GSA PLANNING

TRAFFIC AND PARKING REPORT

For the Central West Regional Road / Rail Freight Terminal at

Great Western Highway, Kelso, Bathurst

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JOB NO: 04135
December 2005

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1.0 INTRODUCTION

This Traffic Report has been prepared for Slobobax Pty Ltd by Gary Shiels & Associates Pty Ltd – (hereafter referred to as GSA Planning). GSA Planning has expertise in Urban Design, Heritage, Environmental & Traffic Planning.

This Report is to accompany an Environmental Assessment (EA) to the Minister for the use of the land in accordance with a Masterplan for a Road/Rail Freight Terminal, Great Western Highway, Kelso. The Masterplan which has been designed by Mellor Gray Architects comprises a freight handling terminal including truck access, open container storage yards, railway sidings and interface, bulky goods retailing, highway frontage uses, warehousing created as development lots for future individual DAs and parking for 465 vehicles.

The report has been prepared to assess the proposed development in terms of traffic, access and parking. In order to assess the likely traffic generation, car parking demand and access requirements, the following matters have been considered:

- RTA Guide to Traffic Generation Developments;
- Australian/ New Zealand Standard (AS) 2890.1;
- RTA Road Design Guide;
- Bathurst Council Car Parking Code;
- Traffic & Parking Surveys; and,
- Anecdotal evidence from the owner of the site.

In addition, in order to quantify whether the proposed access points have the appropriate capacity and geometry on the road and within the site, an INTANAL Analysis has been undertaken.

The remainder of this document is divided into eight (8) sections, which include a description of the site and surrounds, a description of the surrounding road network, a description of the proposal, a traffic generation analysis, access and proposed external road works, internal road and car parking assessment, and, a conclusion.

2.0 SITE AND SURROUNDS

This section contains a description of The Site in Context; Site Description; The Existing Built Form; the Surrounds; and, the Road and Rail Network.

2.1 The Site in Context

The site is located approximately 4km east of the Bathurst Town Centre in the Local Government Area (LGA) of Bathurst (see Figure 1).

Bathurst is located approximately 200kms west of Sydney and within the Bathurst Region Local Government Area. Set in the central tablelands by the Macquarie River, Bathurst is on the GWH west of Lithgow and situated at the junction of the Great Western and Mitchell Highways. Bathurst is also in close proximity to the regional centres of Dubbo, Orange and Cowra in addition to Blayney Shire which has a strong agricultural and mining base. The town of Blayney, which is 36km west of Bathurst, is a major centre for surrounding agricultural producers and a flourishing grazing and dairying district.

The site is located on the Great Western Highway, which is the major transport thoroughfare for goods being transported between Sydney, Bathurst, Blayney and Western NSW. There is high volume of bulk and containerised freight transported in the area, a large proportion of which is interchanged at Blayney which provides a direct import-export rail link to the Sydney Port's.

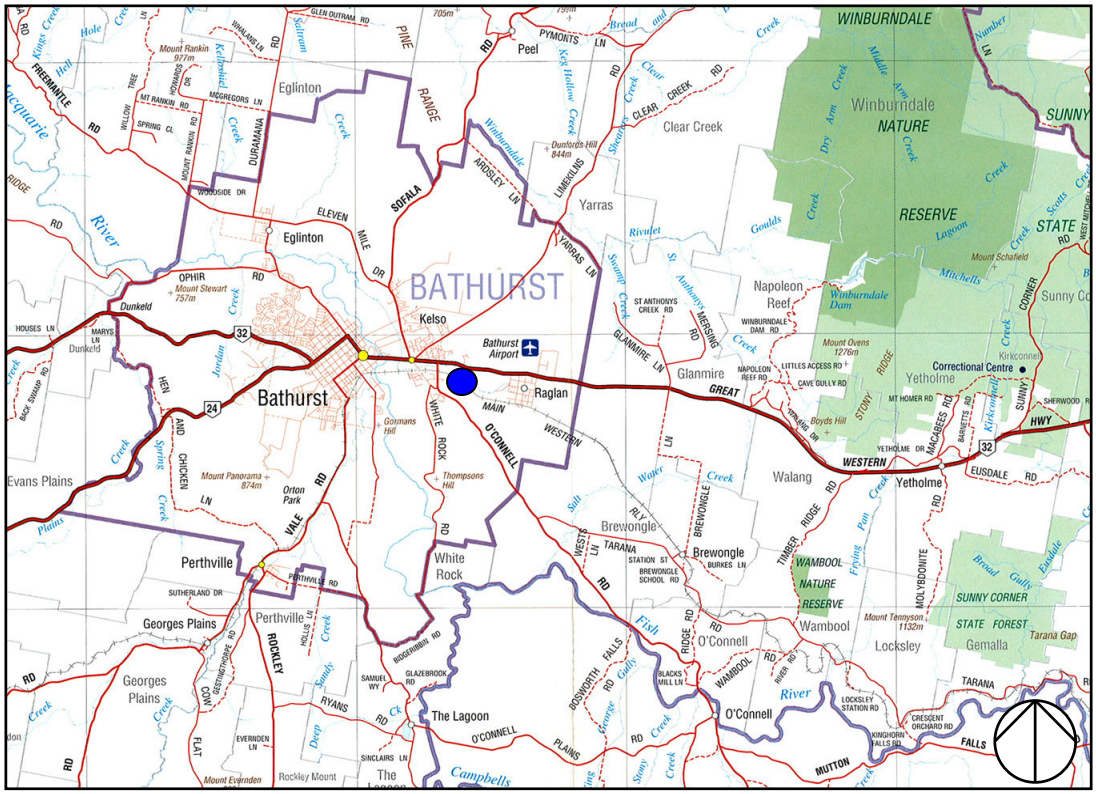

FIGURE 1:
LOCATION PLAN

Job No. 04135 – Great Western Highway, Bathurst
Traffic and Parking Report

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2.2 Site Description

The site is located to the south of the Great Western Highway and is legally known as Lot 1 DP 164151, Lot 21 DP 137352, Lot 22 DP 137352, Pt 81 DP 755781, Pt 60 DP 755781, Pt 73 DP 755781 and Pt 68 DP 755781 (see Figure 2 and Photographs 1 and 2). The site is an irregular parcel of land with a combined northern frontage of 900m to the Great Western Highway, an eastern boundary of 434.82m, a rounded 575m southern frontage to the Great Western Railway (GWR) and a total western boundary of 279.43m, providing a total site area of 30ha.

The site generally consists predominantly of lightly undulating open agricultural land with an old granite gravel quarry (Kelso Gravel Quarry) located in the south eastern portion of the site with numerous tracks and prior stockpiling sites. The site is also bisected by a narrow intermittent watercourse (Main Watercourse, a tributary of Raglan Creek) which runs from the southeastern corner to the middle of the Site's GWH frontage. In addition, a drainage trench is located along the northern frontage and joins the Main Watercourse approximately in the middle of the site. The information from the Bathurst Regional Council (BRC) and RTA officers suggests than an easement (road reserve) for the GWH extends along the centre line of the drainage trench.

