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APPENDIX K1

Draft off-site transport management plan (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Off-site Transport Management Plan (interim draft)

April 2011

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NOTE:

This draft Off-site Transport Management Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

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1 PURPOSE

The purpose of this Transport Management Plan (TMP) is to promote consistent systems and management practices for the safe and efficient operation of all BHP Billiton traffic utilising public roads to and from Olympic Dam.

This document establishes the framework for the operational requirements of the TMP and will form the basis of a management program that complies with relevant State and Australian government regulations.

2 SCOPE

The plan applies to all BHP Billiton employees, contractors, business or professional visitors. It covers those road-going light vehicles, trailers and mobile plant (whether they are privately owned, rented or leased) involved in standard or over-dimensional deliveries associated with the proposed expansion of Olympic Dam and operating on the South Australian public road network.

This TMP complies with the requirements of relevant regulatory agencies, and:

- sets out principles for the safety of all road journey(s) to and from Olympic Dam associated with the proposed expansion to minimise impact on other public road users
- describes the procedures for the transportation of Pre-Assembled Modules (PAM's) and associated items being transported on the public road system
- describes the activities, plans, permits and approvals needed to satisfactorily comply with statutory requirements
- specifies a schedule and timeframe for monitoring requirements.

Specific requirements for transport of uranium oxide (road and rail) and for transport of copper concentrate containing uranium (railed) are addressed in individual management plans and are outside the scope of this document.

3 OBJECTIVES AND ASSESSMENT CRITERIA

3.1 Performance indicators

Indicator	Objective	Assessment criteria
Community interactions	Communities in which BHP Billiton operates value our citizenship.	Community concerns are tracked and all reasonable complaints addressed.
Road safety	Relevant road safety indicators for BHP Billiton road based traffic to and from Olympic Dam are below the targets and objectives in the South Australian Road Safety Action Plan.	Fines imposed by regulatory authorities such as South Australia Police, Department for Transport, Energy and Infrastructure (DTEI) and related agencies.
Traffic delays	Delays due to movement of over-dimensional road movements are minimised and aligned with planned commitments.	Community concerns are tracked and all reasonable complaints addressed.

3.2 Monitoring objectives

The monitoring objectives are to demonstrate a genuinely safe road transport system for the proposed expansion that is aligned with the needs of the South Australian community, and to create a sustainable road transport solution for the proposed expansion by:

- raising awareness and focusing on road safety across all aspects of road transport covering the construction and operational phases of the expansion
- raising community awareness of the road transport task to reduce the adverse impact of traffic activities associated with the expansion
- complying with relevant Australian and South Australian legislative and regulatory obligations
- identifying adverse trends or systematic issues that may impact on the safety of public road users and the increase in traffic.

3.3 Monitoring assessment criteria

The applicable assessment criteria are:

- fines imposed by regulatory authorities such as South Australia Police, SA Department for Transport, Energy and Infrastructure (DTEI) and related agencies
- community feedback and complaints lodged with the project
- that actual outcomes are consistent with predicted outcomes.

4 MANAGEMENT MEASURES

4.1 Transport planning – general

The road transport requirements for movements to and from Olympic Dam are expected to be considerable and will require constant management and coordination across the project. It is a requirement that all BHP Billiton employees and contractors operating a vehicle comply with Olympic Dam site standards and South Australian road rules and regulations as a minimum.

The TMP would apply to the road traffic associated with construction, operation and closure. It would cover, but not be limited to, such aspects of the expansion as:

- planning and coordinating road traffic movements
- ongoing inspection and maintenance of all road transport equipment
- coordinating communications with relevant stakeholders such as South Australia Police, Country Fire Service, State Emergency Services, Department for Transport Energy and Infrastructure, power authorities, the Royal Automobile Association, Australian Rail Track Corporation (ARTC), Royal Flying Doctor Service and other agencies
- project standards and site inductions for activities related to road transport
- chain of responsibility, fatigue management, and safety programs including monitoring compliance and audits
- documenting permits and licences covering codes of practice, conduct, accreditation schemes, commercial arrangements and risk management
- breakdowns and emergency response in co-ordination with SA Emergency Services
- management systems to handle complaints by public road users that cover the receipt, investigation, reporting and addressing of complaints related to expansion road traffic
- developing and using training programs for project staff
- closure planning and rehabilitation as appropriate related to removing supporting infrastructure introduced by BHP Billiton to enable road traffic movements.

4.2 Fatigue management

As part of the Chain of Responsibility legislation and to comply with Occupational Safety and Health regulations, the hazard of fatigue for commercial vehicle drivers will continue to be managed for the expanded operation. A documented Driver Fatigue Management Plan will be implemented (either as part of the provider's Traffic Management Plan or Safety Management Plan or stand-alone). The plan will detail:

- scheduling trips
- rostering drivers
- establishing a driver's fitness to work
- health, diet and exercise
- fatigue management education
- establishing responsibilities
- documentation and record keeping
- managing incidents
- establishing and maintaining appropriate workplace conditions
- internal review.

In addition, an environment will be established that encourages and maintains all personnel to recognise and manage the symptoms of fatigue, prior to it affecting their ability to operate effectively. Appropriate rest times and relevant fatigue related information will be established and encouraged through education and information sharing at company inductions and at safety related meetings.

4.3 Road rules

The following rules will apply:

- At all times, existing South Australian (SA) road rules and regulations in force at the time will apply to all road movements being undertaken by BHP Billiton and its contractors on public and private roads.
- At all times, vehicles will obey speed limits as per posted signs or SA Police instruction.
- Personnel operating a vehicle on a public or private road(s), will always drive to conditions regardless of the posted speed limit signage.
- All personnel must have a current, valid Australian Driver's Licence with the appropriate class endorsements and permits within their license in order to operate a vehicle on public or private roads. Cancellation of an Australian Driver's Licence also removes the right to drive a vehicle associated with the expansion project.
- Seat belts must be worn at all times. Persons are only allowed to travel in vehicles, in a seat, fitted with a seat belt and designed for the purpose.
- Vehicles must not be left unattended with the engine running under any circumstances.
- All employees, contractors and visitors will be "Fit for Work" when undertaking any driving related activities. This means that an individual is in a physical, emotional and psychological state that enables him or her to carry out their driving responsibilities competently in a manner that does not compromise their own safety and health, or that of others. This will include but is not limited to drug and alcohol testing, minimise fatigue management with correct work and rest periods.
- Mobile phones, portable electronic devices and reading material shall not be operated or used whilst driving any vehicle. All vehicles must be stationary and safely parked (as defined in Section 6.6) in a safe location before commencing use.

4.4 Transport planning – over-dimensional movements

The expansion will require over-dimensional items to be moved to and from Olympic Dam. Existing South Australian Government legislation and regulations will cover the majority of such movements. As some over-dimensional movements will require temporary road closures, a TMP would be developed for these occurrences to address specific issues such as:

- times of travel such as day or night movements
- the use of passing bays
- traffic escort services
- refreshments, security and amenities at passing bays.

Where required as part of statutory requirements, over-dimensional loads will be accompanied by either SA Police and or experienced pilot escort services. They will be responsible for the management of public road users in accordance with the procedures detailed within. Should there be any conflict between these procedures and SA Police escort assessment at any time during the transport, the decision made by the SA Police representative will prevail.

4.4.1 Approvals

Approval for the transport of over-dimensional loads on the public road network is under the control and jurisdiction of Department of Transport within the Department of Transport, Energy and Infrastructure (DTEIL) within the South Australian Government.

As detailed project planning progresses, an overall procedure will be agreed with DTEI to manage the approval and permitting process for over-dimensional loads. Individual permit applications for over-dimensional transport permits will be lodged well in advance with DTEI and the SA Police prior to the proposed transport(s). The movement of oversized loads on the public road network will be restricted to the approved days and times as per DTEI permits.

