"PRESTONS INDUSTRIAL ESTATE"

PROPOSED WAREHOUSE DEVELOPMENT

CNR YARRUNGA STREET AND BERNERA ROAD PRESTONS

Assessment of Traffic and Parking Implications

March 2016
(Rev H)

Reference 15168

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1. INTRODUCTION

This report has been prepared to accompany an Environmental Impact Statement to the Department of Planning and Environment for a proposed Warehouse & Distribution Complex on a site on the corner of Yarrunga Street and Bernera Road at Prestons Industrial Area (Figure 1).

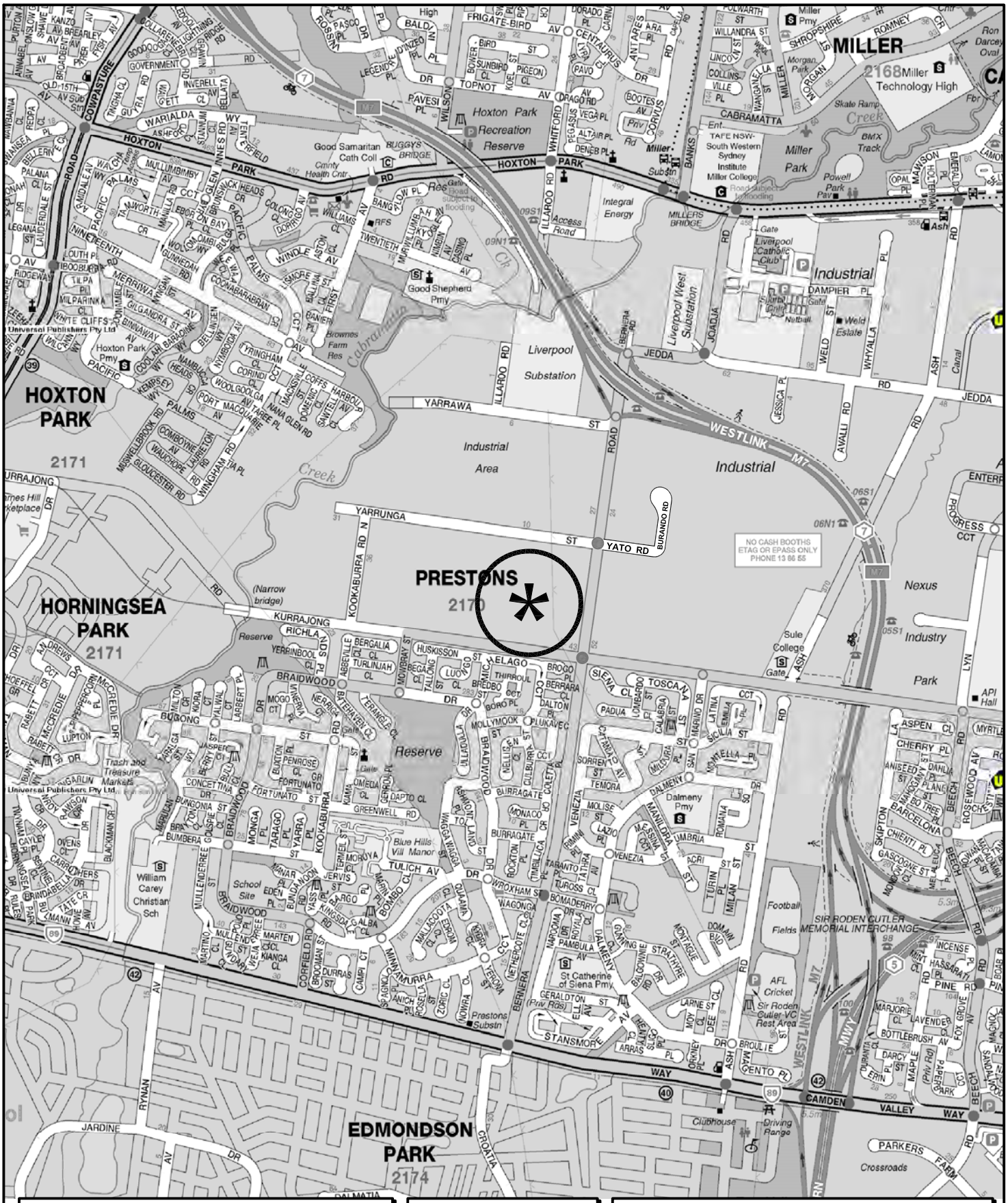
The Prestons Industrial Area is a developing mixed precinct which has evolved on largely vacant land bound by Kurrajong Road, Westlink M7 and Cabramatta Creek. There is a wide range of industrial, manufacturing, warehouse, waste recycling and other uses in the area however the subject site has remained with a rural residential use.

The area has excellent access connections to the arterial road system which links to the cross regional and motorway systems and the bus services will be upgraded in the future improving connection to Liverpool CBD and the rail network. This presents ideal circumstances for establishing large warehouse development and the total proposed staged development scheme comprises:

5 Warehouses (4 stages)	111,480 m^2 GFA
Ancillary Offices	4,725 m^2 GFA

The principal vehicle accesses will be on Yarrunga Street and extensive areas of hardstand paving will be provided for car parking, loading docks and truck / trailer parking.

In response to a request to the Department of Planning and Environment, the Secretary's Environmental Assessment Requirements (SEARS) were issued and included the following:



LEGEND

LOCATION

FIG 1

Transport, Access and Parking

- *Traffic Impact Assessment detailing all daily and peak traffic and transport movements likely to be generated (vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development, including a description of vehicle access routes and modelling of key intersections including Westlink M7/Bernera Rd and Camden Valley Way/Bernera Road;*

- *Details of access to the site from the road network including intersection location, design and sight distance in accordance with Council's requirements*

- *Assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development;*

- *Plans of any road upgrades or new roads required for the development, including those specified by Council*

- *Detailed plans of the proposed layout of the internal road network*

- *Identification of facilities and measures for sustainable travel and parking provision on-site in accordance with the relevant Australian Standards; and*

- *Details of any likely dangerous goods to be transported on arterial and local roads to/from the site, if any, and the preparation of an incident management strategy, if relevant.;*

Roads and Maritime Services Requirements

1. *Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required).*
   The key intersections to be examined/modelled include:
   WestlinkM7/Bernera Road and Camden Valley Way/Bernera Road

2. *Details of the proposed access and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (i.e. turn paths, sight distance requirements, aisle widths, etc.)*

3. *Proposed number of car parking spaces and compliance with the appropriate parking codes.*

4. *Details of service vehicle movements (including vehicle type and likely arrival and departure times.)*

5. *Roads and Maritime requires the Environmental Assessment Report to assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan (eg 'Travelsmart' or other travel behaviour change initiative); and the provision of facilities to increase accessibility of the development site by public transport*

6. *Roads and Maritime will require in due course the provision of a traffic management plan for all demolition/construction activities, detailing vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures.*

The purpose of this report is to provide an assessment of the potential traffic transport and parking implications of the proposed development scheme and respond to the SEARS and RMS requirements.

Meetings and Discussion with Liverpool Council

Preliminary meetings in the form of Pre-DA meetings and meetings with Council engineering staff have taken place to ascertain key traffic and access issues. Part 7 of Liverpool DCP 2008 has clear access requirements for the site and this is discussed at Section 7 of this report.

2. PROPOSED DEVELOPMENT

2.1 SITE, CONTEXT AND EXISTING USE

The site (Figure 2) is a consolidation of lots occupying an irregular shaped area of 20.51ha with extensive frontages to the Yarrunga Street, Bernera Road and Kurrajong Road in the southern part of the Prestons Industrial Area.

The nearby uses comprise:

- The rural residential properties which adjoins to the west and on the opposite side of Yarrunga Street which are zoned for industrial development
- the residential area extending to the south of Kurrajong Road

The existing development on the site comprises:

- single dwellings on the Yarrunga Street frontage
- out buildings, dams and fenced paddocks

2.2 PREVIOUS PLANNING PROCESS

It was originally envisaged that rural lands bounded by Kurrajong Road, Westlink M7 and Cabramatta Creek would be rezoned for residential development. However it eventuated that the lands were rezoned for industrial development and in 2010 a study[1] was undertaken to:

- establish the magnitude of the future development outcome
- access the future potential traffic generation of industrial development
- identify the future traffic circumstances on to road network in 2021
- assess and identify the necessary road network and intersection upgrade works

[1] *Prestons Industrial Area*
Road Network and Traffic Assessment
TTPA March 2010

LEGEND

SITE

FIG 2

The study assessed a developable area of 137ha potentially yielding 740,000m^2 of floorspace with an assessed total traffic generation of 1,734 vtph in the peak periods (i.e. @ 0.23vtph per 100m^2). No delay road network modelling was used to derive the peak movement volumes at the principal intersections.

The study provided detail recommendations in relation to road and intersection geometries/controls and much of these recommendations have already been implemented albeit in an initial stage form in some cases.

2.3 PROPOSED DEVELOPMENT

It is proposed to demolish the existing buildings and structures on the site and undertake some earthworks to install services and to provide level platforms for the building and hardstand areas.

The proposed staged development scheme comprises:

WAREHOUSE FACILITY 1	
Warehouse	26,950m^2
Office	1,800m^2

WAREHOUSE FACILITY 2	
Warehouse	30,005m^2
Office	820m^2

WAREHOUSE FACILITY 3	
Warehouse	12,280m^2
Office Area	1,100m^2

WAREHOUSE FACILITY 4	
Warehouse	3,285m^2
Office	300m^2

WAREHOUSE FACILITY 5	
Warehouse	32,400m^2
Warehouse Mezzanine	6,560m^2
Dock Office	55m^2
Office Area	650m^2

TOTAL	
Warehouse	111,480m^2
Office	4,725m^2
Building	116,205m^2

There will be extensive loading docks along the sides of the warehouse buildings with separate parking areas provided as well as truck and trailer parking.

Vehicle access will comprise:

* 2 ingress/egress driveways on the Yarrunga Street frontage for truck access
* 4 combined ingress/egress driveways on the Yarrunga Street frontage for cars
* An ingress/egress driveway on the Bernera Street frontage for cars
* An ingress/egress driveway on the Bernera Street frontage for trucks

Details of the proposed development scheme are provided on the plans prepared by Axis Architectural which accompany the Application and are reproduced in part in Appendix A.