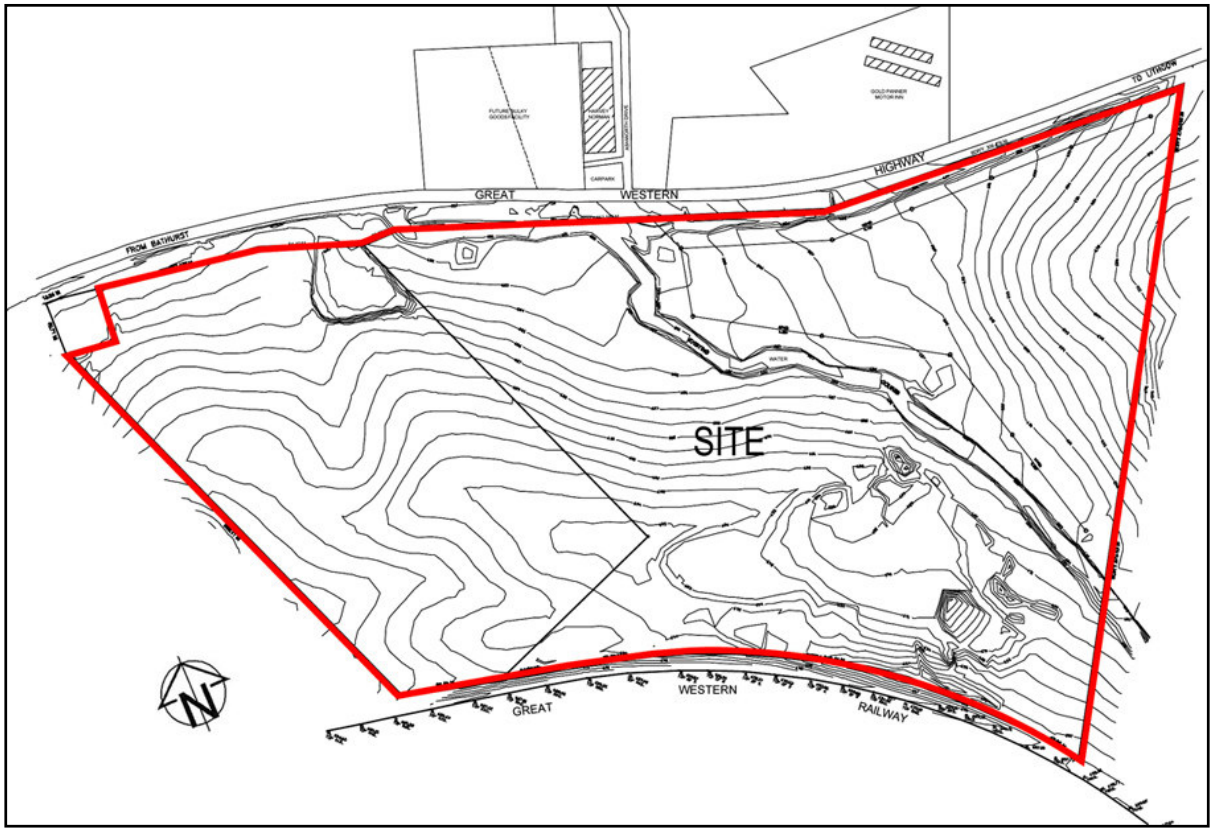

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FIGURE 2:
SITE PLAN

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Photograph 1: *Main access to the site as viewed from the Great Western Highway*

Photograph 2: *View north to the Great Western Highway from within the site*

2.3 Existing Built Form

The site is currently vacant of any improvements with the exception of a dwelling on the Great Western Highway frontage and a small structure (former Ingersole's Abattoir) centrally located close to the Main Watercourse. The site has been extensively cleared of native vegetation and only exotic trees occur in tightly configured corridors confined within the two watercourses

2.4 The Surrounds

Development in the surrounding area comprises a mix of rural, industrial, commercial and residential.

Immediately to the north, on the opposite side of the Great Western Highway is the "Gold Panner Motor Inn" and rural land (to the east of Ashworth Drive). Also to the north is a Harvey Norman Store and carpark, a Stocklands bulky goods development and other retail uses including a pet shop and a horse and riding supplies use (to the west of Ashworth Drive). To the east, south and west is rural and industrial land.

3.0 THE EXISTING ROAD & RAIL NETWORK

This section contains a description of the existing road and rail network in the vicinity of the subject site.

3.1 Description of the Existing Road Network

As indicated, the site has a northern frontage to the Great Western Highway. In the vicinity of the site, the Great Western Highway is a two lane undivided road, carrying two way traffic in an east direction towards Lithgow and Sydney and a west direction towards Bathurst (see Photographs 3 to 6).

The Great Western Highway, in the vicinity of the site has an Average Annual Daily Traffic (AADT) volume of 19,713 vehicles (in 2002). The AADT figure at a given point represents the average number of axle pairs passing in both directions during a 24 hour period, estimated over a period of one year. Of this AADT, some10% will occur in peak hours equating to some 1,970 vehicles in both directions per peak hour or some 985 vehicles per peak hour in each direction.

The Great Western Highway comprises 60km/h and 80km/h speed limits (see Photograph 5). Part of the site's eastern frontage is subject to the 80km/h speed limit and the remainder of the site's frontage (the western part) is subject to the 60km/h limit.

The closest intersection to the site is the T-junction of the Great Western Highway and Ashworth Drive. This intersection comprises a major and a minor road, is unsignalised and permits all possible through and turning movements.

***Photograph 3**: Great Western Highway looking east*

***Photograph 4:** Great Western Highway looking west*

***Photograph 5**: 60km/hr speed zone on Great Western Highway*

***Photograph 6:** Typical heavy and light traffic at Great Western Highway*

3.2 Description of the Surrounding Rail Network

Immediately to the south of the site is the Great Western Railway track and rail corridor, which comprises two lines (see Photographs 7 and 8).

One line carries rail traffic to the east (down line) towards Lithgow and Sydney, while the other line carries rail traffic to the west (up line) towards Bathurst and beyond.

The existing rail infrastructure at Raglan also includes a Master Siding from the main western line which presently services one private siding. The existing rail infrastructure at Raglan does not permit direct entry to the Master Siding from Sydney. Hence, trains from Sydney are required to go to Bathurst for the engines to change ends, then return and travel beyond Raglan and then reverse onto the Master Siding.

***Photograph 7**: Existing rail line looking east*

***Photograph 8:** Existing rail line looking west*

4.0 THE PROPOSAL

This section will contain the Details of the Proposed Development; Summary of the Proposal Details; Car Parking and Road Layout; and Access Arrangements.

4.1 Details of the Proposed Development

The proposal comprises two distinct types of uses. These include the frontage uses containing bulky goods warehousing, a service station and a truck stop at the front portion of the site and a regional warehousing terminal at the rear of the site. A description of these uses is provided below.

4.1.1 Frontage Development – Bulky Goods Retailing / Small Warehousing, and Service Station

The highway frontage uses comprising approximately 11,250m^2 of floor area will be provided along the Great Western Highway. The highway uses will be created as 20 development lots to accommodate uses which include Bulky Goods Retail, small warehousing and rural produce suppliers. The northeastern portion of the site will accommodate 12 lots, of which 8 lots will be located along the western frontage of the site. In future, the buildings will have a northern orientation to take advantage of the highway frontage.

The proposal also provides one service station each for servicing both the light and heavy vehicles. The service station for heavy vehicles will include an additional truck fuelling facility dedicated for the delivery trucks.