Other permits and approvals will be co-ordinated with other relevant authorities such as:

- Power Authorities approvals will also be obtained in regard to over-height load, where applicable, it is the intention of BHP Billiton to eliminate power lines as a hazard to the project by ensuring that the “air draft” is greater than stipulated requirements. All power lines on the proposed transport route(s) will be measured to check that clearance tolerances are acceptable. If the clearance is less than the allowable tolerance, arrangements will be made with relevant owners to lift the power lines to allow the transport of those over-dimensional loads which impact the air draft buffer.
- Rail track control for rail crossing (Port Augusta, Hesso and Pimba) will also be obtained and co-ordinated with Australian Rail Track Corporation (ARTC).

4.4.2 Speed of over-dimensional movements

The following speeds are indicative for the movement of over-dimensional items when travelling on public roads. Speeds would be in accordance with trailer manufactures recommendations and subject to road, weather and other en-route conditions or restrictions applicable at the time of movement for a particular load.

Over-dimensional item	Indicative travel speed	Examples
>300–350 tonnes	5–20 Kph	
200–300 tonnes or up to 15 m wide x 15 m high	15–30 Kph	
100–200 tonnes or up to 10 m wide	20–50 Kph	

Over-dimensional item	Indicative travel speed	Examples
<100 tonnes or up to 4–6 m wide	60–80 Kph	

4.4.3 Escort staff and vehicles

Requirements for vehicles involved in the movement of over-dimensional loads and travelling on private or public roads will be documented in the respective Traffic Management Plan.

The over-dimensional loads will be escorted by SA Police and qualified pilot vehicles travelling in front, and at the rear, of the over-dimensional item in a set formation.

Where over-dimensional loads are travelling in convoy there will also be a pilot vehicle in between the two oversized loads.

Travelling behind the rear escorts will be two traffic control vehicles; one with signage stating: “Expect delays, No overtaking oversize loads”. The second traffic control vehicle will help direct traffic through the parking bays when the over-dimensional convoy stops to allow this.

All escort vehicles will observe the road rules and conditions specified in DTEI permits.

As part of SA Government legislation and regulations and as specified in DTEI permits, suitably trained and qualified escort vehicle personnel, and vehicles required to transport over-dimensional loads, would be provided and accompany the movement of every over-dimensional load.

All vehicles involved in the movement of over-dimensional loads and travelling on private or public roads will have:

- a rotating beacon
- headlights on
- spotter(s) where required
- communication devices suitable for contact between escort vehicles and the load bearing vehicle.

Also, drivers entering BHP Billiton areas will wear the correct Personal Protective Equipment in accord with site procedures. These requirements will be communicated via contractual documentation and recorded in the respective Traffic Management Plan.

4.4.4 Weather and road conditions

BHP Billiton is committed to maintaining the integrity of the sealed road network in the Upper Spencer Gulf where over-dimensional loads will be transported.

Weather conditions

Weather conditions will be monitored for the duration of transport periods from the South Australian Meteorology Office, where a seven-day weather forecast and daily updates of expected weather

conditions for the period of transportation will be accessed. DTEI will also advise of road conditions in regard to the public network.

Weather forecasts and advice will be used to plan for movements of over-dimensional loads in the best weather windows. The final decision about the commencement of over-dimensional transport will be made by the Transport Manager in consultation with DTEI and SA Police.

Road conditions

BHP Billiton views the maintenance of this network as paramount in ensuring the safe execution of the over-dimensional transportation program. The sealed road network on route will have a full inspection by a qualified road engineer 48 hours prior to the transport window commencing. On the basis of the inspection a report will be compiled to identify any existing damage to the road corridor, roadside furniture and to the pavement surface. Roadside impediments, which had not been previously identified, will be removed or modified prior to transportation of an over-dimensional load.

Over-dimensional loads will only operate on unsealed roads if weather permits. After inclement weather, an inspection of road surface conditions will be carried out 24 hours prior to transport resuming.

Environmental considerations

It is the policy of BHP Billiton to be conscious of the environment and to implement management practices that meet or exceed any specified requirements relating to the protection and conservation of the environment. These practices include conservation of resources, waste reduction, emission control, protection of ecosystems and energy efficiency consistent with current technical knowledge and economic practicability.

The transportation of the over-dimensional loads will have minimal impact on the environment.
To ensure this, BHP Billiton will only use equipment that is maintained and has passed a mechanical inspection. In the event of mechanical failure, spill kits and containment equipment will be carried in the support vehicles. Driving at reduced speeds on unsealed roads will control dust.

4.4.5 Mechanical failure

Provision will be made in regard to mechanical failure of equipment. This will be managed by having the necessary tooling and critical spare parts on a support vehicle in transit with the over-dimensional load.

Spare parts may include, but not limited to:

- tyres
- brake boosters
- air and hydraulic hoses
- standby prime mover in case of total mechanical failure.

These support vehicles will travel approximately 5 km in front of the over-dimensional convoy within radio contact and can also be used as forward traffic control, if required.

4.4.6 Emergency services

SA Emergency Services will be notified of the times and proposed routes for oversized movements.

SA Emergency service vehicles will be given right of way by all vehicles involved in the movement of over-dimensional loads.

In the case of an emergency situation occurring while over-dimensional loads are in transit, the escort SA Police shall communicate with emergency services to safely negotiate a passage past the over-dimensional load. This would be achieved by over-dimensional load stopping at the nearest parking bay or dual lane on route. The emergency vehicle will then be able to pass safely.

The range of modern communication devices shall allow this to be organised in advance as to minimise any stoppage of emergency vehicles. Contingency plans will be discussed and set up with respective SA Ambulance Service, CFS, and SES prior to over-dimensional movements.

4.4.7 Community communication and engagement

Managing community relations and road users expectations will be important to community acceptance of the road transport requirements for the expansion project.

Notification to local communities and road users will be via various means such as signs on road verges, newspaper advertisements and commercial and community radio announcements to pre-alert the public of delays due to the movement of over-dimensional movements to Olympic Dam. Control of the transport route will be maintained by SA Police escorts and or pilot vehicles and appointed personnel acting as spotters or traffic controllers using, signage and traffic control measures through congested areas.

A comprehensive and coordinated community communication and engagement program will be developed to address consultation prior to the movement of over-dimensional loads and measures implemented during the movements.

Prior consultation – establishing reference groups and participating in existing government and industry groups to develop strategies and initiatives for all pastoralists local business, roadhouses, road users etc.

- Advanced communication – there are a variety of communication techniques and channels such as state and local press, radio stations, websites, letters and e-mail notices that can be used to disseminate information to the community
- Real time measures – static and dynamic real-time travel information using intelligent transport systems and information boards warning the public of the date and times of over-dimensional convoy(s) and to expect delays. This will happen on a continual basis notifying the dates of the planned movement. The location of such devices will be discussed with local authorities for locations, offsets from highway(s), main road(s).

In Appendix 1 – Example of Community Notifications types of message that would be e-mailed, radio announcements and placed on electronic information boards in advance of the movement of over-dimensional loads to Olympic Dam.