3. EXISTING ROAD NETWORK AND TRAFFIC CONDITIONS

3.1 ROAD NETWORK

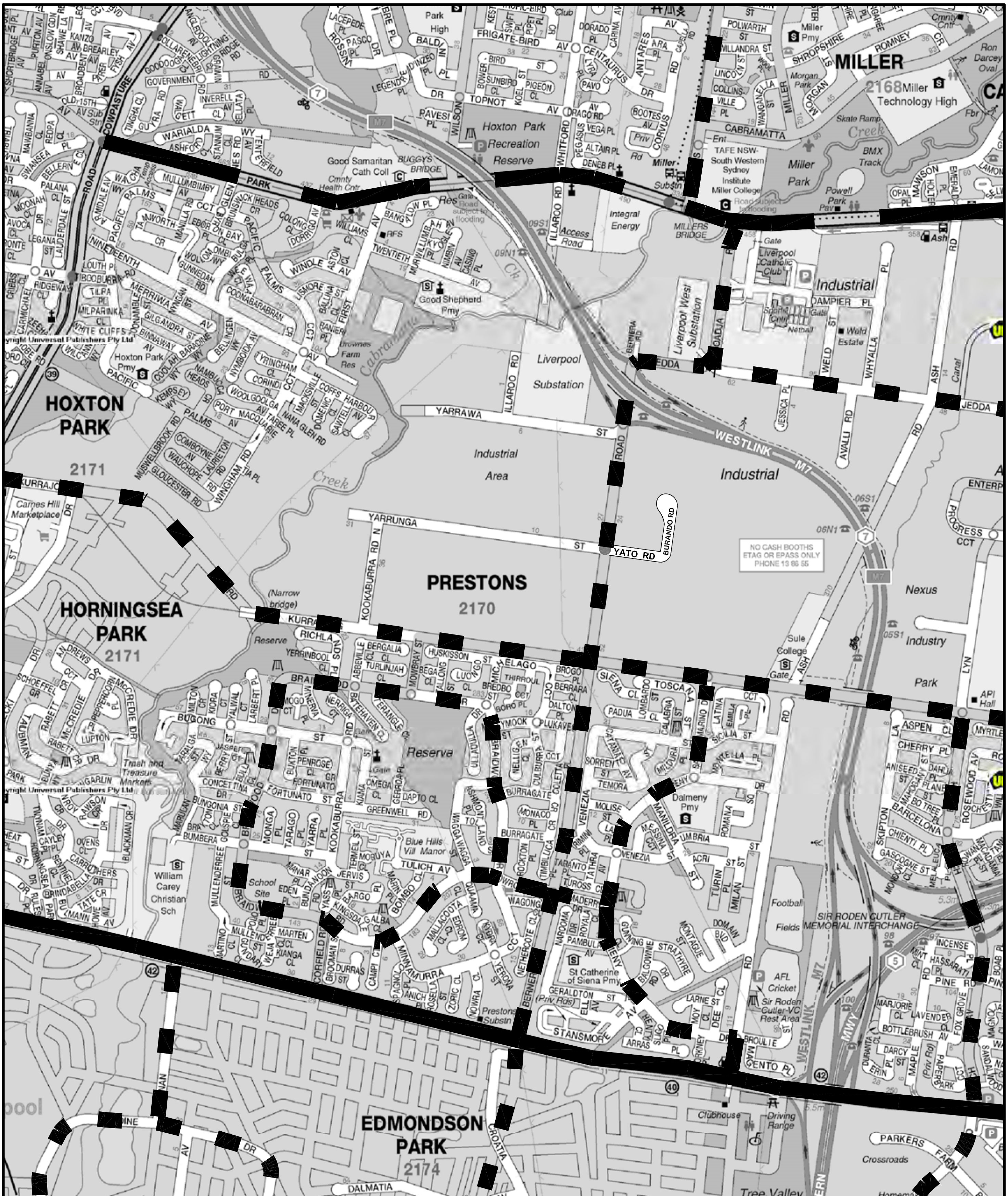
The existing road network serving the Prestons area (Figure 1) comprises:

Arterial and Sub-Arterial Routes

- *Westlink (M7) Motorway* which links between the M2 Motorway at Seven Hills and the M5 Motorway at Prestons
- *South Western (M5) Motorway* which links across the Georges River and continues southwards past Campbelltown
- *Hume Highway* which runs along the western edge of Liverpool CBD to The Crossroads
- *Camden Valley Way* which extends from The Crossroads across Cowpasture Road to Camden
- *Hoxton Park Road* which extends from Hume Highway to Cowpasture Road
- *Cowpasture Road* which extends northwards from Camden Valley Way across Hoxton Park Road

Collector Road Routes

- *Kurrajong Road* which extends westerly from Hume Highway and will connect to Cowpasture Road when the current upgrading over Cabramatta Creek is completed
- *Bernera Road* which extends (north-south) between Camden Valley Way and Hoxton Park Road (via sections of Jedda Road and Joadja Road)
- Ryan Avenue which extends which extends to the south of Camden Valley Way
- Croatia Avenue which extends to the south of Camden Valley Way.



LEGEND

ARTERIAL

SUB-ARTERIAL

COLLECTOR

ROAD NETWORK

FIG 3

There are also numerous other 'lower order' collector routes through the Prestons, Hoxton Park, Horningsea Park, Casula and Lurnea areas including Yarrunga Street/Kookaburra Road North.

3.2 TRAFFIC CONTROLS

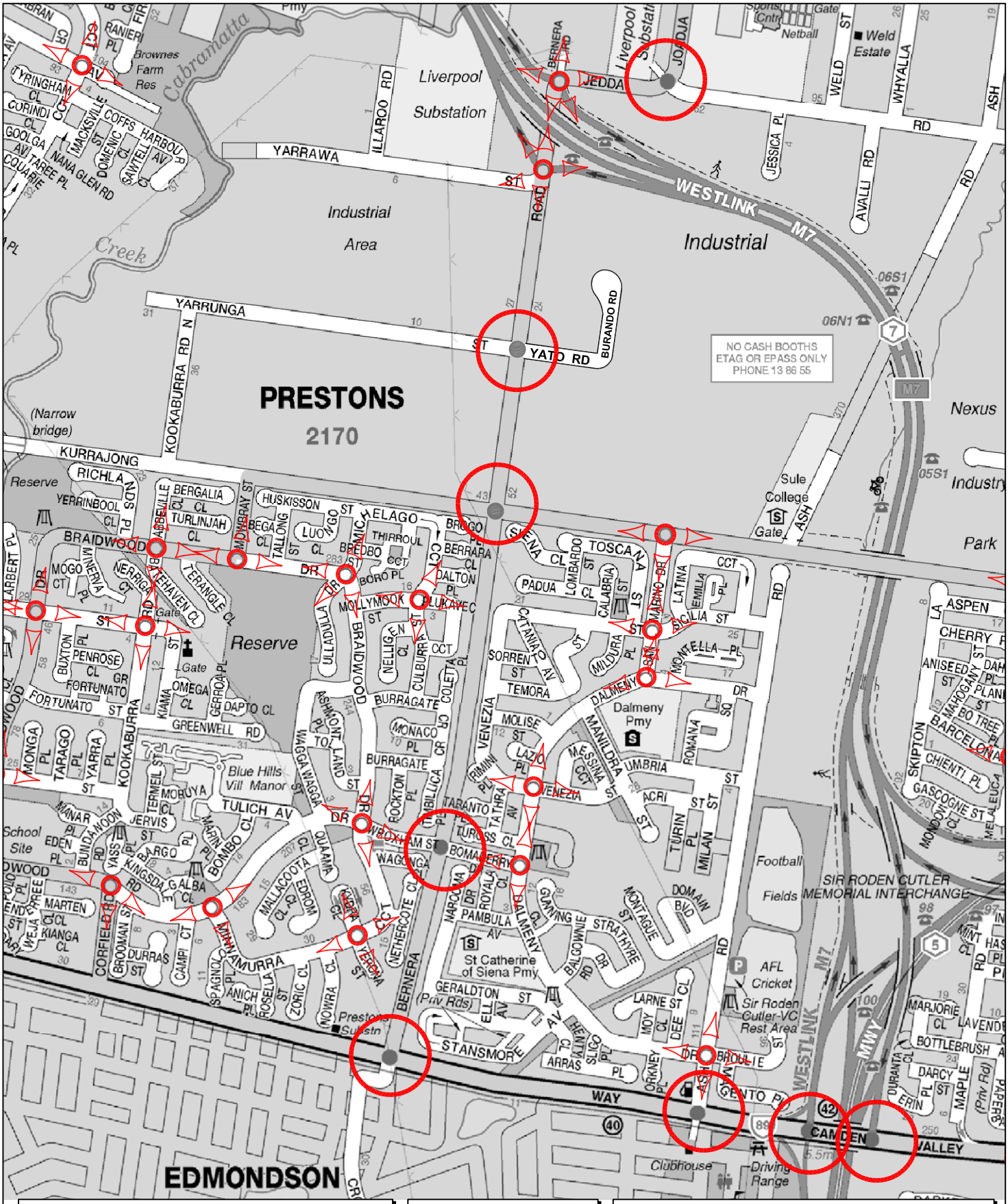
The existing traffic controls on the road system (Figure 4) are largely concentrated on the arterial and sub-arterial perimeter roads. Numerous intersections are controlled by traffic signals particularly along the Hume Highway and Camden Valley Way routes providing controlled access and crossing for the collector and local road system.

Of particular relevance to the access provisions for the development site are:

* traffic signal control at the Camden Valley Way, Bernera Road and Croatia Avenue intersection
* traffic signal control at the Kurrajong Road and Bernera Road intersection
* traffic signal control at the Bernera Road and Yarrunga Street intersection
* roundabout controls at the intersections of Bernera Road and Jedda Road with the M7 ON/OFF Ramp intersections

Details of these intersection controls are provided in Appendix B.