4.1.2 Rear of the Site – Regional Warehousing Terminal

The remainder of the site will provide warehousing in buildings and in open storage yards (hardstand areas) and support services buildings.

Warehousing
The proposal incorporates 8 lots (Regional Warehousing Terminal) to provide warehouse facilities and open storage areas. Seven (Lots 2 - 8) of the eight lots will be located to the north of the Main Hardstand area and to the south of the Main Watercourse while the largest of the lots (Satellite Warehousing, Lot 1) will be located to the north of the Main Watercourse and in the northeast portion of the site. Each lot will have an associated hardstand area.

The warehouse buildings range in size from 3,995m^2 to 13,000m^2, providing a total of approximately 47,275m^2 of gross floor area.

Hardstand areas
The proposal will provide three areas of hardstand, which include the Main Hardstand Area, the Second Hardstand Area and the Third Hardstand Area.

The Main Hardstand Area will be located immediately to the north and parallel to the private siding and will help facilitate the transfer of goods and produce from trucks to trains.

This area with a storage size of approximately 35,520m^2 and an approximate width of 53m will allow for the storage of four stacks of 40 foot containers or some 8 stacks of 20 foot containers.

The proposed width will also allow for appropriate space between stacks for container identification purposes. The Main Hardstand will be bounded by a service road to the north and the loading zone to the south.

The second hardstand area will be located to the east of the satellite warehousing in the northeast corner of the site and will have a storage area of approximately 3,075m^2. This hardstand is for the exclusive use of the satellite warehousing. The third hardstand area, which will be used as a supplementary container storage area, will be located in the southwest corner of the site. This area will have a storage area of approximately 13,585m^2 and is intended to be used as a storage area for surplus containers that return from the Sydney Ports. This area will provide a temporary storage facility in lieu of occupying the Main Hardstand which might hamper the loading operations from the Main Hardstand to the train.

All three hardstand areas will be adequately illuminated. Artificial lighting will be suitably located to prevent any impact of the light spill on the operations of trains on the main western train line.

Support Services Buildings
A two storey combined Administration and Security Building will be located to the east of the OSD Pond 1 and will comprise approximately 1,060m^2 of floor area. This building will be strategically placed in the vicinity of the access to sight every arriving truck. It is anticipated that administration of quarantine functions will also be accommodated in this building.

The Truck Stop - Railway Engineers Accommodation Building with approximately 1,215m^2 of floor area will be located in the northwest portion of the site. This building will accommodate railway engineers administration and accommodation facilities. In addition, amenities such as toilets, showers / change rooms, canteen and lounge areas and payment counter associated with the Service Station – Heavy Vehicles will also be located in this building.

The Forklift Maintenance Facility will be accommodated in a building located in the southeast corner of the site. This building will comprise approximately 590m^2 of floor area to accommodate forklift maintenance facility as well as administration associated with forklift operations and amenities.

4.2 Summary of the Proposal Details

A summary of the proposed uses, gross floor areas of the buildings and allocated car parking is presented below (see Table 1).

TABLE 1: DETAILS OF THE PROPOSAL			
Building No. or Identification	**Use**	**Car Parking Details**	**Gross Floor Area**
Lot 1	Warehousing	52 car spaces	13,000m^2
Lot 2	Warehousing	22 car spaces	5,250m^2
Lot 3	Warehousing	29 car spaces	7,125m^2
Lot 4	Warehousing	16 car spaces	3,995m^2
Lot 5	Warehousing	17 car spaces	4,135m^2
Lot 6	Warehousing	16 car spaces	3,990m^2
Lot 7	Warehousing	15 car spaces	3,520m^2
Lot 8	Warehousing	26 car spaces	6,260m^2
Admin & Security bldg	Admin & Security	12 car spaces	1,060m^2
Railway Engineers Facility – Truck Stop	Railway Engineers Facility – Truck Stop	2 car spaces	1,215m^2
Forklift Maintenance bldg	Forklift Maintenance	6 car spaces	590m^2
Bulky Goods A	Bulky Goods	88 car spaces	4,500m^2
Bulky Goods B	Bulky Goods	66 car spaces	3,375m^2
Bulky Goods C	Bulky Goods	66 car spaces	3,375m^2
Service Station	Service Station	32 car spaces	520m^2
TOTAL		**465 car parking spaces**	**61,910m^2**

4.3 Car Parking and Loading Facilities

Car parking for the buildings in generally located at the front of the buildings, with heavy vehicles and loading areas located at the rear of the buildings accessed via service roads.

A total of 465 car parking spaces will be provided on site to serve the various uses. The allocation of car parking spaces for the individual uses has been summarised in Table 1.

4.4 Access Arrangements

The site provides three access points to or from the Great Western Highway, and these lead to internal roads which service individual areas. The site has service roads for the manoeuvring and movement of trucks which are line marked for clear interpretation of traffic direction.

The eastern-most point is described as access No. 1, the middle access point is described as access No. 2, and the western-most point is described as access No. 3. These access points will now be described.

Eastern Access (No. 1)
This access provides an egress only and serves the highway frontage uses. The access comprises an acceleration lane to the east and the west onto the Great Western Highway.

Middle Access (No. 2)
This access comprises an ingress only and serves the highway frontage uses as well as the warehousing uses at the rear. The access comprises a deceleration lane for left in traffic and a right turn bay for right in traffic.

Western Access (No. 3)
This access comprises a combined ingress and egress, and serves the service station and highway frontage uses, as well as an egress for the warehouses uses at the rear. The access comprises a seagull intersection treatment with acceleration, deceleration and right run bays.

4.5 Railway Spur Line

The existing master siding at Raglan will be extended by approximately 700m from the existing buffer stop to connect to the proposed double rail sidings within the site. These two private sidings will connect to the existing Master Siding which connects to the main western line at Raglan travelling towards Bathurst.

The two private sidings within the site will each be approximately 630m in length extending from the southeastern edge of the site to the northwestern portion of the site with points on either end to provide run around facilities. The double rail design will allow 567m length trains (2 loco / 26 wagon) to enter and exit the site in a forward direction.

A facing crossover will also be installed on the eastern end of Raglan in order to provide direct access to the Master Siding from Sydney. The proposed private sidings will utilise motive power and rolling stock from an existing operator on the ARTC Network.

5.0 CONSULTATION

The proposal requires approval under Section 138 of the Roads Act 1993 to undertake works on the Great Western Highway and concurrence is required from the RTA. In addition, State Environmental Planning Policy (SEPP) No. 11 – Traffic Generating Development requires the matter to be referred to the RTA.

Accordingly, consultation has been undertaken with the RTA on a number of occasions.

A meeting was held with the RTA and Council Traffic Engineering officers to identify any key issues or concerns relating to the proposal. The advice from Coucnil and the RTA was that the application would need to be accompanied by a Traffic Study.

Further, a Planning Focus Meeting (PFM) was held at the offices of Bathurst Council with all government agencies and stakeholders. Following the PFM, in the letter dated 22 April 2005 to the Department of Infrastructure, Planning and Natural Resources (DIPNR), the RTA had the following comments:

> *A statement to be included in the EIS addressing any environmental impacts that may occur within the existing road reserve by the impending roadworks.*

This is discussed in Section 7.0 of this report. The access design and the design of the intersection is in accordance with RTA recommendations and Section 4 of the Road Design Guide.