5 RESIDUAL RISKS

5.1 Key transport risks

Project component	Project phase	Event	Cause
Transport	Construction	Delays to public road uses on public highway due movement of over-dimensional loads	Transport of over-dimension loads along public highway ▪ delays exceeding the predicted time of 45 minutes ▪ damage to roads, rail and other associated infrastructure
Transport	Operations	Release of materials during road or rail transport	Failure of containment systems of vehicle accident Failure and or inadequate load restraint measures
Whole of Project	Operations	Vehicle accidents	Increase traffic failed to follow road safety rules; ▪ not using personal restraints (i.e. seat belts). ▪ driving while fatigued or intoxicated. ▪ exceeding speed limits. ▪ unsafe driving behaviours given the conditions at the time (i.e. night, sunrise/sunset, wet weather)

5.2 Contingency plans

Contingency plans will be developed for the construction phase where required and incorporated into contractual documentation where appropriate. As previously mentioned, specific Traffic Management Plans will be developed for over-dimensional movements and submitted to the regulatory authorities where required. A feature of these individual plans will be contingency measures.

6 MONITORING PLAN

The following table presents the preliminary monitoring requirements for off-site traffic movements. This will be further developed during the Definition Phase of the Olympic Dam expansion project.

Requirement	Description	Frequency
Monitor	Community complaints associated with road movements	Fortnightly/Monthly initially, then quarterly
Monitor	Positive community feedback associated with road movements	Fortnightly/Monthly initially, then quarterly
Monitor	Hazard/Incident data associated with off-site road transport	Fortnightly/Monthly initially, then quarterly
Review	Implementation of corrective actions associated with off-site road transport community complaints	Quarterly
Review	Implementation of corrective actions associated with off-site road transport hazards/incidents	Quarterly
Audit	Ongoing contract providers' Safety Management Plans/ Traffic Management Plans (TMPs)	Bi-annual
Audit	Sample of individual TMPs for over-dimensional loads	Bi-annual

APPENDIX K2

Over-dimensional loads: 30 min vs 45 min delays

BHP Billiton

Olympic Dam Expansion Environmental Impact Statement

Appendix K2 - Over Dimensional Loads: 30 min v 45min delays

FINAL | August 2010

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1. Over-dimensional Loads Assessment

1.1 Overview

This summary note has been prepared to report on the estimated change in traffic impact and passing bay requirements along the Stuart Highway and Olympic Way (south of Roxby Downs) should a change of the maximum delay to road users from 45 minutes to 30 minutes be required. The closure of a road and the use of passing bays would be required for over-dimensional loads greater than 8m in width. This summary note should be read in conjunction with the Traffic Impact Assessment dated October 2008 (TIA) particularly Section 3.8 regarding the movement of over-dimensional loads.

1.2 Assumptions

The assumptions used to determine the estimated traffic impacts and passing bay requirements for 30 minute closure were the same as those adopted and reported in the TIA. These assumptions are as follows:

- The concept traffic management plans for the movement of over-dimensional loads outlined in the TIA remain the same;
- The proposed traffic volumes along Stuart Highway and Olympic Way (south of Roxby Downs) remain the same as those estimated in the TIA;
- The average travel speed of the over-dimensional load convoy is 30km/h;
- The time required for traffic to clear the section to be closed is based on the spacing of the passing opportunities and an assumed travel speed of 90km/h;
- Three traffic management crews are provided, which allows for a crew to be set-up in advance of the closure that is currently operating; and
- The time required between closures to allow the traffic management set-up to be completed and the convoy to prepare to leave is 10 minutes. It is noted that this time is not included in the closure time but does affect the overall convoy travel time.

1.3 Impact Assessment

A reduction in delay to road users to a maximum of 30 minutes decreases the number of vehicles delayed at one end of the closure but increases the minimum number of passing bays that would be required. The findings in greater detail are outlined as follows:

- A minimum of 14 passing bays would be required on Stuart Highway between Port Augusta and Pimba (minimum of 9 required for a 45 minute delay).
- During the peak hour on Stuart Highway, it is expected that approximately 50 vehicles will be delayed at one end of the closure (77 vehicles for 45 minutes delay).
- A minimum of 8 passing bays, plus layover at the intermodal terminal, would be required on Olympic Way (minimum 6 required for a 45 minute delay).

- During the peak hour on Olympic Way, it is expected that approximately 45 vehicles will be delayed at one end of the closure (67 vehicles for 45 minute delay).
- The area required for each individual bay is expected to be smaller given that a lesser number of vehicles will be delayed at one location at any one time. It is noted however, that the total area of all bays combined is likely to be greater due to the increased number of bays and a loss of efficiency in the use of space for the smaller bays.

The above estimates are based on a theoretical spacing of passing bays to limit the delay to a specified maximum of time. The physical locations of passing bays will depend on the site specific conditions (e.g. highway alignment, location of existing bays, topography etc). As part of this summary note, likely concept locations of the passing bays have been developed for the 30 minute maximum closure time as is discussed in Section 1.5.

1.4 Traffic Surveys

It is noted that the number of vehicles delayed at one end of the closure, as outlined in Section 1.3, is based on the existing peak hour volumes expressed as a percentage of the average weekday daily traffic. The existing percentage of peak hour traffic was applied to the 2015 traffic volumes (i.e. including ODX generated traffic and ancillary traffic) along the Stuart Highway and Olympic Way to estimate the likely future peak hour traffic volumes for each of these roads.

The existing peak hour volumes for the Stuart Highway and Olympic Way (south of Roxby Downs) occur at 2pm and 3pm, respectively based on traffic surveys undertaken in July 2008. These traffic surveys were undertaken by Austraffic using automatic traffic counters, over a 7 day period, outside the school holiday periods. A cross reference of the Stuart Highway surveys with DTEI traffic surveys undertaken over a year in 2006 indicates a similar shape profile to the surveys undertaken for 1 week in July 2008 and the same peak hour.

Austraffic is a traffic and transport data specialist and regularly undertakes traffic surveys for a number of government agencies including DTEI. During the surveys, the automatic counters were checked by field staff to ensure that a complete 7 day data set was collected and that the automatic traffic counters were not interfered with.

Automatic traffic counters are the most common traffic survey mechanism for collecting link traffic flows. Automatic traffic counters typically use 2 rubber tubes placed across the lane of traffic and a data logger to record air pulses as tyres strike the rubber tubes. The direction, time and pattern between tyres striking the tubes is recorded electronically and used to determine the speed at which a vehicle is travelling, the direction, number of vehicles and their classification (12 classifications as per Austroads guidelines) based on their axle configuration.

The peak hour and daily profile of Stuart Highway (using most recent July 2008 counts) is shown in Figure 1 and is typical of a highway in a rural area. The peak hour and daily profile of Olympic Way is shown in Figure 2 and appears to be a hybrid of tidal traffic flows (more common in developed areas) and a rural profile (peak in the middle of the day).

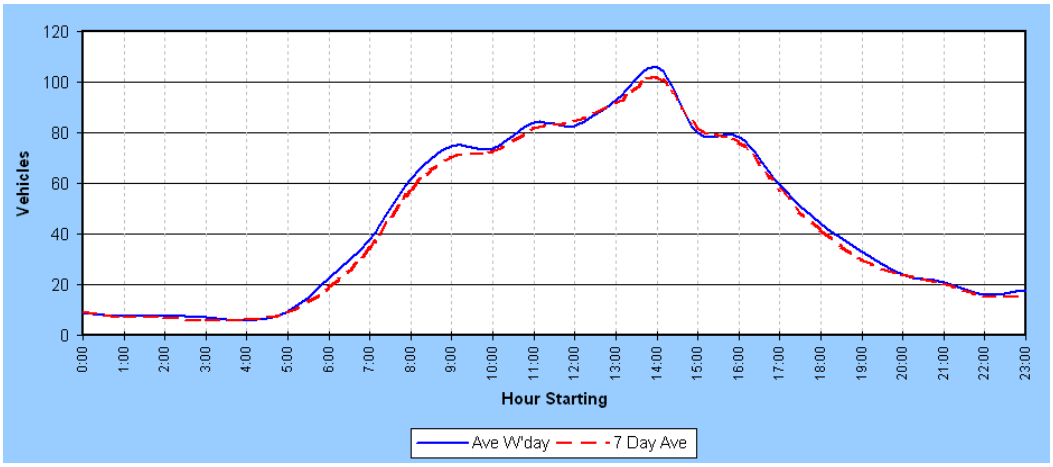


Figure 1 – Stuart Highway (1.1km north of Yorkeys Crossing)