A 70 kmph speed restriction applies along the Camden Valley Way route, however the speed limit on the local and collector road systems is generally 50 kmph.



LEGEND

- TRAFFIC SIGNAL CONTROL
- ROUNDABOUT
- RESTRICTED TURNING MOVEMENT

N

TRAFFIC CONTROLS

FIG 4

3.3 TRAFFIC CONDITIONS

An indication of the existing morning and afternoon peak traffic conditions in the area is provided by traffic surveys undertaken at the principal intersections relevant to the site (as requested by RMS). The results of these surveys are summarised in Figure 5 and the operational performance of these intersections has been assessed using SIDRA. The results for the morning and afternoon peak periods are provided in Appendix D and summarised in the following while the criteria for interpreting SIDRA output is reproduced overleaf:

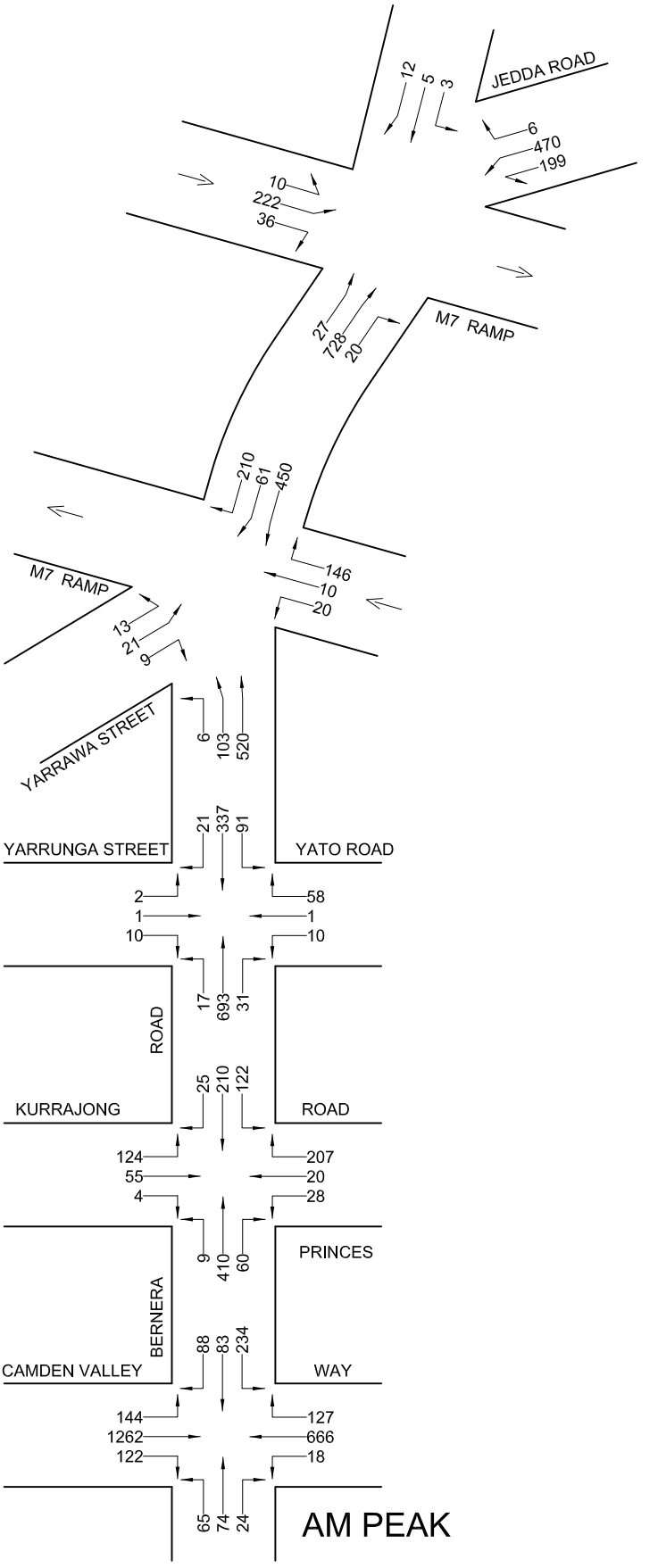
	AM		PM	
	LOS	**AVD**	**LOS**	**AVD**
Bernera/Yarrunga	A	9.4	A	10.4
Bernera/Kurrajong	B	23.5	B	25.1
CVWY/Bernera	B	17.2	B	25.9
Bernera/M7	A	5.8	A	4.6
Jedda/M7	A	6.6	A	6.7

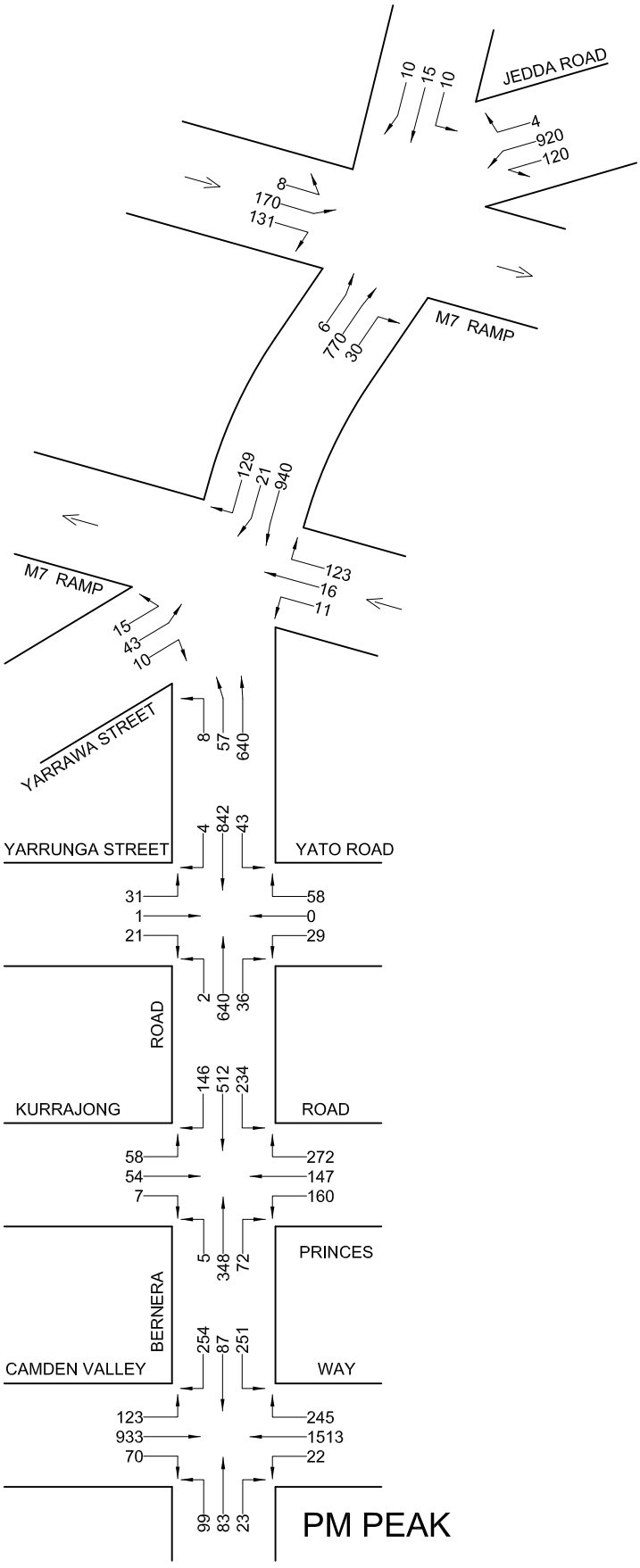
The results of this assessment indicate that all intersections operate with a satisfactory level of service.

3.4 TRANSPORT SERVICES

At the present time, there is only somewhat limited public transport servicing of the Prestons area. The railway stations at Edmondson Park, Glenfield, and Casula are some 3 to 4km from the site where the Cumberland, Airport and East Hills, Inner West and Southern Railway lines provide connections to the Liverpool, Campbelltown, Fairfield, Bankstown, Parramatta and the Sydney CBD areas.

'Busabout' (see details overleaf) currently operates along Camden Valley Way with the Route 864 and 867 services providing connection to Glenfield Railway Station and Route 856 and 857 providing connection to Liverpool Railway Station and Interchange.





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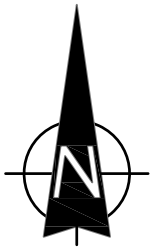


PEAK TRAFFIC MOVEMENTS

FIG 5

Criteria for Interpreting Results of SIDRA 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 (ie inner city conditions) and on some roads (ie 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.