In addition, the RTA requested the following:

> *A need for a traffic impact statement dealing with the freight terminal to identify traffic flows, type of vehicles expected on site, origin and destination of loads and projected numbers.*

This is discussed in Section 6.0 of this report and contains the anticipated traffic generation and origin/destination of the respective loads.

6.0 TRAFFIC GENERATION & LIKELY IMPACT

This section will contain the likely traffic generation of the proposed uses and the likely impacts of this traffic generation.

6.1 Traffic Generation

The proposal will generate light traffic as well as heavy vehicle traffic. The light traffic will be primarily generated by the highway frontage uses, whilst the majority of heavy vehicle traffic will be generated by the warehousing uses at the rear of the site. The traffic generation of both frontage and rear warehousing uses will now be discussed.

6.1.1 Traffic Generation of Frontage Uses

It is expected that some of the uses will generate additional traffic whereas other uses will rely on passing traffic already on the Great Western Highway. The service station will rely on through traffic, as is the case for most other service stations in rural and urban situations.

The *RTA Guide to Traffic Generating Developments* (2002) has been used to calculate the traffic likely to be generated by the proposed development. The Guide contains daily generation rates and peak generation rates for various uses.

As indicated, the frontage uses comprise a combination of bulky goods retailing and small warehouses. The peak hour traffic generation for warehouses is 0.5 trips per 100m^2. If 50% of the frontage uses comprised warehousing then the traffic generation would be in the order of 28 peak hour trips.

The RTA Guide indicates that for bulky goods retailing surveys be undertaken of similar uses. A traffic survey of the Moore Park Supa Centre in Sydney shows a peak hour rate of 2.5 trips/100 m^2. If 50% of the frontage uses were utilised by bulky goods retailing uses, then the traffic generation would be in the order of 141 peak hour trips.

Accordingly, the frontage uses (a combination of bulky goods and small warehousing) are likely to generate in the order of 169 peak hour trips (28 small warehousing trips plus 141 bulky goods trips). Again, however, it is not expected that not all trips will be generated by these uses, and in fact a proportion of these trips will be already in the traffic system (passing traffic). The traffic generation rates are derived from Sydney examples. The location of the site is vastly different in traffic terms from the Moore Park Supa Centre. The highway location of the site would attract a significant number of passing vehicles already on the highway. A conservative figure of 20% of passing traffic, would result in a more realistic traffic generation. Notwithstanding this, for the purposes of traffic modelling, all 169 trips (say 170 trips) have been used as an estimate of cars entering and leaving the site in a given peak hour.

6.1.2 Traffic Generation of Warehousing Uses

As indicated, the peak hour traffic generation for warehouses under the RTA Guide is 0.5 trips per 100m^2. Based on a gross floor area 47,275m^2, these uses are likely to result in 236 peak hour trips. This figure does not truly reflect the characteristics of this particular site and indeed the proposal. Accordingly, the traffic generation of these uses has been estimated on the likely demand of this particular use.

The origin and destination of the warehousing loads comprises four scenarios in each direction as described in Table 2.

TABLE 2: OPERATION OF THE PROPOSED WAREHOUSING ORIGIN & DESTINATION OF LOADS

Scenario	Step	Action
No. 1	1	The goods and produce from the surrounding region will be delivered by semi trailers to the site either on pallets or as separate items.
	2	Goods and produce delivered on pallets will be transferred into containers in the warehouses.
	3	Containerised goods/produce loaded onto a train to be transported to either Sydney or Melbourne.
No.2	1	The goods and produce from the surrounding region will be delivered by semi trailers to the site either on pallets or as separate items.
	2	Goods and produce delivered on pallets will be transferred into containers in the warehouses.
	3	Containerised goods/produce scheduled to be collected in the short term will be stored on the hardstand area to the south of the warehouses.
	4	Containerised goods/produce loaded onto a train to be transported to either Sydney or Melbourne.
No. 3	1	Pre-containerised goods/produce from the surrounding region will be delivered by semi trailers to the site.
	2	Pre-containerised goods/produce scheduled to be collected in the short term will be stored on the hardstand area to the south of the warehouses.
	3	Pre-containerised goods/produce loaded onto a train to be transported to either Sydney or Melbourne.
No. 4	1	Pre-containerised goods/produce from the surrounding region will be delivered by semi trailers to the site.
	2	Pre-containerised goods/produce loaded straight onto a train to be transported to either Sydney or Melbourne.

In light of the above mentioned scenarios, the traffic generation can be estimated based on the number of containers per train servicing the site. In the short term (2005) it is expected that 1 train will service the site per day, however in the longer term (2015), there could potentially be 3 trains servicing the site (see Table 3). Each train has 26 wagons and each wagon carries 3 x 20 foot containers. This results in a total of 78 x 20 foot containers. It is estimated that 80% of the trucks servicing the site will have the trailer capacity to carry 2 x 20 foot containers, while 20% of trucks will carry 1 x 20 foot container. This results in a total of 47 truck loads for one train or 141 truck loads for three trains. This is equivalent to 94 truck movements per day (truck in and truck out) if one train services the site or 282 truck movements (truck in and truck out) if three trains service the site per day. Using the RTA recognised 10% proportion for the estimation of the peak hour, this results in a traffic generation of 9 to 29 truck movements per hour (see Table 3).

TABLE 3: TRUCK MOVEMENTS					
Movement		Outcome	No. of Truck Loads	Total No. of Movements/ Day	Peak No. of Movements / Hour (10%)
Short Term (2005)	1 x Train movement/day (containing 78 x 20ft containers)	Truck breakdown comprises 80% x 40ft capacity, 20% x 20ft capacity	47	94	9
Long Term (2015)	3 x Train movement/day (containing 78 x 20ft containers)	Truck breakdown comprises 80% x 40ft capacity, 20% x 20ft capacity	141	282	29

A peak hour truck generation of 9 to 29 trucks per hour is not considered to be high, particularly given the location of the site and this is likely to be absorbed by the surrounding road and intersection network without any significant impact. This is further discussed and analysed in the following sections.

6.2 Traffic Distribution / Assignment

The origin and destination and general traffic distribution/assignment resulting from the frontage uses and the warehouse uses is discussed below. This is also based on the traffic generation figures of Section 6.1. The traffic distribution is also indicated in Figure 3.

