of 39% of the parking provision. The peak demand for parking was recorded at 165 vehicles (out of 420 spaces provided), relating to 53,500m^2 of warehousing and office space accommodated in four buildings. This equates to a parking rate of 1 space per 324m^2, which confirms the RTA rate of 1 space per 300m^2.

6. ACCESS, INTERNAL CIRCULATION AND SERVICING

6.1 ACCESS

It is proposed to retain the existing access location and install traffic signals in order to provide for safe turning movements and to increase the capacity of the intersection. The provision of traffic signals has been determined on the basis of traffic modelling and the projected traffic volumes associated with the potential development outcomes.

The existing intersection geometry (seagull arrangement) is ideally suited for conversion to traffic signals as it current includes an indented right turn lane, continuous through lanes and generous radii at the site access.

A concept signal plan is contained in Appendix A. The layout has been designed to accommodate the turning movements associated with semi-trailers and B-doubles.

6.2 INTERNAL CIRCULATION

The subject application is for a rezoning of the site, however during the preparation of the development scenarios a basic internal road layout has been developed for each scenario. Each road layout adopts the road width stipulated in Councils DCP for Industrial collector and local road and have been shown to accommodate B-Double vehicles. The detailed design of the road network would be subject to more rigorous assessment during the Development Application process.

6.3 CONNECTIVITY

In order to provide connectivity to the site from the surrounding areas it is proposed to implement a number of facilities that will encourage access to the site by alternative means of transport rather than private vehicles. These facilities are summarised in the following:

- Construction of a shared footpath/cycleway along the western site of Wallgrove Road extending from the site access and connecting with the existing crossings at the Great Western Highway intersection

- Construction of a short section of cycleway on the eastern side of Wallgrove Road connecting between the existing cycleway and the proposed pedestrian crossing, which will form part of the signalised intersection

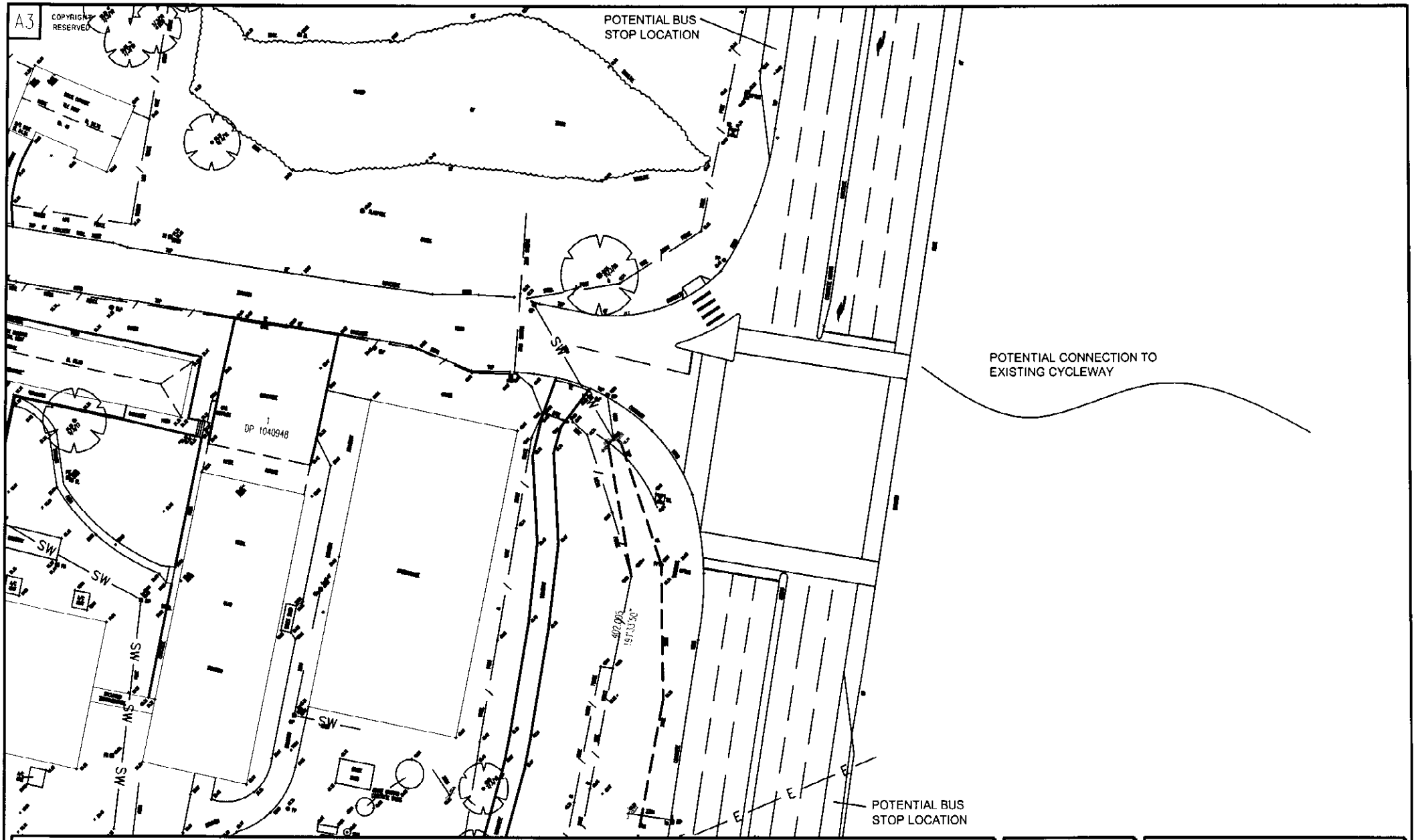
- Provision of Bus Stops in the vicinity of the proposed access intersection as indicated on the Concept Access Plan.