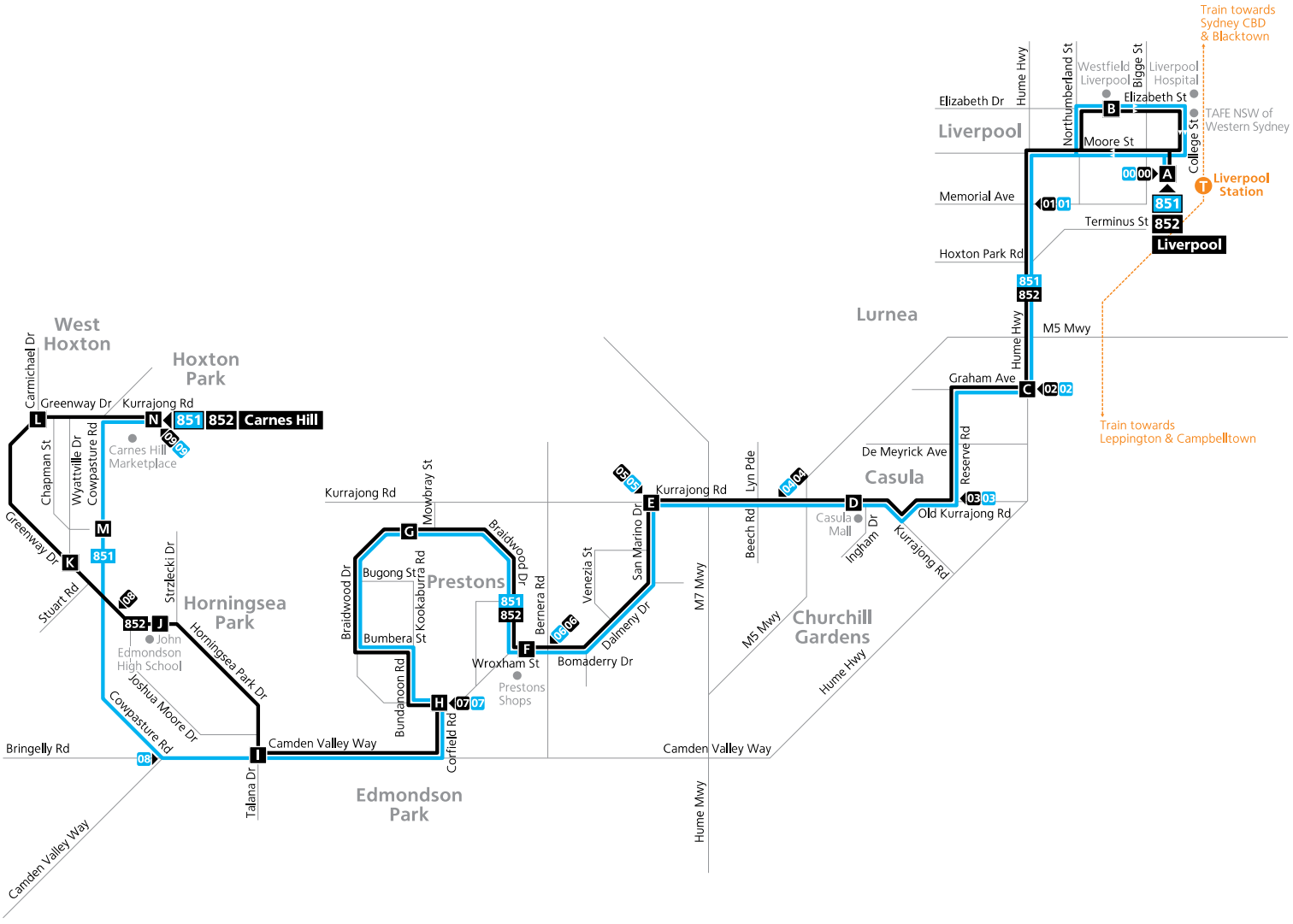
For intersections controlled by **traffic signals**[1] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

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*

Bus route map

851, 852



Legend

- Bus route
- 851 Bus route number
- A Timing point
- 00 Section point
- T Train line/station

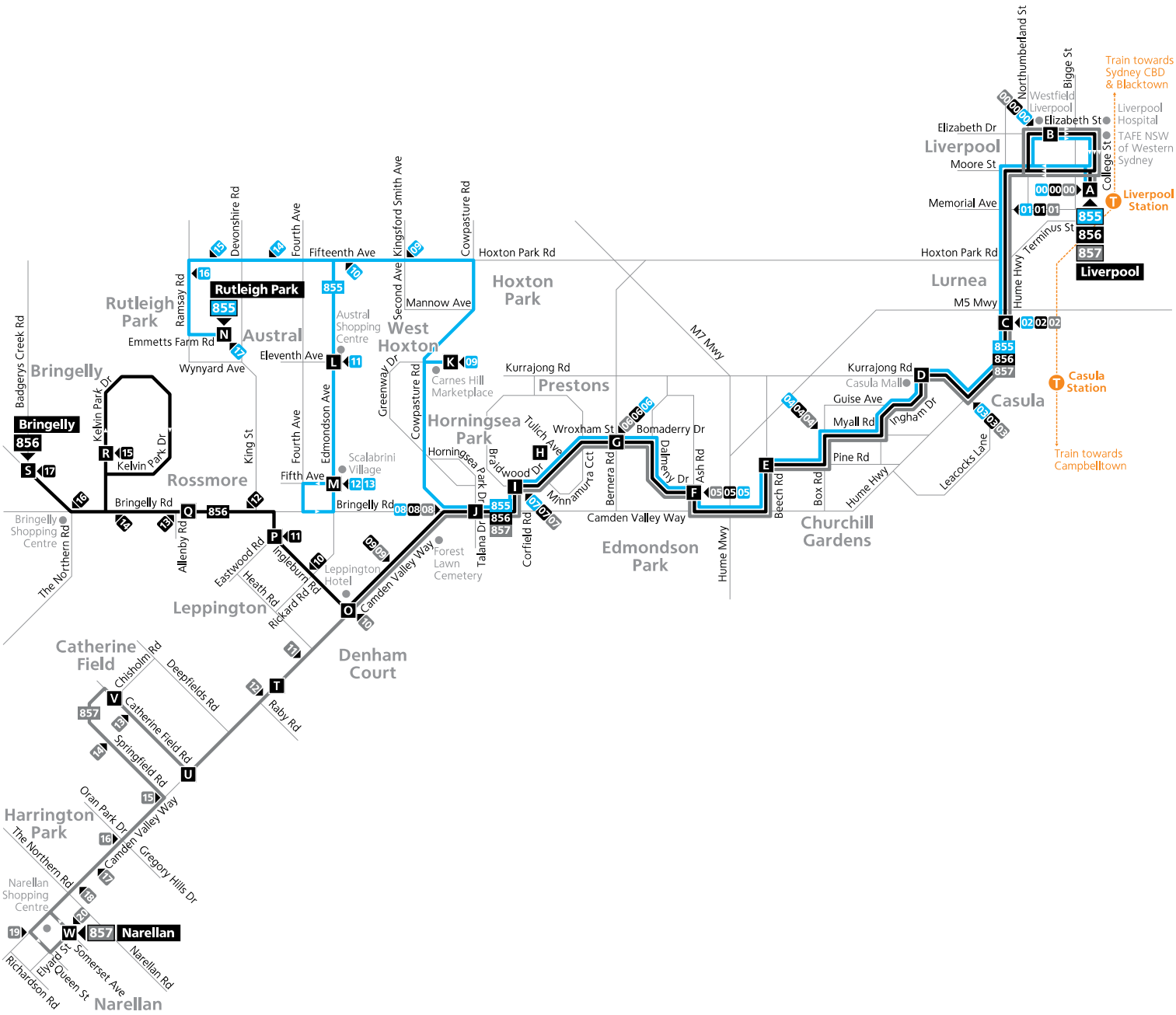
North

Diagrammatic Map
Not to Scale

Transport

Bus route map

855, 856, 857



Legend

- Bus route
- 855 Bus route number
- A Timing point
- 00 Section point
- T Train line/station

Diagrammatic Map
Not to Scale
North

Transport

4. FUTURE ROAD NETWORK, TRAFFIC AND TRANSPORT CIRCUMSTANCES

The future road network and traffic circumstances in relation to the site involve the upgrading of the Bernera Road route with road widening and intersection works. Yarrunga Street will also be upgraded as frontage sites are developed and the proposed development will contribute to that with upgrades along the extensive site frontages to Kurrajong Road, Bernera Road and Yarrunga Street. Council is collecting S94 contributions for the planned widening of Bernera Road and other upgrade works in the area.

It is envisaged that a priority bus route will be introduced on a widened Bernera Road and RMS has undertaken a study in relation to this proposal (although it is understood that this study has not been released for comment at this time).

5. TRAFFIC

5.1 OPERATIONAL

Traffic modelling for the Project has been undertaken in accordance with the RMS Guide to Traffic Generating Developments specifying the requirements for a traffic study (and is provided in Appendix H). No requirement for traffic growth is included per RMS Guidelines. Besides, this is not a Planning Proposal or a development which exceeds the existing planning provisions for development on the site.

It is noted that TTPA undertook the assessment for Council of the Industrial Zoning for Prestons adopting a network peak traffic generation rate virtually identical to that adopted in the current development assessment. This generation rate incorporates a "sensitivity factory" of +40% above that of the RMS derived network peak generation rate for Erskine Park and Wonderland. It is apparent therefore that the assessment is very robust.

Further, a guide to the potential traffic generation of the proposed development is provided in the RMS Technical Direction TDT 2013-4b (see extract Appendix E). However there are numerous errors in this document (which have been brought to the attention of RMS) and the data for Industrial Estates needs to be assessed carefully.

There were 4 Metropolitan Area sites surveyed and assessed for the RMS study, namely:

Site 1	Site 3
Erskine Park Industrial Area	Wonderland Business Park
Total GFA 693,605m^2	Total GFA 406,600m^2
Site 2	Site 4
Helensburgh	Riverwood Business Park
Total GFA 1,605m^2	Total GFA 29,983m^2

Thus the Erskine Park and Wonderland sites have a total GFA of 1,100,000 m^2 and contain a mixture of large warehouse/distribution, factory, factory/warehouse and office uses. By comparison, Site 2 has 9 offices, 3 manufacturers and 1 commercial unit and Site 4 has 15 warehouses (small factory units) and 1 office use.

Clearly Sites 1 and 3 present the most pertinent data base for comparison for large contemporary warehouse/distribution use. In fact if the aggregated results of the 4 sites (as contained in TDT 2013-4b of 0.52 vtph/100m^2 AM and 0.56 vtph/100m^2 PM) are applied to the Erskine Park floorspace it would indicate peak generations of 3,606 vtph and 3,884 vtph for the AM and PM peaks respectively, whereas the actual surveyed peak generations were only 1,148 vtph AM and 1,294 vtph PM for site peaks and 976 vtph AM and 1,073 vtph PM for the "network peaks".

The relevant surveyed results for Sites 1 and 3 from TDT 2013-4b are as follows:

	Site 1	**Site 3**	**Average**
Site Peak AM	0.15	0.20	0.18
Site Peak PM	0.16	0.19	0.18
Network Peak AM	0.13	0.17	0.15
Network Peak PM	0.14	0.17	0.16

These are very consistent results and the reasons for the difference between these generation rates and the other sites and earlier former RTA data are:

- very large contemporary warehouses with low staffing levels
- 12 hour shifts where worker arrival/departure does not occur during the network commuter peak periods

In order to provide some robustness a sensitivity factor of +40% is applied for the adopted peak generation rates for the "network" peaks of 0.21 vtph/100m^2 which also reflects the rate adopted for the earlier road network assessment.