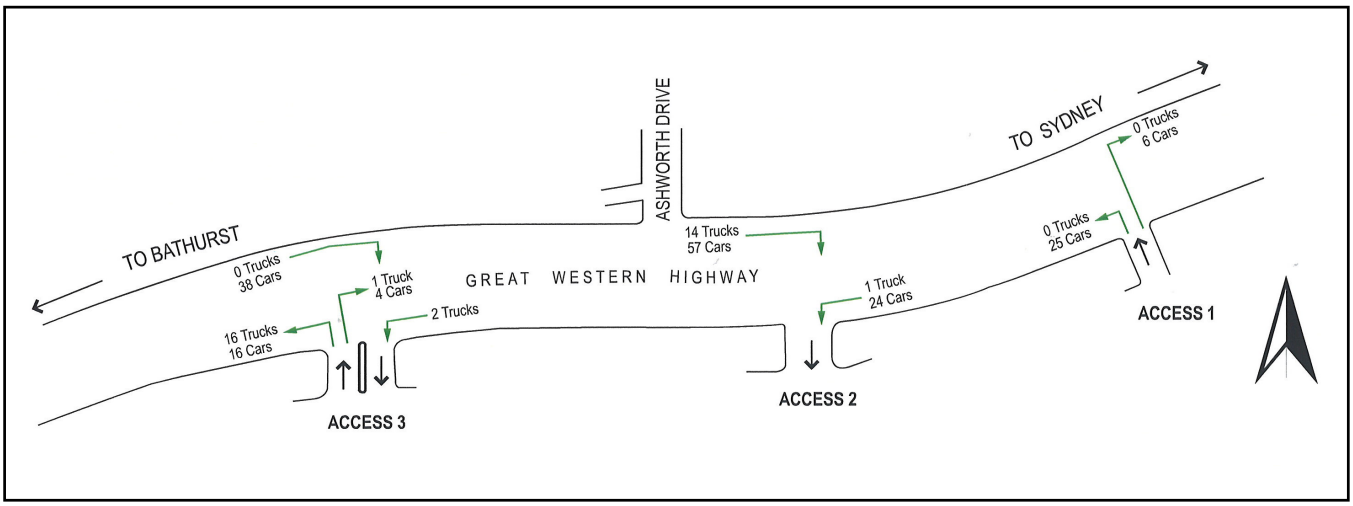

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FIGURE 3:
TRAFFIC ASSIGNMENT/DISTRIBUTION
(AM & PEAK FLOWS)
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Light Vehicle Traffic – Frontage Uses

As indicated, for the modelling of the access points to the site all 170 peak hour trips have been included, notwithstanding the proportion of passing traffic or direct/purpose trips to the site.

Origin/Destination

In terms of origin and destination, the owners of the site also own and operate a number of retail outlets in Bathurst and the surrounding area. The owners of the site have advised that the vast majority of shoppers (say 80%) will be coming from the west (Bathurst etc), while the remainder (say 20%) will be primarily coming from the east (Lithgow).

Accordingly, 80% of the car trips will be to and from the west and 20% of the car trips will be to and from the east.

Inbound/Outbound Split

It is assumed that at the peaks (morning and evening), the majority of trips will be inbound, say 70% in and 30% out. This assumption is made as the morning comprises staff entering the site and shoppers also entering, with a small proportion of shoppers having the time to leave before the peak period. In the evening, the main flow will be an in flow from people entering the frontages uses on their way home from work, and a small proportion leaving by 6pm.

Accordingly, the 70%/30% split represents 119 trips in and 51 trips out in the morning or evening peak periods.

Inbound Car Trips

Of the inbound trips (119 trips), 80% or 95 trips will be coming in from the west and 20% or 24 trips from the east. As there are two entry points, the incoming traffic to the western most uses will use Access 3 and the traffic to the eastern most uses will use Access 2. On the basis of the floor area distribution of these uses, 40% of the 95 trips (38 trips) will use Access 3 and 60% of the 95 trips (57 trips) will use Access 2.

Accordingly, for incoming light vehicle traffic to the frontage uses, 38 trips will turn right into Access 3, 57 trips will turn right into Access 2 and 24 trips will turn left into Access 2.

Outbound Car Trips

Of the outbound trips (51 trips), it is expected that the traffic leaving the eastern most frontage uses will exit via Access 1 and the traffic leaving the westernmost frontage uses will do so via Access 3. As the westernmost uses account for 60% of the total frontage uses, it is expected that 60% of the outbound trips (31 trips) will use Access 1. As the easternmost uses account for 40% of the total frontage uses, it is expected that 40% of the outbound trips (20 trips) will use Access 3.

Of the 31 trips leaving Access 1, it is expected that 80% will be heading back to the west (25 trips) and 20% heading to the east (6 trips). Of the 20 trips leaving Access 3, it is expected that 80% will be heading back to the west (16 trips) and 20% heading to the east (4 trips).

Accordingly, for outbound light vehicle traffic from the frontage uses, 6 trips will turn right and 25 trips will turn left out of Access 1 while 4 trips will turn right and 16 trips turn left out of Access 3.

Truck Traffic – Container Traffic and Petrol Station

The truck traffic to and from the site will be primarily dictated by the trains arriving and departing the rear of the site. For the purposes of the traffic modelling of the access points, a maximum volume of traffic has been assumed, in other words, 3 trains arriving to the site in the one day. This results in a total of 29 (say 30) truck trips per hour.

Origin and Destination
Anecdotal evidence from the owners of the site would suggest that the majority of manufacturers and suppliers are located to the west of the site in centres such as Blaney, Orange and Parkes. These centres generate the goods that will be transported to the site via trucks and then by train to Sydney. The trucks returning to these centres will be primarily empty containers from their loaded trip to the site. It is expected that some 90% of trips will be to and from these centres (in other words to and from the west) with only 10% of trips to and from the east, be it Oberon or Lithgow. The main east bound movement to Sydney will not be by road, it will be by rail.

Accordingly, 90% of the truck trips will be to and from the west and 10% of the truck trips will be to and from the east.

Inbound/Outbound Split
It is expected that the split between inward and outward movements will be in the order of 50%/50%, as a truck will come in the site and well within an hour will have unloaded and depart the site.

Accordingly, the 50%/50% split represents 15 trips in and 15 trips out in the morning or evening peak period.

Inbound Truck Trips
Of the total inbound trips (say 15 trips), some 90% will be coming from the west and 10% will be coming from the east. In other words, 14 will be coming from the west and turn right into Access 2 and 1 trip from the east and turn left into Access 2.

The petrol station on site will serve the trucks accessing the site as well as some trucks already on the Great Western Highway. Given that there is another petrol station some kilometres to the east of the site, the traffic generation of this particular station is not considered to be significantly high. It is expected that the site's petrol station will generate some 4 trips in the peak period, with a 50%/50% split. All of these trips will be left in trips, as they relate to passing traffic. As such, there will be 2 truck trips into the petrol station via Access 3.

Accordingly, for incoming truck traffic, 1 trip will turn left into Access 2, 14 trips will turn right into Access 2 and 2 trips will turn left into Access 3.

Outbound Truck Trips
Of the total outbound trips (say 15 trips), some 90% will be departing to the west and 10% will be going to the east. In other words, 14 will be going to the west and turn left from Access 3 to the Highway and 1 trip to the east and turn right from Access 3 to the Highway. In addition, the petrol station traffic from passing traffic will result in a further 2 trips turning left onto the Highway from Access 3.

Accordingly, for outbound truck traffic, 1 trip will turn right from Access 3 onto the Highway and 16 trips will turn left from Access 3 onto the Highway.