7. CONCLUSION

The traffic and parking assessment undertaken for the proposed rezoning of the proposed Minchinbury Employment Park at 60 Wallgrove Road has concluded that in relation to the traffic implications, the property is suitable for industrial development within the constraints present by the site. The existing access provides a suitable connection to the arterial road network and through the provision of traffic signals will accommodate safe and efficient access to the site, without detrimental impact upon Wallgrove Road and its two closest intersections. Future development project applications and/or development applications would be subject to detailed parking access and manoeuvring design in accordance with AS2890.1 and it is recommended that the RTA rates for carparking are adopted as a basis for the future parking provision. The site access and internal road layouts have been shown to accommodate vehicles up to a 25 metre B-double. The provision of new footway/cycleway connections and bus stops will improve the connectivity of the site and ultimately provide for alternative forms of transport.

APPENDIX A

CONCEPT ACCESS ARRANGEMENT



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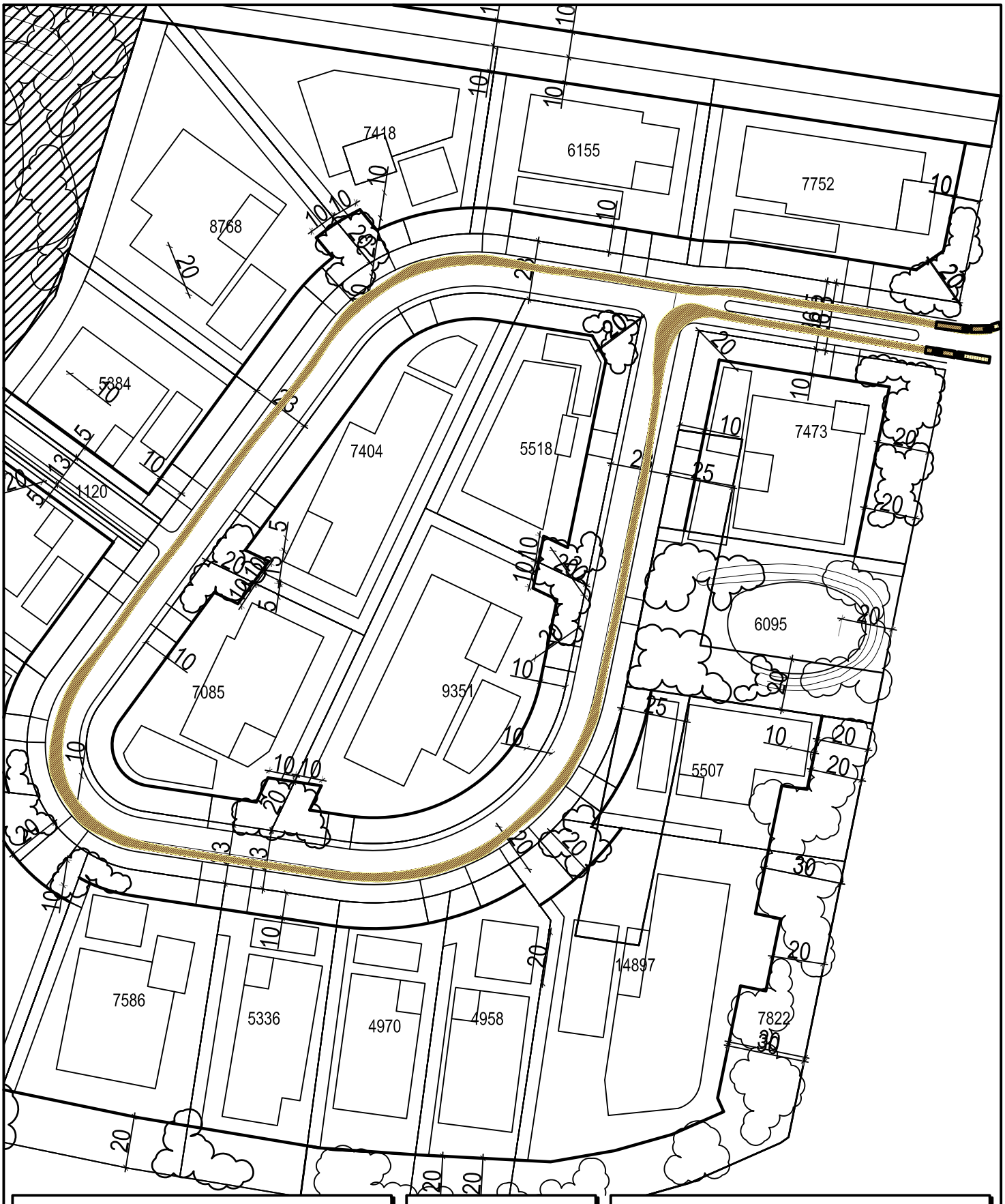
CONCEPT ACCESS ARRANGEMENT

APPENDIX B

SWEPT PATH ANALYSIS



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2000. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

SWEPT PATH ANALYSIS OF A 25m ARTICULATED VEHICLE ENTERING AND EXITING THE SITE

SP 1