Application of the adopted peak traffic generation rate to the proposed development of 116,205m^2 indicates the following projected total traffic generation outcome of 258vtph.

Assessment of the potential directional distribution of the vehicle movements generated by the proposed development has had regard for the survey results of the existing industrial access movements at the Bernera Road/Yarrunga Street/Yato Road intersection.

This assessment has indicated:

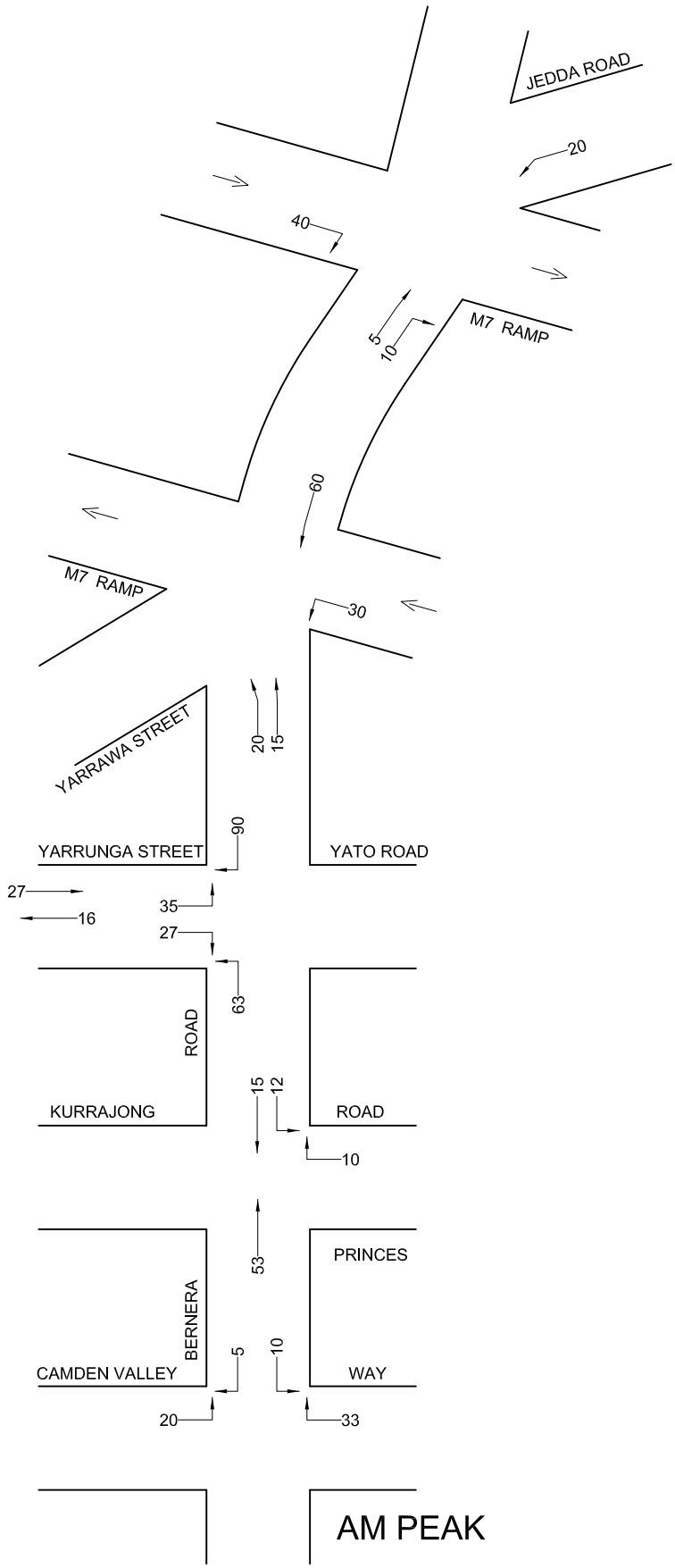
- a peak directional split (i.e. IN/OUT) of 70%/30%
- a geographical split of 60% north and 40% south on Bernera

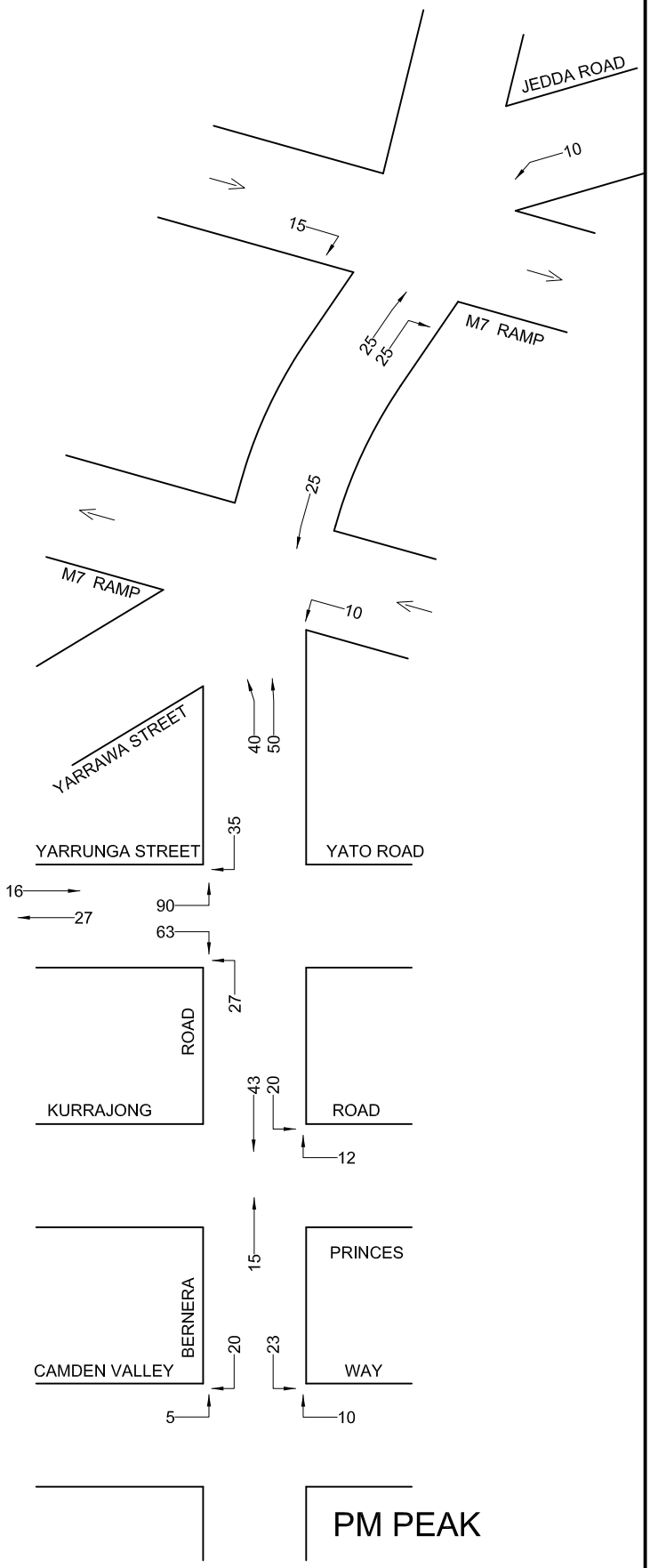
It is understood Council may decide at some future time to introduce movement constraints at the Kurrajong Road/Kookaburra Road North intersection however, there will not be any significant movements generated by the proposed development along Kookaburra Road North.

The assessed generated traffic movements on this basis are as follows:

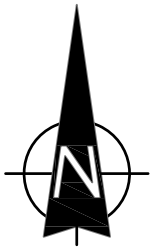
	AM	**PM**
IN from North	90	35
IN from South	63	27
IN from West	27	16
OUT to North	35	90
OUT to South	27	63
OUT to West	16	27
Total:	**258**	**258**

The resultant traffic flows are shown on Figure 6 and may be compared to the existing traffic volumes shown on Figure 5.





LEGEND



GENERATED TRAFFIC MOVEMENTS

FIG 6

The daily volume is not relevant to traffic impact, however if the Erskine Park/Wonderland factor is adopted the projected daily traffic generation (two-way) for the proposed development would be some 2320vpd.

A SIDRA intersection assessment has been undertaken in relation to this outcome. The results of the SIDRA modelling are provided in Appendix D and summarised in the following:

	AM		PM	
	LOS	**AVD**	**LOS**	**AVD**
Bernera/Yarrunga	B	15.4	B	21.1
Bernera/Kurrajong	B	23.8	B	28.0
CVWY/Bernera	B	17.6	C	28.7
Bernera/M7	A	5.6	A	4.6
Jedda/M7	A	6.8	A	6.9

The results of the modelling indicate that these intersections will continue to operate satisfactorily. More than 90% of the generated vehicle movements will travel through the traffic signal and roundabout controlled intersections on Bernera Road. While the minor access movements for Warehouse 4 will be restricted to left turn IN/OUT. The vehicle accesses on Yarrunga Road will be located well away from the Bernera Road intersection (and each other) on a straight and level section of roadway. It is apparent that the proposed development will not result in any adverse road safety implications.

The Data Report which underlies the RMS analysis for Erskine Park reveals that:

- The site generation peaks were 6.15 to 7.15am and 2.45 to 3.45pm (i.e. not concurrent with road network peaks)
- The proportion of articulated trucks during the site generation peaks was 9.0%
- The proportion of articulated trucks during the off peak (e.g. 10am to 12noon) was some 22%
- The proportion of articulated trucks during the afternoon network peak was only 6.0%

Due to the similarities between the proposed development and Erskine Park it can be confidently assumed that there will be similar levels of truck activity at the various times of the day. On this basis the potential total daily traffic generation of the proposed development of some 2,320vpd would comprise 1,624 cars (70%), 394 rigid commercial vehicles (17%) and 302 articulated vehicles (13%).

The only 'external' issue in relation to large truck movements is that of turning provision at the Bernera Road/Yarrunga Road intersection. With the required provision of a 6m splay on the boundary of the site the radius on the south western corner will be increased to facilitate the left turn of a B Double truck as indicated on the diagrams overleaf.