6.3 Likely Traffic Impact – INTANAL Analysis

Keys Issues

The key element of the proposal in a macro scale is the reduction of truck movements to Sydney and Melbourne as a result of the proposed use of the rail line. Currently trucks deliver containers to and from Sydney, and this will be replaced by the use of trains from the subject site. Although this is not likely to result in a reduction in the traffic surrounding the site (as trucks will still need to access the site), it will result in a reduction in the number of truck movements to and from Sydney and Melbourne. Accordingly, when assessing the likely impact of the proposed development a number of key factors need to be considered. These are as follows:

Firstly, the freight terminal is not likely to result on "new" traffic being generated on the surrounding road network. This is due to the existing situation where freight is transported to Sydney and other centres via the road network, and trucking routes. The proposal will be creating a transport hub for the goods being transported from Blayney and surrounding areas to Sydney (and vice versa) via the road network. The proposal will reduce the reliance of the surrounding businesses to truck their freight to Sydney, as they will be able to transport their freight to Sydney via the new rail spur and warehousing depot. The benefits of such a change in freight movements will be experienced by the surrounding and regional road networks, as the trucks that previously transported freight to Sydney, will need to only transport to or from the subject site. This reduces the overall truck kilometres travelled, and has a beneficial impact on such environmental issues as air and water pollution, and traffic issues such as congestion. While the proposal may not reduce the number of truck movements experienced in the area, it will reduce the number of long distance truck movements and have a regional beneficial impact. Accordingly, the traffic to be generated by the proposal is traffic that is already within the road network and the proposed freight terminal is unlikely to generate any significant level of additional traffic.

Secondly, the traffic generation from the bulky goods uses is likely primarily comprise light vehicles. Although there is a proportion of service vehicles associated with this use, the main traffic source is that of light vehicles. The light traffic has a considerably lower impact on the road network than heavy vehicles.

Thirdly, the peak hours of the frontage uses and the rear warehousing uses are not likely to coincide. The warehousing uses will be dictated by the arrival of a train, factory produce schedules and so on, where as the peak hour of the frontage uses may be more constant.

Accordingly, the traffic attracted to the proposed development is likely to be primarily traffic already within the road system, is not likely result in a high number of additional vehicles. On this basis, the proposal is unlikely to significantly affect the capacity, operation or level of service of surrounding streets and intersections.

INTANAL Analysis

Notwithstanding the above considerations, in order to quantify whether the proposed access points have the appropriate capacity and geometry on the road and within the site, an INTANAL Analysis has been undertaken. The INTANAL analysis has been undertaken for each of the proposed access points at the site's frontage.

INTANAL is a traffic management and traffic engineering computer program that analyses the operation of intersections. The results of the analysis are provided in the form of level of service, degree of saturation, delay and queue length.

Level of service is a qualitative measure describing the driver's and or passenger's perception of the operational conditions of an intersection. Level of service ranges from A which is a condition of free flow where the driver's level of comfort and convenience is excellent, to level of service F which is a zone of forced flow where break-down occurs resulting in queuing and delays.

Degree of saturation can be defined as the maximum flow of vehicles across a lane, ranging from zero for very low traffic to 1 for saturated flow or capacity. Delay is measured in seconds and relates to the entire intersection rather than just one approach.

In addition, the INTANAL model provides results in terms of required queue length, be it in terms of car length or truck length.

As the proposed development has dedicated right and left turning bays, the two key results are level of service and queue length.

The INTANAL Analyses have been undertaken using the traffic generation figures from Section 6.1 and the traffic distribution figures from Section 6.2 for the morning peak period of 8am to 9am and the evening peak period of 5pm to 6pm.

The results of the INTANAL analysis reveal that all three access points will operate at a level of service A, which is the optimum level of service, with a low degree of saturation and delay. Accordingly, the results indicate an optimum level of service and operation of the access points.

In addition the INTANAL analysis results also indicate a maximum required queue length of 3 vehicles. If this is interpreted as a car this length is 18m (3 x 6m) or indeed if this is interpreted as a truck it is 48m (3 x 16m).

The external approaches to the site, from the Great Western Highway, have right and left turn bays well in excess of the 18m and 48m maximum queue length. The internal exit points for Access 2 and 3, which will be utilised by trucks and cars have queue lengths well in excess of 48m, whilst Access 1, which will primarily serve cars has a queue length in excess of 18m.

Accordingly, all three access points result in an optimum Level of Service A and their geometry is well in excess of the maximum queue length of 3 cars or trucks. On this basis, the access points are appropriate from a traffic point of view.

Impact on Surrounding Road/Rail Crossings

There is only one nearby level crossing, at Nile Street to the east of the site. The road, at this location, and indeed the level crossing, leads to very few residences and has a low volume of traffic.

There is not expected to be any significant (or noticeable) impact on traffic by the proposed 1 to 3 additional rail movements per day.

7.0 ACCESS AND EXTERNAL ROAD CHANGES

This section contains an assessment of the proposed access points of the development in light of the RTA Road Design requirements.

7.1 Access Points

As indicated, the proposal provides three (3) access points onto the Great Western Highway.

The eastern access (No. 1) provides an egress only and serves the highway frontage uses. This access comprises an acceleration lane to the east and the west onto the GWH.

The middle access (No. 2) comprises an ingress only and serves the highway frontage uses as well as the warehousing uses at the rear. This access comprises a deceleration lane for left in traffic and a right turn bay for right in traffic.

The western access (No. 3) comprises a combined ingress and egress, and serves the service station and highway frontage uses, as well as an egress for the warehouses uses at the rear. This access comprises a seagull intersection treatment with acceleration, deceleration and right run bays.

As indicated, the Great Western Highway varies in speed limit along the frontage of the site, between 60kph and 80kph. The requirements for the acceleration and deceleration lanes will now be discussed in relation to the speed limit of the GWH.

7.2 RTA Access Requirements

The Great Western Highway has an AADT volume of some 19,713 vehicles per day. Of this, some 10% will occur in peak hours equating to some 1,970 vehicles in both directions per peak hour or some 985 vehicles per peak hour in each direction.

Under the RTA Road Design Guide, the following lengths of deceleration lanes and acceleration lanes are required based on the respective signposted design speeds. The relationship between the signposted speed and the length of lane is as follows (see Table 4).

TABLE 4: RTA ROAD DESIGN GUIDE REQUIREMENTS

Design speed of approach kph	Entry Deceleration Lane length in metres	Exit Acceleration Lane length in metres based on 4 sec travel + merge taper
50	40	105
60	**55**	**125**
70	75	150
80	**100**	**170**
90	125	190
100	155	210
110	185	230

The relevant requirements for the 60km/h speed zone include a minimum length of the acceleration lane of 125m and a minimum length of the deceleration lane of 55m. For the 80km/h speed zone the requirements include a minimum length of the acceleration lane of 170m and a minimum length of the deceleration lane of 100m

Comparing these lengths with the Austroads Part 5 "Intersections at Grade" publication which takes into account volumes and absorption capacity, the length of 55m is in excess of the Austroads queuing length and so is acceptable. However, Austroads suggests that the mean queue in peak periods will be some 4 vehicles (or 24 m) with a design queue of 8 vehicles. In any event, the RTA guidelines will predominate.

7.3 Compliance with RTA Requirements

Acceleration and Deceleration Lanes
As indicated, the proposal comprises three (3) access points to the Great Western Highway.

The Eastern Access (No. 1) comprises an acceleration lane to the east and the west onto the Great Western Highway. The Middle Access (No. 2) comprises a deceleration lane for left in traffic and a right turn bay for right in traffic. The Western Access (No. 3) comprises a seagull intersection treatment with acceleration, deceleration and right run bays.

The compliance of the acceleration and deceleration lanes with the RTA requirements is provided below (see Table 5).