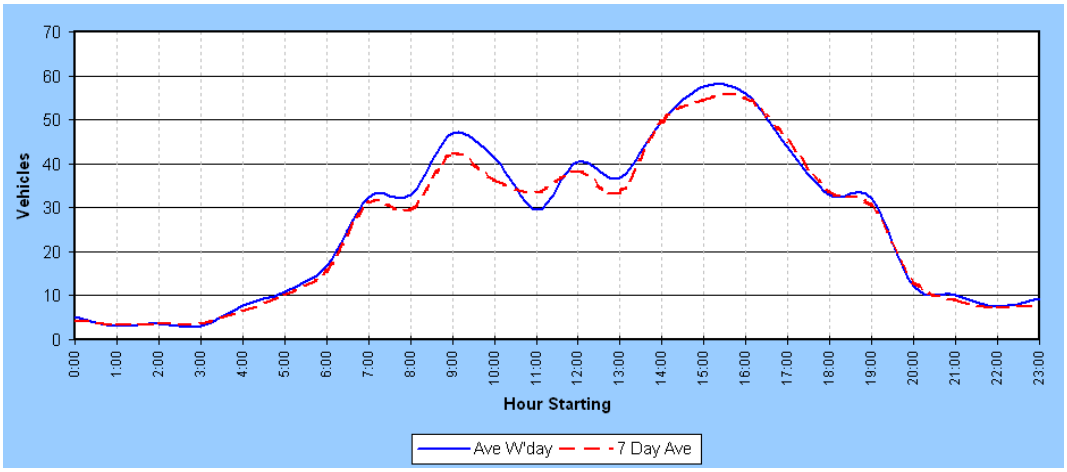


Figure 2 - Olympic Way (south of Roxby Downs)

1.5 Concept Locations of Passing Bays

Analysis of the maximum permitted delay for motorists indicates that the minimum number of bays would be as per those indicated in the Section 1.3 or at approximately 11.3km spacing.

This guiding spacing was used to inform the concept location and design of the passing bays that are required to facilitate the movement of the over-dimensional loads. It is noted that this is only a high level assessment and would not take the place of the detailed site investigations that would be required to establish local site topography, vegetation removal requirements, costs etc.

Aerial photography and geographic information systems were used to identify features that may influence the approach for managing public traffic on the highways during load transportation. The features that were considered include:

- Existing rest areas, truck parking bays and gravel storage areas that could be utilised or upgraded for use as passing bays;

- Intersecting roads, highway alignment and significant property accesses from which traffic could enter the route during load transportation;
- Railway level crossings which will require coordination between load movements and other transport systems.

These were reviewed for their suitability to provide a network of passing opportunities. Other locations that would require the over-dimensional load to leave the road, such as bridges and railway level crossing bypasses, were also considered. Generally, the existing bays will require upgrade to provide adequate storage and standard of facility for the movement of over-dimensional loads. However, the extent of works required for the upgrade of existing bays is expected to be less than what would be involved in the construction of new bays.

It is noted that the construction of new bays at maximum spacing (i.e. 11.3km) would reduce the total number of passing bays (existing plus new) that are required, as the new bays would be placed at maximum spacing rather than using a reduced spacing to utilise the existing bays. However, for the purpose of this assessment it has been assumed that rather than constructing new bays at maximum spacing, the spacing of bays would be adapted to utilise and respond to the infrastructure onsite (e.g. existing rest areas and level crossing bypasses).

Based on this approach, the physical locations of passing bays would be such that a total of 16 passing bays (i.e. an additional 2 passing bays than the theoretical minimum) would be required on the Stuart Highway. Given that there are no existing passing bays on Olympic Way other than the level cross bypass at Pimba, all remaining passing bays along Olympic Way will be new passing bays and therefore there is more freedom to the proposed spacing.

As discussed, the above assessment was based on a 30 minute delay. For the purpose of comparison, a similar process was undertaken to assess the likely physical locations of passing bays for a 45 minute delay. A summary of the comparison between the passing bay spacing for a 30 minute and 45 minute delay assuming that existing bays should be utilised is shown in Table 1.

Table 1 - Passing Bay Requirements

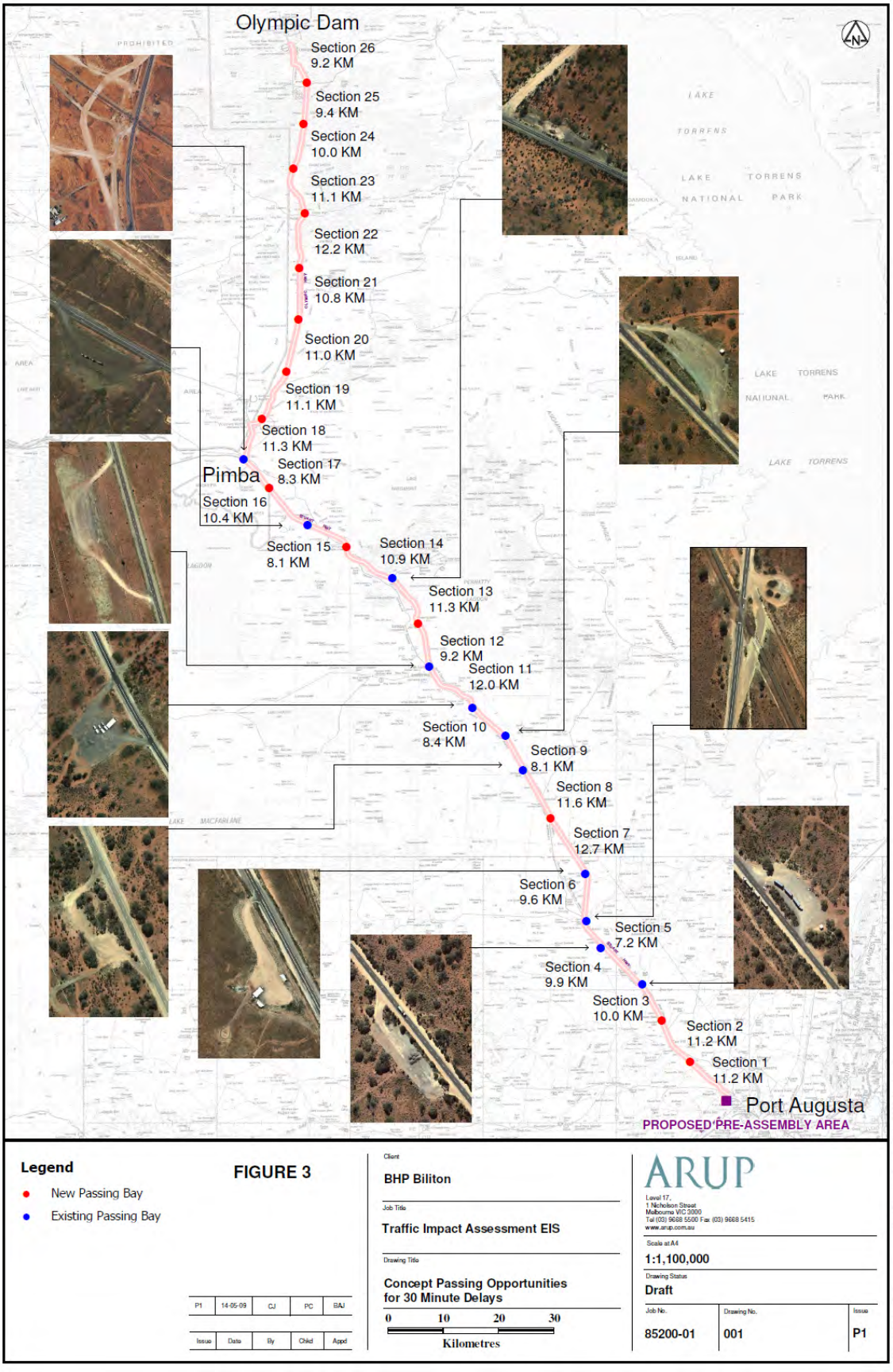
Road	30 Minute Delay			45 Minute Delay		
	Existing to be upgraded	New	Total	Existing to be upgraded	New	Total
Stuart Hwy	10	6	16	5	5	10
Olympic Way	1	8	9	1	6	7
Total	**11**	**14**	**25**	**6**	**11**	**17**

As indicated in Table 1, the reduction in delay from 45 minutes to 30 minutes is likely to increase the number of new passing bays that are required by three (3) and the number of existing bays that will require upgrade by five (5).