5.2 CONSTRUCTION

DEMOLITION

This activity will occur over a 3 month (12 weeks) period with approximately 10 truck visitations (20vt) per day being largely truck & dog units.

There will be some 10 – 20 workers (up to 40 traffic movements per day) on the site for this activity with trucks and cars using a new construction access on Yarrunga Road.

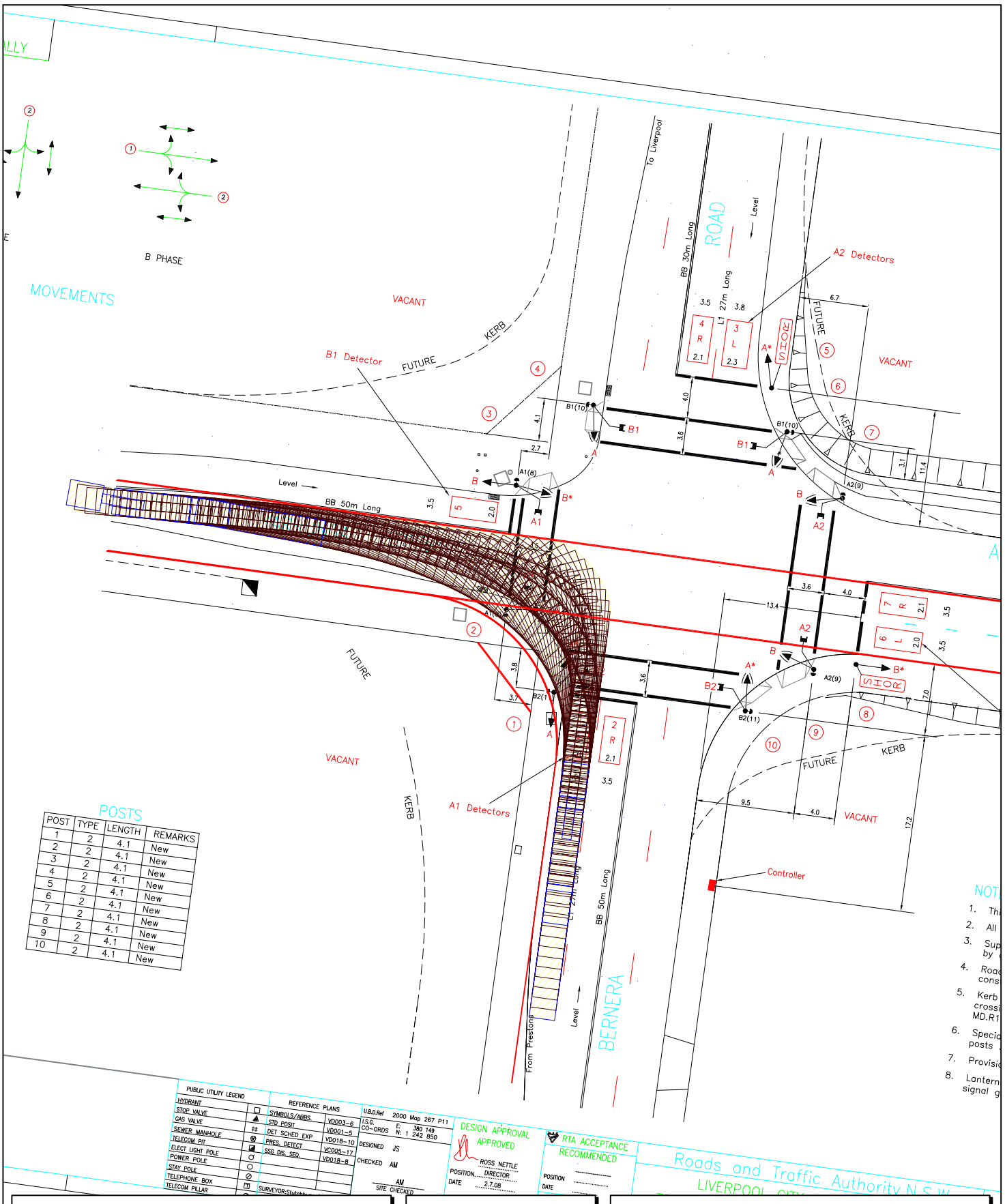
EARTHWORKS

This activity will occur over a 9 month (36 weeks) period with an average of some 80 truck & dog visitations (160vt) per day.

The earthworks activity will involve:

- 1*DC6 dozer;
- 1*pad foot roller;
- 1*825 compactor;
- 1*smooth drum roller;
- 1*30T excavator; and
- 2*water carts

The vehicle access arrangements will be via the proposed construction access, shown on Costin Roe Erosion and Sediment Control Plan reproduced overleaf.



POSTS

POST	TYPE	LENGTH	REMARKS
1	2	4.1	New
2	2	4.1	New
3	2	4.1	New
4	2	4.1	New
5	2	4.1	New
6	2	4.1	New
7	2	4.1	New
8	2	4.1	New
9	2	4.1	New
10	2	4.1	New

PUBLIC UTILITY LEGEND
HYDRANT
STOP VALVE
GAS VALVE
SEWER MANHOLE
TELECOM PIT
ELECT LIGHT POLE
POWER POLE
STAY POLE
TELEPHONE BOX
TELECOM PILLAR

REFERENCE PLANS
SYMBOLS/ABBS. VD003-6
STD POSIT. VD001-5
DET SCHED EXP VD018-10
PRES. DETECT. VC005-17
SSG DIS. SEQ. VD018-8
SURVEYOR:Studdon

U.B.D.Ref 2000 Map 267 P11
I.S.G. CO-ORDS E: 380 149 N: 1 242 850
DESIGNED JS
CHECKED AM
AM
SITE CHECKED

DESIGN APPROVAL
APPROVED
ROSS NETTLE
POSITION DIRECTOR
DATE 2.7.08

RTA ACCEPTANCE
RECOMMENDED
POSITION
DATE

Roads and Traffic Authority N.S.W.
LIVERPOOL CITY

LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. 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

CONTINUES ON PLAN 2 ON DA71

MATCH EXISTING LEVELS
OF YARRUNGA ST INTERFACE OF NEW AND EXISTING PAVEMENT

CH 50.00 | CH 40.00 | CH 30.00 | CH 20.00 | CH 10.00 | CH 0.00

EXISTING K&G TO REMAIN

EXISTING PRAM RAMP

EXISTING STORMWATER PIPE

RMS STOP LINE (TF) LINETYPE

K&G

K&G

SITE BOUNDARY

NEW PIT
APPROX. I.L 30.85

PROVIDE XXm ⌀ PIPE
FOR SITE DRAINAGE

NEW HALF ROAD CONSTRUCTION,
REFER TO DETAIL ON DRG DA73

EXISTING PIT IL 30.73. ADJUST EXISTING
KERB INLET PIT TO SEALED PIT WITH
CLASS D LID

PRAM RAMP
REFER TO DETAIL ON DRG DA74.

3.6m WIDE PEDESTRIAN CROSSING

EXISTING K&G TO BE REMOVED

NEW K&G

EXISTING PIT IL 30.80. ADJUST EXISTING
KERB INLET PIT TO SEALED PIT WITH
CLASS D GRATE

3.5m | 3.5m

PROVIDE MEW KERB INLET PIT
TO LIVERPOOL COUNCIL REQ'S

MATCH EXISTING LEVELS &
ALIGNMENT OF EXISTING K&G

EXISTING K&G
REMAINS

INTERSECTION FUNCTIONAL LAYOUT PLAN 1

SCALE 1:100

PRELIMINARY
FOR INFORMATION ONLY

1m 0 1 2 3 4 5 6 7 8 9 10m

SCALE 1:100 AT A1 SIZE SHEET

ISSUED FOR REVIEW	10.11.15	A
AMENDMENTS	DATE	ISSUE

ARCHITECT

CLIENT
LOGOS PROPERTY
SUITE 02, LEVEL 12
167 MACQUARIE STREET
SYDNEY NSW

PROJECT
PROPOSED DEVELOPMENT
32 YARRUNGA ROAD
PRESTONS NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MW	XC			A1		8753.11-DA70

CONSULT AUSTRALIA

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CostinRoe Consulting
Value in Engineering and Management

DRAWING TITLE
YARRUNGA STREET FUNCTIONAL
LAYOUT PLAN -SHEET 1

DRAWING No. C08753.11-DA70

ISSUE A

SEDIMENTATION BASIN NOTE

FOR SEDIMENT & EROSION CONTROL DETAILS REFER TO DRAWING C08753.00-C25&C26

SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND CONSTRUCTION, MANAGING URBAN STORMWATER–THE BLUE BOOK' CAPACITY BASED UPON 5 DAY RAINFALL DEPTH AT 85th PERCENTILE INTENSITY (32.2mm)

APPROXIMATE AREA OF DISTURBED SITE = 19.5 Ha

SEDIMENTATION BASINS TO COLLECT RUN-OFF IN EXTREME RAINFALL EVENTS. COLLECTED RUN-OFF TO BE ASSESSED BY A QUALIFIED LABORATORY FOR DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.

EACH BASIN IS TO HAVE A MARKER PLACED AS PER THE DETAIL TO INDICATE WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED AND DEWATERED PRIOR TO REMOVAL FROM SITE.

ALLOWANCE TO BE MADE DURING BENCHING OF SITE TO ENSURE RUN-OFF IS DIRECTED TO SEDIMENTATION BASINS.

NOTES:
1. ASSUME TYPE D SOIL (CLAY/SILTY CLAY)
2. ASSUME GROUP D SOIL (HIGH PLASTICITY AND SHRINK/SWELL PROPERTIES)

SOIL TYPE ASSESSED FROM GEOTECHNICAL REPORT PROVIDED BY XXX TITLED XXX DATED XXX.