TABLE 5: COMPLIANCE WITH RTA REQUIREMENTS – ACCELERATION AND DECELERATION LANES

Access	Direction	Acceleration Lane	Requirement	Deceleration Lane	Requirement	Complies
East - No. 1 Speed Zone - 80kph	Eastbound	170m	170m	n/a	n/a	**Yes**
	Westbound	170m	170m	n/a	n/a	**Yes**
Middle - No. 2 Speed Zone - 60 kph	Eastbound	n/a	n/a	100m	100m	**Yes**
	Westbound	n/a	n/a	110m	100m	**Yes**
West - No. 3 Speed Zone - 60 kph	Eastbound	120m	125m	60m	55m	**Yes**
	Westbound	130m	125m	60m	55m	**Yes**

As shown in Table 5, the proposal provides adequate acceleration and deceleration lanes for the movement of traffic into and out of the site. The proposal complies with the RTA requirements for the safe movement of vehicles in regard to the speed limit of the road.

Sight distances for entry/exit vehicles
Under AS/NZ Standard 2890.1 2004, the desirable safe sight distances for a motorist turning out of the two exit driveways or into the entry driveway is 83m for the 60kph zone and 111m for 80kph zone.

The proposal provides these sight distances with the design of the entry and exit points, and is improved by the existing design of the Great Western Highway, and the relatively straight nature of this portion of the roadway. The proposal is considered to comply with the sight distances.

Driveway width design

As indicated, the site contains a total of 465 car parking spaces. The type of access arrangement necessary for the proposed driveway has been designed using AS/NZ 2890.1 - 2004 Parking Facilities Part 1: Off Street Car Parking and the RTA Guide to Traffic Generating Developments.

The AS/NZ Standard and the RTA Guide indicate that driveways should be located with due consideration to the distance from surrounding intersections. The driveway width is based on the type of fronting road, the proposed use and the number of car spaces serviced.

As indicated, the site contains a total of 465 car parking spaces and has frontage to a major road. On this basis, the means of access should comprise a Category 4 Driveway. A Category 4 Driveway includes a 6-8m entry, a 6-8m exit and a 1-3m wide separation. However, as the proposal also serves heavy vehicles, the access is elevated to a Category 7 driveway. A Category 4 Driveway includes a 10-12m entry, a 10-12m exit and a 1-3m wide separation.

As the proposal comprises 3 access points it could be argued that as not each access point serves all 465 car spaces, the driveways do not necessarily need to be Category 7 driveways. Notwithstanding this, the proposed means of access comprise at a minimum a 10-12m entry, a 10-12m exit and a 1-3m wide separation and comply with the relevant requirements.

7.4 External Changes to the Great Western Highway

The proposal will require changes to the Great Western Highway. These include the following:

- Widen the road at the eastern end of the site to incorporate an eastbound acceleration lane;
- Widen the road at the eastern end of the site to incorporate a westbound acceleration lane;
- Widen the road in the centre of the site to incorporate an westbound deceleration lane;
- Widen the road at the centre of the site to incorporate an eastbound deceleration lane;
- Widen the road at the western end of the site to incorporate a seagull turn which allows for an eastbound acceleration lane, an eastbound deceleration lane, a westbound acceleration lane and an eastbound deceleration lane.

The proposed changes essentially widen the Great Western Highway to three lanes across the frontage of the site to accommodate the acceleration and deceleration lanes located along it. These proposed roadworks comply with the relevant RTA requirements and have been include as part of the proposed development.

8.0 CAR PARKING AND INTERNAL ROAD ASSESSMENT

This section contains an assessment of the proposed car parking, internal road layout and circulation of the proposed development.

8.1 Car Parking Assessment

The *RTA Guide to Traffic Generating Developments* (December 2002) has been used to calculate the car parking requirements of the proposed development. The requirements of each use will now be discussed.

8.1.1 Warehousing

Council's Car Parking Code and the 2002 RTA Guide states that car parking should be provided for a warehousing use at the rate of 1 space per 300m^2. The proposal provides 47,275m^2 of warehousing floor space, which according to the Guide requires 158 car spaces.

This calculation is considered to be excessive for this proposal, due to the proposed operation of the warehousing facility. The warehousing will act as storage, with approximately 10-15 employees per warehouse building, multiplied by the 8 buildings. Council's Code has an employee rate, which states 1 space per 4 employees. On this basis the proposed warehouses, would have been required to provide a total of 30 spaces. However, Council's Code does require that the greater rate be used for assessment, which in this instance is based on floorspace.

Council's and the RTA's requirements are considered particularly onerous in relation to the anticipated low intensity of the use and operation of the warehousing facilities. Notwithstanding this, provision has been made for 158 car spaces to comply with these requirements.

8.1.2 Bulky Goods

Council's Car Parking Code does not have a car parking rate for bulky goods retailing. The only reference is that of a bulk store, which does not include retailing. The 2002 RTA Guide does not provide parking rates for bulky retail development and states that comparisons should be drawn with similar developments.

A parking survey of several bulky goods retail centres was conducted in March 2002 at four locations in Sydney and included:

- Auburn Bulky Retail Centre
- Caringbah Supa Centre.
- Liverpool Mega Centre.
- Prospect Homebase.

The results from this survey are tabulated below. The results reveal that a peak demand occurs in the afternoon on the weekends between 1pm and 3pm. The peak demand of parking and its relationship with the Gross Leasable Area is tabulated below to allow a typical recommended rate to be determined (see Table 6).

TABLE 6: BULKY GOODS PARKING DEMAND SURVEY						
Shopping Centre	Gross Leasable Area (m^2)	Actual Parking Provision (m^2 / space)	Parking Demand in m^2 per Parking Space			
			Saturday 2/32002	Sunday 3/32002	Saturday 9/3/2002	Sunday 10/3/2002
Auburn	22,750	34	77	72	68	66
Caringbah	19,359	34	54	52	45	43
Liverpool	30,890	31	96	No data	92	70
Prospect	25,582	47	52	50	49	47
		Ave Demand	**70**	**58**	**64**	**57**

The above survey shows that the average amount of gross leasable floor area per parking space occupied in a peak period is 62.2m^2 for the four centres.

However, these Bulky Goods centres are larger than the 11,250m^2 development proposed.

Further information on bulky goods retail parking demands is provided by the RTA's land use traffic generation document 18 "Bulky Goods and Retail Stores" which provides a summary of surveys of existing parking at various sites throughout Sydney. Only three of the ten sites described in this document have been included in this analysis due to the lack of relevance of the other seven due to their scale or the nature of the location or retail activity. The three sites include:

- Ikea, Gordon
- Harvey Norman, Fairfield
- BBC Hardware, Marrickville

The 1992-3 RTA surveys were conducted on both Thursday evenings (then the peak weekday shopping time) and on weekend days. The amount of gross leasable floor area per parking space was calculated and is shown in Table 7 below.

TABLE 7: RTA BULKY GOODS PARKING DEMAND SURVEY				
Shopping Centre	Gross Leasable Area (sq m)	Area 9sq m of Leasable Area vs Peak Parking Demand		
		Thursday Evening	Saturday Daytime	Sunday Daytime
Ikea, Gordon	2,216	96	No data	43
Harvey Norman, Fairfield	3,005	72	60	33
BBC Hardware, Marrickville	2,064	86	No data	65
	Ave Demand	85	60	47

The above survey shows that the average amount of gross leasable floor area per parking space occupied in a peak period is 65m^2 for the three centres.