The concept passing bay network and the spacing of bays, based on a 30 minute delay, is shown in Figure 3. It is noted that in some instances the spacing of bays exceeds the optimal 11.3km spacing and the delay in this area may be marginally greater than 30 minutes depending on the consistency of the movement of the over-dimensional loads with the assumptions outlined in Section 1.2. The greater spacing in these sections has been adopted to utilise a nearby passing bay rather than proposing the construction of a new bay.

The required footprint area of the bays will depend upon the time of travel of the loads (e.g. travel at night reduces the number of vehicles that need to be stored in the bays), the number of loads per convoy, extent of amenities and support vehicles provided etc. Nominally, a passing bay footprint area of 250m in length and 30m in width has been assumed for this assessment. This area would be expected to allow for a lane of traffic movement, a lane for amenities and adequate storage area for the maximum number of vehicles delayed at one end of the closure (i.e. during the peak hour).

Figure 3 - Concept Passing Bay Network



1.6 Conclusion

While reducing the closure period from 45 minutes to 30 minutes has some benefit, a notable delay to motorists remains. Initiatives that could be used to reduce the impact of a delay include:

- Notification of over-dimensional load movements and interruptions through regular community announcements;
- Aiming to transport loads at times that are outside of the peak traffic period;
- The provision of amenities, refreshments and information to motorists at each of the passing bays;
- Consideration of convoy travel and night travel.

It is expected that the physical implications of the spacing of bays (e.g. design of specific passing bay locations) would be determined through detailed site investigations and once the required passing bay design standard, time of travel, convoy configuration etc. has been agreed with the relevant authorities

APPENDIX K3

Level of service assessment south of Port Augusta

BHP Billiton

Olympic Dam Expansion Environmental Impact Statement

Appendix K3 - Level of Service Assessment South of Port Augusta

Final | August 2010

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1. Level of Service South of Port Augusta

1.1 Introduction

This summary note has been prepared to estimate the theoretical spare capacity on the Princes Highway (RN 3500) between Port Augusta and Adelaide to determine whether additional traffic could be accommodated whilst maintaining the current Level of Service (LOS). This assessment has been based on the forecast traffic volumes in the years 2015 and 2020 with and without the Olympic Dam Expansion (ODX). This summary note should be read in conjunction with the Traffic Impact Assessment, dated October 2008 (TIA).

1.2 Traffic Volumes

1.2.1 Data Sources and Assessment Locations

Traffic volumes were obtained from the Department for Transport Energy and Infrastructure (DTEI) for locations within six segments of the Princes Highway between Port Augusta and Adelaide that were identified by DTEI and shown in Figure 1. The surveys were aligned to the year 2008 by using growth factors where necessary, (adopted growth rates discussed in the TIA).

1.2.2 Assessment Years

The year 2008 was selected as the year that the existing LOS calculations should be based, which is consistent with similar calculations undertaken as part of the TIA. Similarly, as indicated in the TIA, the peak traffic generation (during the construction period) and ongoing traffic generation as a result of ODX is expected to occur in the years 2015 and 2020, respectively. Accordingly, these years were selected as the critical years for assessment of the LOS along Princes Highway.

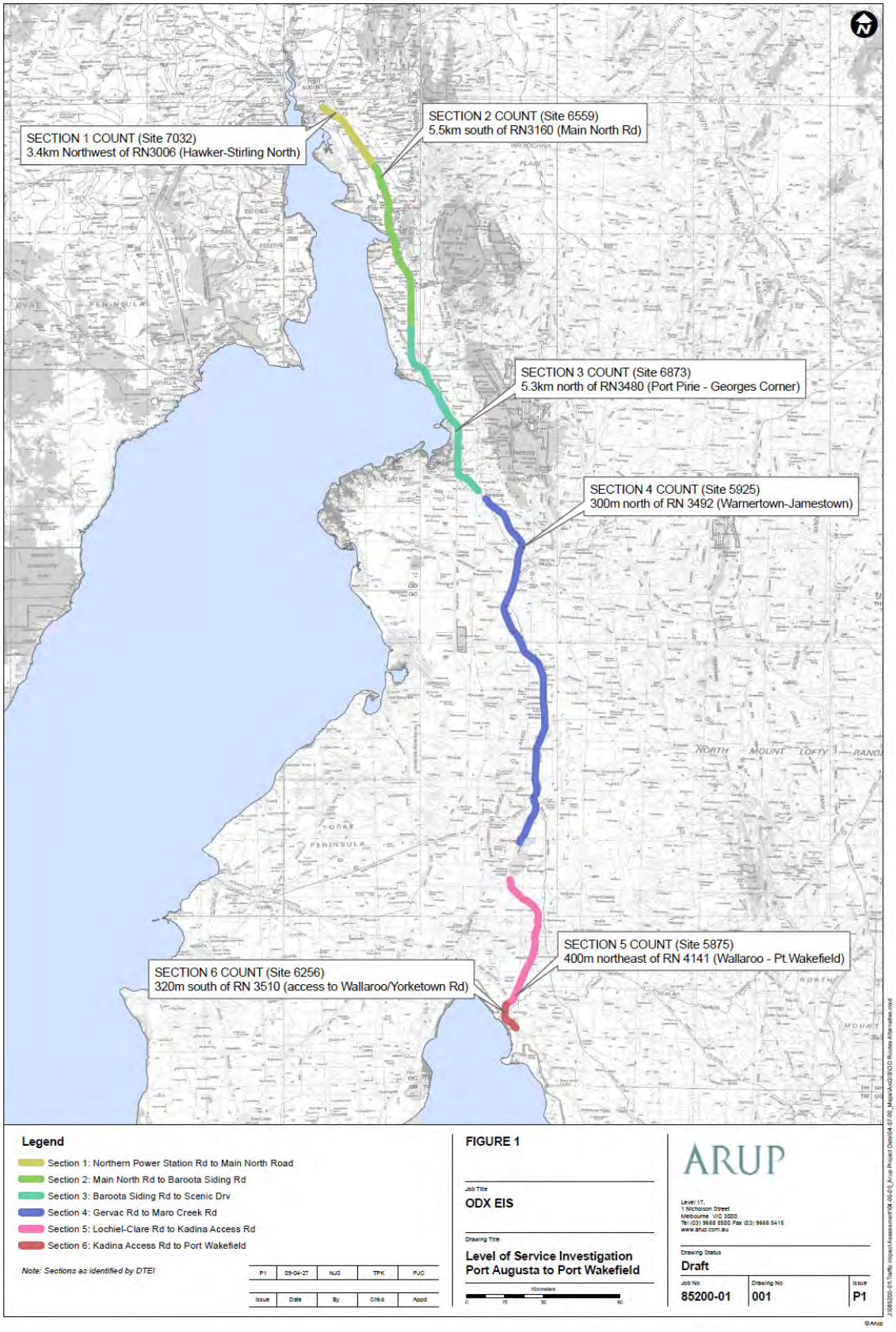
1.3 Level of Service Calculations

1.3.1 Assessment Methodology

In order to establish the existing LOS along the Princes Highway the 2008 peak hour traffic volumes were determined for each of the six segments of the Princes Highway shown in Figure 1. In addition, baseline traffic volumes along the Princes Highway were also calculated for the years 2015 and 2020, taking into account background traffic growth. These 2015 and 2020 baseline traffic volumes include the existing approved increase in activity at Olympic Dam but exclude traffic related to ODX. The daily traffic volumes were converted to peak hour volumes based on the existing peak hour ratios (peak hour volumes/daily traffic volumes) for each road segment.