SEDIMENT BASIN 1:

CATCHMENT AREA	= 4.68ha
REQUIRED BASIN VOLUME	= 1130m³
BASE DIMENSION (LxB)	= 12.0m x 41m
TOP DIMENSION (LxB)	= 21.0m x 50.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 1159m³

SEDIMENT BASIN 2:

CATCHMENT AREA	= 3.86ha
REQUIRED BASIN VOLUME	= 932m³
BASE DIMENSION (LxB)	= 20.0m x 21.0m
TOP DIMENSION (LxB)	= 29.0m x 30.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 947m³

SEDIMENT BASIN 3:

CATCHMENT AREA	= 10.50ha
REQUIRED BASIN VOLUME	= 2536m³
BASE DIMENSION (LxB)	= 38.0m x 45.0m
TOP DIMENSION (LxB)	= 39.0m x 54.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 2571m³

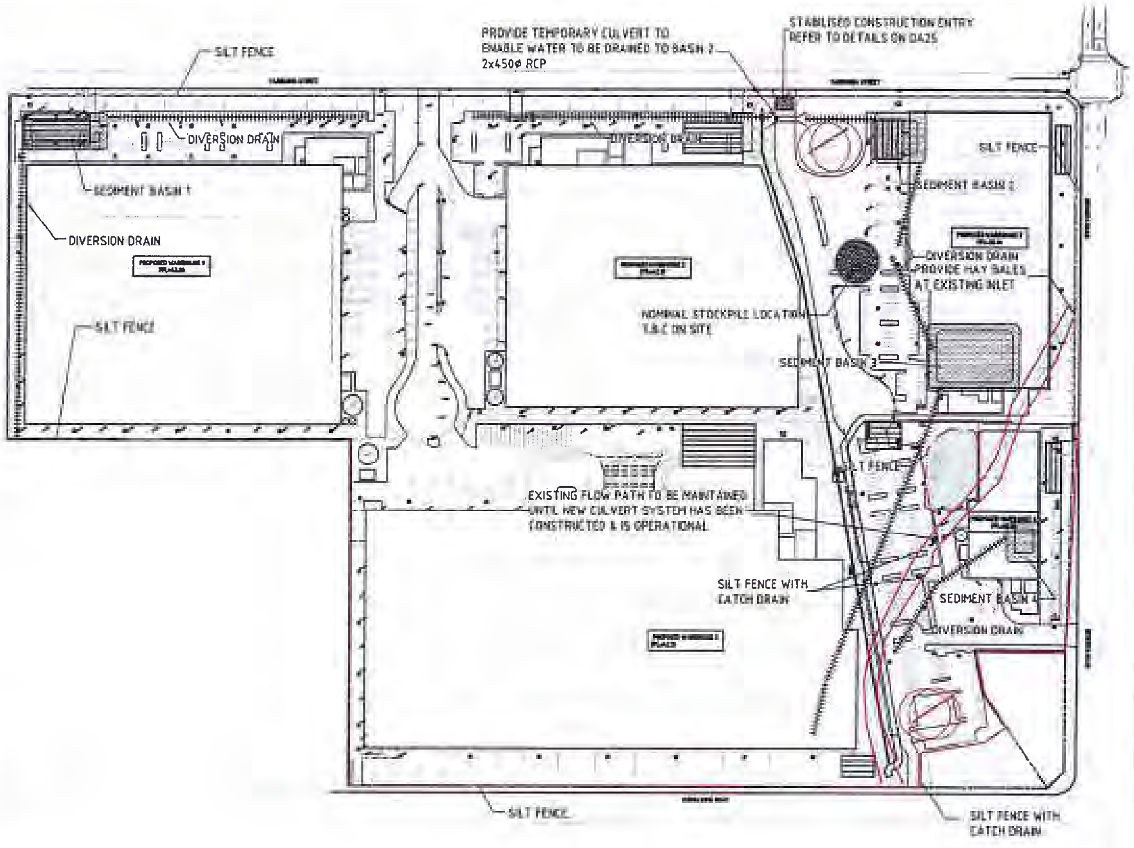
SEDIMENT BASIN 4:

CATCHMENT AREA	= 1.8ha
REQUIRED BASIN VOLUME	= 435m³
BASE DIMENSION (LxB)	= 11.0m x 14.0m
TOP DIMENSION (LxB)	= 20.0m x 23.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 440m³

EROSION CONTROL NOTES

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200MM.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.



EROSION AND SEDIMENT CONTROL PLAN
SCALE 1:1500

PRELIMINARY
FOR INFORMATION ONLY

15m 0 15 30 45 60 75 90 105 120 135 150m
SCALE 1:1500 AT A1 SIZE SHEET

ISSUED FOR REVIEW 15.11.15 A	CLIENT: LOGOS PROPERTY, SUITE 02, LEVEL 12, 167 MACQUARIE STREET, SYDNEY NSW	PROJECT: PROPOSED DEVELOPMENT, 32 YARRUNGA ROAD, PRESTONS NSW	Costin Roe Consulting Pty Ltd. Consulting Engineers	Costin Roe Consulting — Value in Engineering and Management	DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN; DRAWING No: C08753.11-DA20; ISSUE: A

Costin Roe Consulting Pty Ltd.
Consulting Engineers
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000

CONSTRUCTION

This activity will occur on a staged basis of generally 9-12 months per building with the following truck activity:

Steel erection	15 semitrailer visits per day for 12 weeks
Concrete slab	25 concrete truck visits per day for 12 weeks
Fitout	10 truck visits per day and 100 worker cars

There will be some overlap with these processes, however it is quite apparent that in general the vehicle movements associated with the construction processes (max 150 per day during construction) will be less than that of the proposed uses on the site (258 vehicle trips per hour).

The movement of construction vehicles will be facilitated by the traffic signal controlled access intersections and the arrangements for site access will be incorporated in a comprehensive Construction Traffic Management Plan prepared and submitted as part of the Construction Certificate documentation.

Construction traffic access for the buildings will also be primarily from Yarrunga Street for Warehouses 1, 2, 3 and 5, and a combination of Yarrunga Street and Bernera Road Warehouse 4.

6. PARKING

The parking provision criteria for 'warehouse' use contained in the majority of Metropolitan Councils DCP's do not reflect the realities of very large contemporary warehouse and distribution centre type uses. Liverpool Councils parking criteria is typical in specifying the following.

Warehouse

- 1 space per 35m^2 of office LFA
- 1 space per 75m^2 of warehouse LFA

Accordingly it is normal practice for large estates to provide parking in accordance with RMS Guidelines.

The RMS Development Guidelines specify a parking provision for warehouse use of 1 space per 300m^2 (warehouse and office floorspace) while TTPA has undertaken very extensive assessment of contemporary warehouse parking demands and details of this assessment are provided in Appendix F.

It is apparent that a parking provision in the range of 1 space per 200m^2 to 300m^2 is applicable to large contemporary warehouse developments. The parking provision for the proposed warehouses at Prestons will be based on a rate in excess of 1 space per 250m^2 GFA as follows:

Warehouse 1	28,750m^2	-	168 spaces	(1 space per 171.1m^2)
Warehouse 2	30,825m^2	-	198 spaces	(1 space per 155.7m^2)
Warehouse 3	13,380m^2	-	65 spaces	(1 space per 205.8m^2)
Warehouse 4	3,585m^2	-	39 spaces	(1 space per 92m^2)
Warehouse 5	39,665m^2	-	245 spaces	(1 space per 161.8m^2)
Total:			**715 spaces**	

Appropriate provision will be made for accessibility needs with 12 spaces overall and it is apparent that the proposed parking provision will be quite adequate.

No formal truck parking areas are required, although overnight and temporary truck parking may occur on hardstand areas without disrupting loading/unloading.

7. ACCESS, INTERNAL CIRCULATION AND SERVICING

ACCESS

Liverpool DCP 2008 contains a guide to the envisaged vehicle access arrangements for the subject site and adjoining lands. An explanation of the proposed access outcome and its implications is provided in overleaf.

The proposed vehicle access provisions for the development comprise:

- two 12.0m wide combined ingress/egress driveways for trucks on the Yarrunga Street frontage being just to the east and west of the centre of the frontage

- four 6.0m wide combined ingress/egress driveways for cars on the Yarrunga Street frontage serving the elongated frontage car parks

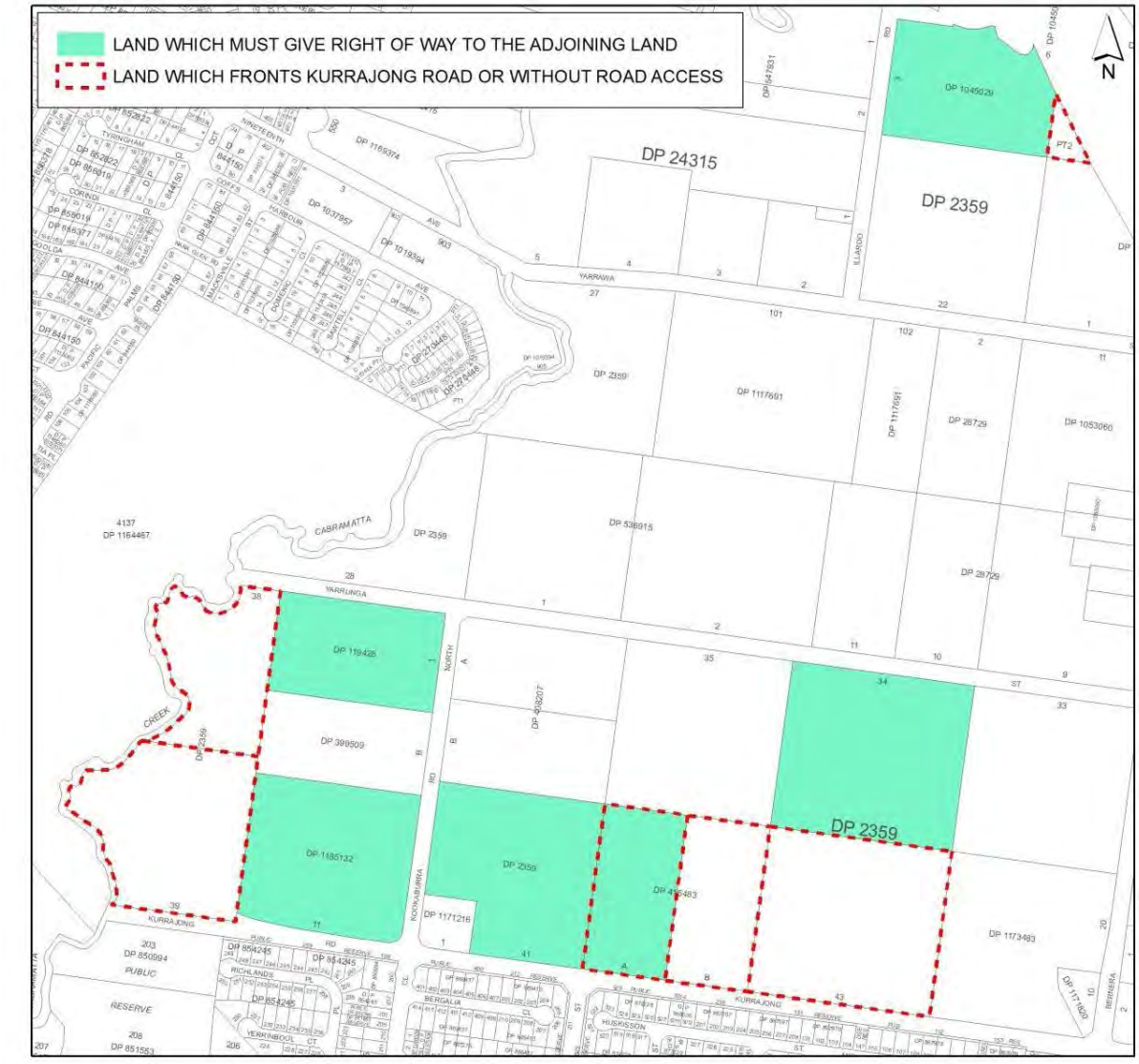
- a 6.0m wide combined ingress/egress driveway for cars and a 12.0m wide ingress/egress driveway for trucks on the Bernera Street frontage. These driveway movements will be limited to left turn IN/OUT by central median islands in Bernera Road across the driveways