Accordingly, the required car parking rate should be between 1 space per 62.2m^2 and 1 space per 65m^2. Adopting the higher rate of 1 space per 62.2m^2, the Bulky Goods Buildings A, B and C require 72, 54 and 54 spaces respectively.
It should be noted that this rate is for gross leasable area, and the above calculation

is based on gross floor area. Generally the gross floor area is in the order of 20% in excess of the gross leasable area. Accordingly, the car parking proposed provides more spaces than would be normally required under the respective rates.

It should be noted that while the surveys are for bulky goods locations in the Sydney Metropolitan Region, the features of bulky goods stores are similar throughout the urban and regional areas of NSW. These features include distance from a town centre, distance from other services or retail outlets and distance from public transport services. Due to these factors, it is considered the survey data to be relevant in this case, and an appropriate indication of car parking demand.

8.1.3 Service Station

The Guide states that for service station development, 5 car spaces per 100m^2 of GFA of convenience store are required to be provided. The proposal provides a convenience store of 520m^2 and is required to provide 26 spaces. The proposal provides 26 spaces, and complies with this requirement.

8.1.4 Truck Stop

The Guide states that for Truck stop development, a proposal must provide 1 truck parking space per motel and 1 car space per 2 employees. In addition, for the restaurant facilities the proposal is required to provide 15 spaces per 100m^2 of GFA.

The proposal does not include motels. The proposal only provides for 10 rooms and 2-3 employees. The proposal is required to provide 10 truck spaces and 2 car parking spaces. The proposal provides 10 truck spaces and 2 car spaces and complies with these requirements.

8.1.5 Forklift maintenance Workers Building

While there are no stated requirements for such a use in the RTA Guide, the approach adopted to calculate the parking demand is to provide 1 car space per employee. The subject building is 590m^2 and is anticipated to employ 2-5 people at one time. The proposal will provide 5 car spaces, and is considered to comply with the likely demand of this use.

8.1.6 Rail Workers Accommodation Building

There is no stated car parking requirement for such a use in the RTA Guide. The subject building will provide accommodation of rail workers. This accommodation is temporary (eg. one night), and the rail workers are expected to arrive at the site via a freight train. Therefore this use does not generate a car parking demand. The staff from the Truck Stop are expected to undertake any maintenance or cleaning of the accommodation facilities. Therefore no additional car spaces are needed for the employees of the accommodation facility, as these spaces have already been accounted for.

8.1.7 Administration and Security Building

A two storey combined Administration and Security Building will be located to the east of the OSD Pond 1 and will comprise approximately 1,060m^2 of floor area. This building will employ 6-8 people. On the basis of the employee demand with the occasional visitor, it is considered at a total of 10 spaces would satisfy this parking demand.

8.1.8 Parking Summary

A summary of the required and proposed number of car spaces is contained in Table 8 below (see Table 8).

TABLE 8: CAR PARKING COMPLIANCE SUMMARY			
Use	**Requirement / Likely Demand**	**Provision**	**Complies**
Warehousing	158	193	Yes
Bulky Goods	180	220	Yes
Service Station	26	32	Yes
Truck Stop	2 (+ 10 truck spaces)	2 (+ 10 truck spaces)	Yes
Forklift Bldg	5	6	Yes
Rail workers Bldg	0	0	Yes
Admin Building	10	12	Yes
TOTAL	**381 car spaces** **10 truck spaces**	**465 car spaces** **10 truck spaces**	**Yes** **Yes**

As shown in Table 8, the proposal provides for more parking than required and complies with the car parking requirements as recommended in the RTA Guide and other justified calculations. The proposal is considered to cater for the car parking demand generated, and satisfy the relevant controls.

8.2 Internal Road Network and Circulation

As discussed, the proposal provides three access points to the Great Western Highway. The internal circulation provided by these access points will now be discussed.

The middle ingress (No. 2) is an ingress only and services the driveways leading to the bulky goods buildings to the east and west, as well as the warehouses to the rear of the site. The light traffic accessing the bulky goods buildings B and C will proceed in front of these buildings to the car parking area and then egress via the eastern most egress. Similarly, the heavy vehicles will proceed to the rear of the buildings (the loading area) and then egress via the eastern most egress. This is a logical and appropriate traffic movement.

The heavy vehicles accessing the warehouses will proceed to the front or the rear of the warehouses, depending on whether they are dispatching containerised goods/produce (for direct transfer to either hardstand or train) or dispatching palletised goods/produce (front of warehousing for subsequent containerisation) or receiving goods (rear of warehousing). Again, the traffic movement is a logical and appropriate one from a traffic point of view, without any conflicts.

As indicated, access No. 3 provides a combined entry and exit point for the site. This access point provides access to bulky goods building labelled A, the service station, truck stop facility and the regional warehousing terminal at the rear of the site. The circulation pattern again, is a logical one without any apparent conflicts.

Accordingly, the internal circulation is appropriate for the movement of light and heavy vehicles around the site.

9.0 CONCLUSION

The proposed development has been assessed in terms of its likely traffic generation, car parking demand and appropriateness of the access arrangements and internal circulation.

The key element of the proposal in a macro scale is the reduction of truck movements to Sydney and Melbourne as a result of the proposed use of the rail line. Currently trucks deliver containers to and from Sydney, and this will be replaced by the use of trains from the subject site. Although this is not likely to result in a reduction in the traffic surrounding the site (as trucks will still need to access the site), it will result in a reduction in the number of truck movements to and from Sydney and Melbourne.

The traffic attracted to the proposed warehouse development is likely to be primarily traffic already within the road system, is not likely result in a high number of additional heavy vehicles. The traffic generation from the bulky goods uses is likely primarily comprise light vehicles. The light traffic has a considerably lower impact on the road network than heavy vehicles. The peak hours of the frontage uses and the rear warehousing uses are not likely to coincide. On this basis, the proposal is unlikely to significantly affect the capacity, operation or level of service of surrounding streets and intersections.

In order to quantify whether the proposed access points have the appropriate capacity and geometry on the road and within the site, an INTANAL Analysis has been undertaken. The INTANAL analysis reveals that all three access points result in an optimum Level of Service A and their geometry is well in excess of the maximum queue length of 3 cars or trucks. On this basis, the access points are appropriate from a traffic point of view.

The proposed means of access has been designed in accordance with the RTA Road Guide and the AS 2890.1. The proposed driveways comply with the requirements for a Category 4 and or 7 driveway and these means of access are considered appropriate in this instance. Furthermore, the width, design and number of proposed driveways are also considered to be appropriate.

The proposed means of access will require a number of road works for the Great Western Highway, in order to accommodate acceleration, deceleration and turning lanes. These road works have been indicated on the submitted drawings and comply with the relevant RTA Guide for the design speed of the roadway.

The proposal provides for 465 off-street car parking spaces, which are more than required by the Council Car Parking Cod. The number of spaces complies with the Council Car Parking Code, the RTA Guide and applicable survey data for parking requirements.

Having regard to the above considerations, it is considered that the proposed development of the subject site is appropriate in terms of traffic generation, access and car parking provision.