The LOS assessments were undertaken for the 2008 traffic volumes as well as the baseline 2015 and 2020 traffic volumes for each of the segments of the Princes Highway identified by DTEI.

Figure 1


SECTION 1 COUNT (Site 7032)
3.4km Northwest of RN3006 (Hawker-Stirling North)
SECTION 2 COUNT (Site 6559)
5.5km south of RN3160 (Main North Rd)
SECTION 3 COUNT (Site 6873)
5.3km north of RN3480 (Port Pirie - Georges Corner)
SECTION 4 COUNT (Site 5925)
300m north of RN 3492 (Warnertown-Jamestown)
SECTION 5 COUNT (Site 5875)
400m northeast of RN 4141 (Wallaroo - Pt.Wakefield)
SECTION 6 COUNT (Site 6256)
320m south of RN 3510 (access to Wallaroo/Yorketown Rd)
Legend
Section 1: Northern Power Station Rd to Main North Road
Section 2: Main North Rd to Baroota Siding Rd
Section 3: Baroota Siding Rd to Scenic Drv
Section 4: Gervac Rd to Maro Creek Rd
Section 5: Lochiel-Clare Rd to Kadina Access Rd
Section 6: Kadina Access Rd to Port Wakefield
Note: Sections as identified by DTEI
FIGURE 1
Job Title
ODX EIS
Drawing Title
Level of Service Investigation
Port Augusta to Port Wakefield
ARUP
Drawing Status
Draft
Job No
85200-01
Drawing No
001
Issue
P1

The total peak hour traffic volume that would result in conditions within the stream of traffic deteriorating to the next LOS was then calculated. This total peak hour traffic volume was compared to the 2008 peak hour traffic volumes, as well as the baseline 2015 and 2020 peak hour traffic volumes (excluding all ODX related traffic). This comparison provides the 'spare capacity' that is available on each section of the Princes Highway for which additional traffic could be accommodated without triggering a change in the LOS.

LOS assessments were undertaken in accordance with Austroads guidelines[1], and based on the following key points:

- A single length within the indentified segments of the Princes Highway was assessed based on the location of available traffic surveys;
- The peak hour traffic volume is assessed rather than AADT; and
- The cross-section of the road is not expected to change (upgraded or otherwise).

1.3.2 Results of Assessment

The results of the LOS assessments are summarised in Table 1 and include the following key components:

- '2008 LOS' based on the 2008 peak hour traffic volumes.
- 'LOS Threshold' indicating the peak hour traffic volume threshold along the Princes Highway in order to change conditions within the traffic stream to the next category of LOS (e.g. from LOS A to LOS B).
- Baseline peak hour traffic volumes for the year 2015 and 2020 (i.e. existing traffic volumes plus and an allowance for background traffic growth and the approved activity at Olympic Dam but not including traffic related to ODX).

It is noted that LOS is measured from A (best) to F (worst).

Table 1 - Existing Level of Service and Baseline Traffic Volumes

Section Number	2008 Level of Service (LOS)	LOS Threshold (Peak Hour Volume)	2015 Baseline (Peak Hour volume)	2020 Baseline (Peak Hour Volume)
Section 1	A	***860***	689	736
Section 2	A	***329***	207	221
Section 3	A	***341***	252	270
Section 4	B	***556***	388	414
Section 5	A	***329***	213	228
Section 6	B	***581***	473	506

[1] Austroads Guide to Traffic Engineering Practice, Roadway Capacity – Part 2, 1988

It is clear from Table 1 that these sections of the Princes Highway currently operate at LOS A or LOS B during the peak hour. The greater LOS threshold of section 1 is due to the four lane, two way dual carriageway that is provided at the location where the survey was undertaken. It is noted that the baseline traffic volumes in both 2015 and 2020 are below the relevant LOS threshold.

Table 2 shows the peak hour traffic volumes including ODX heavy vehicles and ancillary traffic. The anticipated ODX heavy vehicles and ancillary traffic that has been used in this assessment are those volumes presented in the TIA. In this instance, the ancillary traffic volumes used for the assessment of Princes Highway have been based on a theoretical case whereby *all* ancillary vehicles from the Olympic Dam Expansion pass through each of the six locations along the Princes Highway.

Given that the peak hour ratios vary slightly for each of the relevant sections of Princes Highway, marginally different ODX volumes have been applied to each section of Princes Highway. While this is noted, the variation is minor and it is clear from Table 2 that spare capacity remains on the Princes Highway.

Table 2 - Traffic Volumes with ODX Heavy Vehicles and Ancillary Traffic

Section Number	LOS Threshold (Peak Hour Volume)	2015 Baseline + ODX (Peak Hour)	Difference on Threshold 2015	2020 Baseline + ODX (Peak Hour)	Difference on Threshold 2020
Section 1	***860***	775	-85	799	-61
Section 2	***329***	274	-55	271	-58
Section 3	***341***	322	-19	321	-20
Section 4	***556***	462	-94	468	-88
Section 5	***329***	297	-32	290	-39
Section 6	***581***	540	-41	556	-25

1.4 Summary

This summary note shows that the existing Level of Service (LOS) along Princes Highway between Port Augusta and Adelaide currently varies between LOS A and B. The traffic volumes in the years 2015 and 2020 show that the LOS is not expected to change and that there is still spare capacity to maintain the respective LOS for each location.

APPENDIX K4

Over-dimensional loads: Port Augusta assessment

BHP Billiton

Olympic Dam Expansion Environmental Impact Statement

Appendix K4 – Over-dimensional Loads: Port Augusta Assessment

Final | August 2010

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1. Over-dimensional Loads: Port Augusta

1.1 Overview

This summary note has been prepared to report on the estimated traffic impacts due to the movement of over-dimensional loads around Port Augusta as part of the Olympic Dam Expansion. This note focuses on the traffic impacts when public roads are crossed by over-dimensional loads travelling along the proposed access corridor at the western extents of Port Augusta. This summary note should be read in conjunction with Section 1.2 below and the Traffic Impact Assessment, (TIA) dated October 2008 which was publicly exhibited in Draft Environmental Impact Statement (DEIS) with particular reference to Chapters 5 and 19.

1.2 Over-dimensional Load Movements

The location of the proposed landing facility, pre-assembly yard and the connecting access corridor are shown in the TIA. The proposed alignment in the Draft EIS for the access corridor crosses Shack Road, Caroona Road and the Eyre Highway prior to connecting to the pre-assembly yard at Press Road. The alignment has since been modified slightly in response to submissions received and the revised alignment is provided in the Supplementary EIS. The following changes have been made to the proposed alignment;

- between Caroona Road and the Eyre Highway, this section is now closer to the Port Augusta airport rather than Kittle street as originally planned.
- the access corridor now crosses the Eyre Highway to the west of the pre-assembly yard and from there runs parallel to the highway to the pre-assembly yard but on the northern side in an alignment outside the Eyre Highway road corridor.