The proposed vehicle accesses will be located where good sight distances are available and there will be appropriate separation from intersections and each other. The truck accesses will accommodate all vehicles requiring access to the site as indicated on the turning path diagrams in Appendix G.

Liverpool DCP Access Requirements

Part 7 of the Liverpool Development Control Plan, 2008 specifically deals with access arrangements for the subject site and adjoining lands.

In particular the provisions in the DCP provide that there is to be no access form Kurrajong Road for the sites shown on the following plan and instead a system of ROW's is to be established to provide access to the existing lots on Kurrajong Road as shown following:



Specifically this therefore requires that a ROW be provided per the following table:

Land which fronts Kurrajong Rd or without road access.	**Land which must give right of way to the adjoining land**
Lot A and B DP 416483	Lot 41 DP 2359
Lot B DP 416483	Lot A DP 416483
Lot 43 DP 2359	Lot 34 DP 2359
Lot 39 DP 2359	Lot 11 DP 1185132
Lot 38 DP 2359	Lot 1 DP 119428

Pt Lot 2 DP 1045029	Lot 3 DP 1045029

(Table 3 – Liverpool DCP – Rights of Way)

The access arrangements in the current proposal therefore meet these requirements, with access from Lot 34 DP 2359 creating access to Lot 43 DP 2359, although no ROW is proposed as the site will be amalgamated into a single allotment.

The proposal does not however, provide a parallel service road to Kurrajong Road, per the DCP requirement as the proposal is able to meet all DCP access requirements without the need for the service road. This does not impact on the lots immediately to the west (being lots Lot A DP 416483, Lot B DP 416483 and Lot 41 DP 2359) that are required by the DCP to have a ROW link through from Kookaburra Road North. The fact that the internal service road does not connect through to these lots will not prejudice their access and is compliant with the ROW's as required in the DCP. Further we note that an existing approval for an industrial subdivision of Lot 41, DP 2359 has been issued that provides the Right of way link through to Lot A, DP 416483. We therefore believe that the internal services road is not required from the subject site and that the key access provisions of the DCP have been met.

The amalgamation of this site into one large development site was perhaps not contemplated at the time of the DCP preparation and we believe the access arrangements meet the intent of the DCP without prejudicing other adjoining sites.

INTERNAL CIRCULATION

The design of the carpark areas complies with the requirements of AS2830.1 and 6 with quite satisfactory provision for turning and manoeuvring.

The design of the loading dock areas including driveways and manoeuvring areas for warehouses 1, 2, 3 and 5 comply with AS2890.2 and will accommodate B Double trucks.

The design of warehouse 4 will also comply with AS2890.2 and will accommodate semi-trailers.

The ability for trucks to manoeuvre on the site is confirmed by the turning path assessments for representative movements which are depicted on the diagrams in Appendix G.

SERVICING

Refuse will be removed by a contractor and this vehicle as well as other service vehicles (e.g. fuel and tyre deliveries etc.) will be able to utilise the large hardstand area provided.

8. TRAVEL MANAGEMENT

The development site has ready access to existing bus services running along Kurrajong Road which connect to Liverpool Railway Station and the Metropolitan Transport System. The frequency and capacity of bus services past the site will increase significantly with the proposed 'transit route' along Bernera Road (subject of recent RMS feasibility study). This proposed system will connect into the existing transit way running along Hoxton Park Road to the north and to Edmondson Park Railway Station to the south.

In relation to walking and cycling, these travel modes will be facilitated by Council's proposed off road shared paths along Bernera Road and Kurrajong Road, and these both connect to the regional shared path running along the Westlink M7. Councils DCP indicates a provision of bicycles for developments at a rate of 1 space per 200m^2 however application of this rate to the proposed development would indicate a provision of some 600 bicycle spaces.

The amenities provided in the proposed warehouses will include showers and lockers and there will be an appropriate quantum of bicycle spaces provided in each warehouse (e.g. 5% of the maximum daytime staff number).

The attributes of the site and the proposed development will therefore be conducive to worker travel by public transport, walking and cycling and this would be supported by a Workplace Travel Plan which would be common to each of the warehouses.

9. CONCLUSION

This assessment of the potential traffic and parking implications of proposed new warehouse facilities in Yarrunga Street at Prestons has concluded that:

* there will not be any unsatisfactory traffic implications
* the proposed parking provision will be suitable and adequate
* the proposed vehicle access arrangements will appropriate and will accommodate all vehicles requiring to access the site
* the proposed internal circulation arrangements will be suitable and appropriate for the manoeuvring and standing of trucks and cars

APPENDIX A

DEVELOPMENT PLANS

YARRUNGA STREET
BERNERA ROAD
KURRAJONG ROAD
WAREHOUSE 1
FSL 43.800
final finished floor level subject to final civil engineers design
WAREHOUSE 2
FSL 42.100
final finished floor level subject to final civil engineers design
WAREHOUSE 3
FSL 35.000
final finished floor level subject to final civil engineers design
WAREHOUSE 4
FSL 35.800
final finished floor level subject to final civil engineers design
WAREHOUSE 5
FSL 42.100
final finished floor level subject to final civil engineers design
OFFICE 1
OFFICE 2
OFFICE 3
OFFICE 4
OFFICE 5
STAFF / VISITORS CARPARK
PRIVATE ACCESS ROAD
TRUCK TURNING AREA
HARDSTAND
RECESSED DOCK
DOCK OFFICE
SHARED HARDSTAND AREA
SYDNEY WATER
ADJOINING FUTURE INDUSTRIAL DEVELOPMENT
black painted steel palisade style street front fence and gates at 1800 high with pointed spear tops - to Yarrunga & Bernera Roads only
corporate pylon sign up to 12m high - Building Tenant pylon sign
emergency gate for access to building 3 only used if Transgrid block private access road during maintenance to powerline tower
HIGH VOLTAGE POWER LINE TOWER
10m landscape setback with screening plants to landscape architects details
vertical masonry retaining wall along boundary with varying heights to civil engineers details
FIRE TRUCK EMERGENCY ACCESS (emergency vehicle use only)
carpark access ramp
access stairs for fire fighting purposes
NOTE: building 3 includes internal load zone to ensure trucks are clear of easement line
150 high kerb
WAREHOUSE MEZZANINE LEVEL SHOWN DOTTED
black PVC coated chain link fence at 1800 high with 3 rows of black barbed wire
20m landscape setback with screening plants to landscape architects details
corporate pylon sign up to 12m high - Estate and Tenant identification pylon sign
screening plants to landscape architects details
15m building setback to to warehouse 3 with 14m wide easement to drain water for length of building - refer to civil engineers details (10m building setback by council)
new 900 wide median strip in front of driveway to control left in left out traffic restrictions to traffic enters details
ABORIGINAL ARCHAEOLOGICAL ZONE
archaeological zone with history signage and landscaped areas to landscape architects details
10m building setback by council
vertical masonry retaining walls with varying heights to civil engineers details
FIRE TRUCK EMERGENCY ACCESS - (emergency vehicle use only)
SITE PLAN
1 : 1000 scale

ABBREVIATIONS - GENERAL

FP	footpath - street path 1.2m wide
F-1	fence type 1 - 1800 high black palisade fence with pointed spear tops
F-2	fence type 2 - 1800 high black chain link fence with 3 rows of barb wire
FSL	finished structural level
G-SLD	gate - sliding
G-H	gate - hinged
PR	pump room for fire service
PS	pylon sign
RSD	roller shutter door - power operated
RWT	rain water tank
SWT	sprinkler water tank for fire service

Issue	Date	Amendment
A	28/11/15	ISSUED FOR DEVELOPMENT APPLICATION
B	15/02/16	UPDATED BUILDINGS 1, 2 & 5

1 : 1000 scale @ A1 / 1 : 2000 scale @ A3

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PRESTONS INDUSTRIAL ESTATE

PROPOSED WAREHOUSE DEVELOPMENT

Cnr YARRUNGA STREET & BERNERA ROAD , PRESTONS NSW

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AXIS ARCHITECTURAL Pty Ltd - ABN 18 086 853 376
Nominated Architect - David McDonald NSW ARB No. 7997

Drawing: SITE PLAN - COLOURED OVERALL ESTATE PLAN

Drawn: AA | Date: November 2015 | Scale: 1 : 1000 @ A1, 1 : 2000 @ A3 | Project No: 140604 | Drawing No: DA - A 102 | Issue: B