These adjustments to the proposed access corridor will have no effect on the assessment undertaken in this report. The landing facility would be used for all over-dimensional loads that are moved by sea to Upper Spencer Gulf as shown in Table 1.

Table 1 – Annual One Way Over-dimensional Load Movements from Landing Facility

Class	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Permit Only	0	0	0	3	6	1	0	0	0	0	0
Pilot Only	0	0	0	20	226	347	306	232	362	60	0
Pilot and Police	0	0	0	34	108	82	62	57	92	15	0
Greater than 8m in width	0	0	0	38	133	132	129	88	135	22	0

1.3 Traffic Volume Data

In order to determine the impacts of the movement of over-dimensional loads crossing Shack Road, Caroona Road the Eyre Highway, traffic survey data was obtained from Port Augusta City Council (PACC) and DTEI as summarised in Table 2. Port Augusta City Council also provided traffic survey data for Press Road as is shown below.

Table 2 - Summary of Survey Data

Road	Source	Period	Location
Shack Road	PACC	4 March to 2 April 2009	South of Caroona Road intersection
Caroona Road	PACC	2 April to 17 April 2009	East of left turn into Shack Road
Press Road	PACC	17 April to 6 May 2009	South of access to DTEI conference rooms
Eyre Highway	DTEI	19 Nov 2003 to 25 Nov 2003	5.1km north east of Lincoln Highway

The survey data was reviewed to identify appropriate days for assessing the daily profile of traffic volumes along each of the roads.

It was noted that the survey data provided by Port Augusta City Council included:

- Days where traffic patterns are affected by the school holidays or public holidays (e.g. Easter and Adelaide Cup). The Port Augusta City Council survey dates for Caroona Road particularly limited the dates that are suitable for analysis.
- Days where incomplete data has been recorded.

During the review of the survey data, it was noted that greater traffic volumes were generally recorded during weekend periods. Given this and the above issues, the data used for the analysis below was refined to represent a 7 day average daily profile for each of the roads, which excluded the days where traffic patterns may be affected or unrepresentative of an average day.

1.4 Assumptions and Limitations

1.4.1 Traffic Surveys

The traffic survey data collected for this study is shown in Table 2 and is discussed above. These surveys were used as a basis for analysis, with the following limitations and assumptions:

- The traffic survey data has not been adjusted to account for seasonal variation. Accordingly, it is assumed that the surveyed traffic volumes are generally representative of the average daily traffic volumes throughout the year.
- The traffic surveys were undertaken at a single point location and therefore the traffic volumes may vary along the length of the road (e.g. volume at Shacks Road just south of Caroona Road may be greater than near the proposed landing facility).
- The traffic survey undertaken on Caroona Road was undertaken east of Shack Road. Given that the proposed access corridor crosses Caroona Road to the west of Shack Road and also having regard to the local function of Shack Road, the traffic volumes on Shack Road have been subtracted from Caroona Road. The resulting volumes assume that all traffic on Shack Road travels to and from the centre of Port Augusta and not along Caroona Road to the west of Shack Road. It is acknowledged that this does not account for the vehicle movements turning right in to Shack Road and left out of Shack Road. While this volume is expected to be relatively small, this data limitation should be considered in the interpretation of the results presented below.

1.4.2 Growth Rates

Given that over-dimensional load movements will occur from 2013 to 2019, surveyed traffic volumes need to be adjusted to account for background traffic growth. As a worst case, the surveyed traffic volumes were adjusted to the year 2019 to consider the full effect of background growth during the anticipated period of over-dimensional load movements.

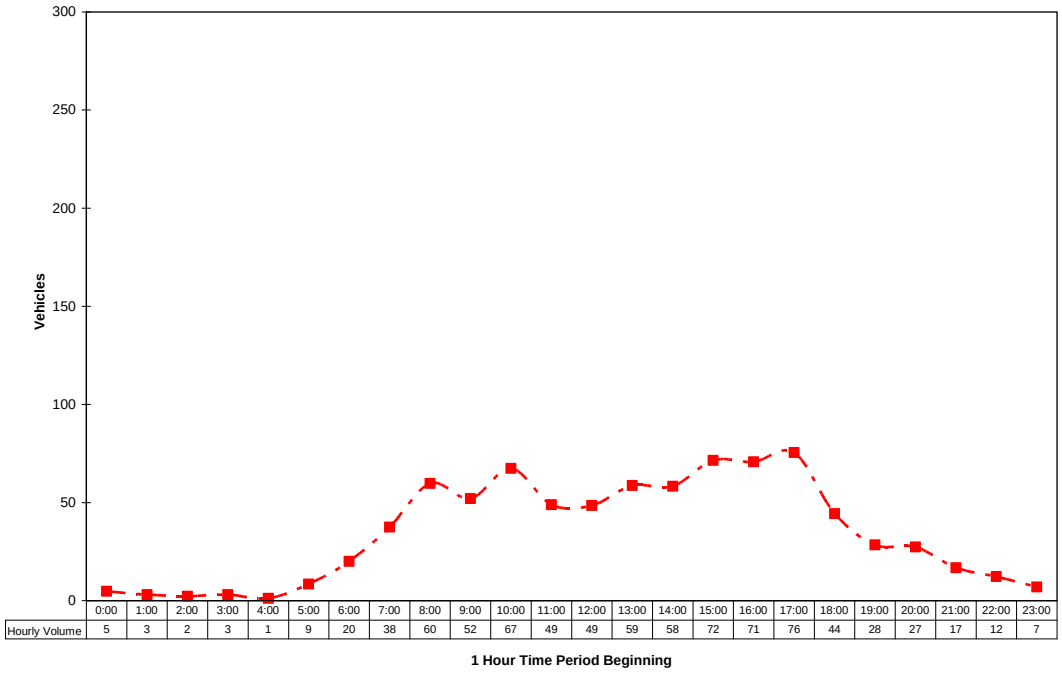
A background traffic growth rate of 1.19% per annum was adopted for the Eyre Highway and sourced from the Bureau of Transport and Regional Economics study, “Demand Projections for AusLink Non Urban Corridors: Methodology and Projections” – Australian Government, 2006. A growth rate of 3.8% per annum was adopted for the remaining local roads of Shack Road, Caroona Road and

Press Road which is broadly based on forecasts contained within the appendices of the Draft Port Augusta West Structure Plan - Road Network Assessment (May 2009). This document provides estimates of 2026 traffic volumes for Caroona Road which can be reduced back to anticipated 2019 traffic volumes assuming an even rate of annual growth. It is noted that this growth rate is conservatively high given that it is greater than the growth projections for both the Eyre Highway and Princes Highway near Port Augusta.

1.5 Daily Profiles

The daily profiles allow an understanding of the number of vehicles likely to be delayed at any time over a 24 hour period. The seven day average daily profiles incorporating the adopted growth rates extrapolated to 2019 are shown in Figure 1 to Figure 3. The Caroona Road volumes have had the Shack Road volumes removed as discussed in Section 1.4.1.

Figure 1 - Shack Road Daily Profile (2019)



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
Hourly Volume	5	3	2	3	1	9	20	38	60	52	67	49	49	59	58	72	71	76	44	28	27	17	12	7

Figure 2 - Approximated Caroona Road Daily Profile (2019)

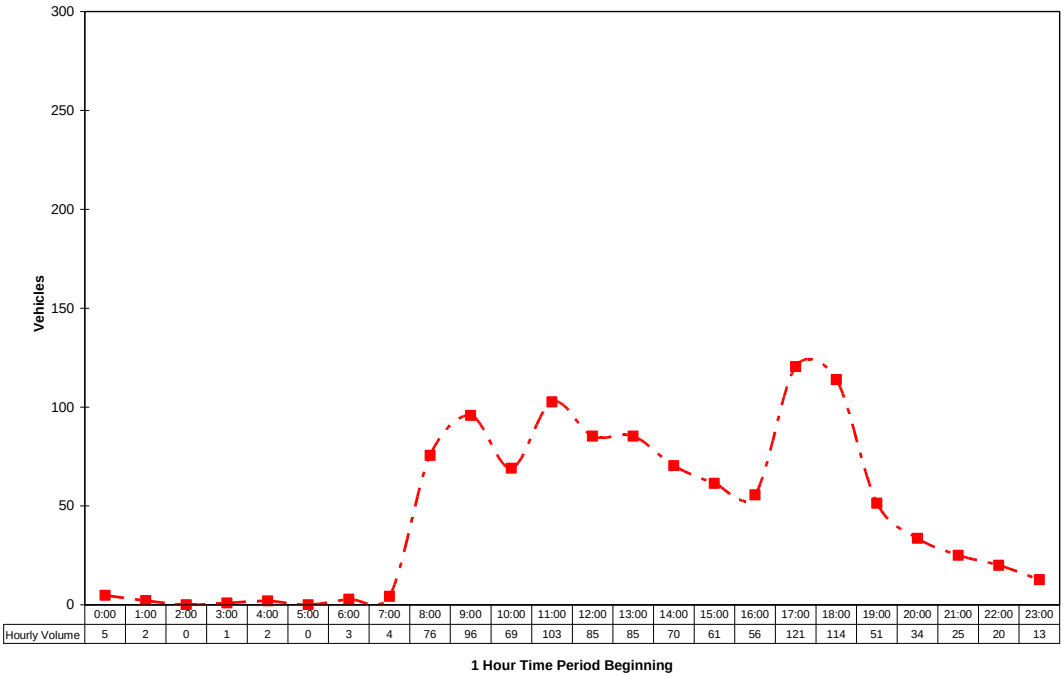
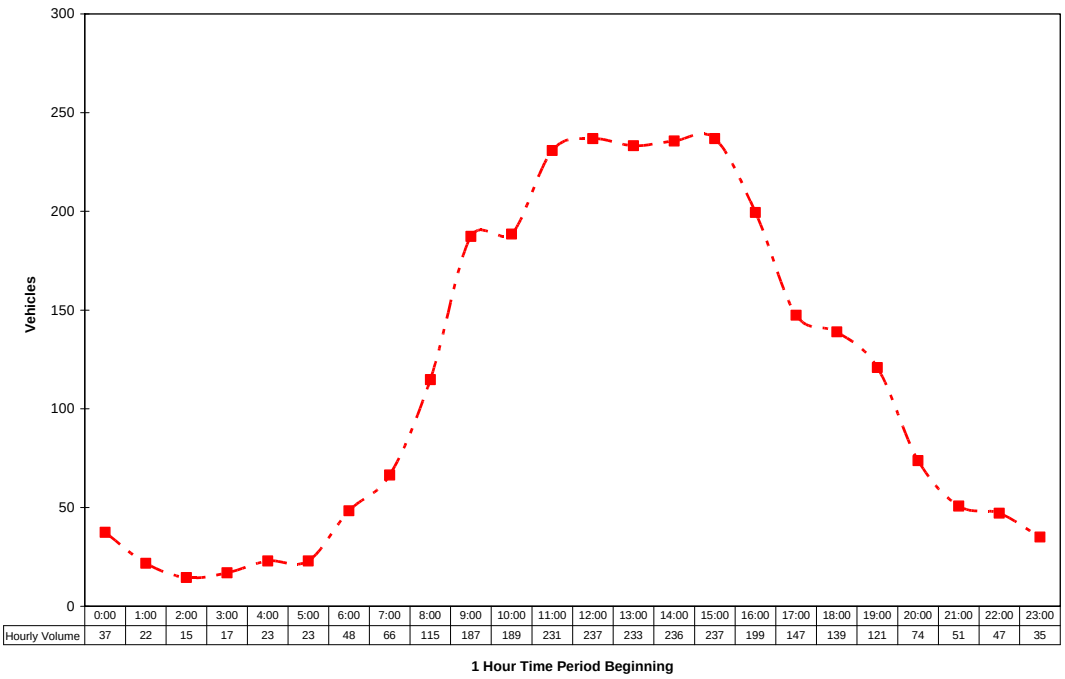


Figure 3 - Eyre Highway Daily Profile (2019)

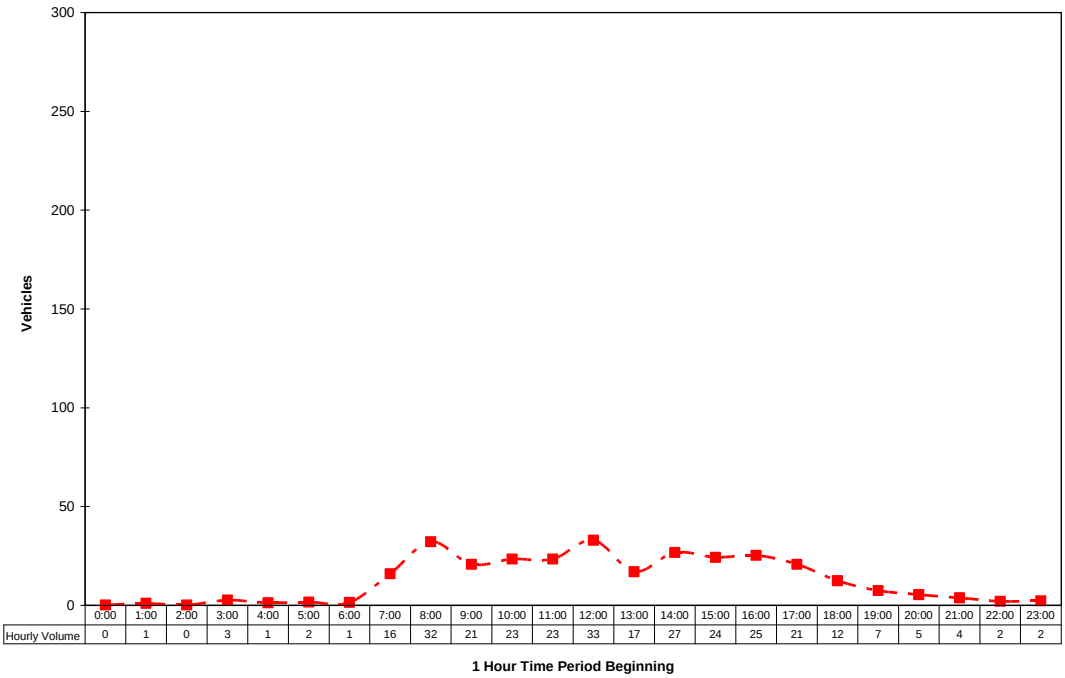


The following key points are noted from the data presented in Figure 1 to Figure 3:

- The Eyre Highway, Caroona Road and Shack Road are important road links for Port Augusta given the traffic volumes recorded.
- The daily profile of traffic volumes along the Eyre Highway is rounded with a peak in the middle of the day.
- The daily profile along Caroona Road has a distinct peak in the PM, which is potentially associated with movements to and from the airport.
- From the daily profiles presented in Figure 1 to Figure 3, the number of vehicles delayed could be reduced by transporting loads during periods of lesser traffic flows (e.g. outside peak periods or at night).

Following movements to the pre-assembly yard, over-dimensional loads would move along the access corridor to the Stuart Highway as per the DEIS. However, for information purposes the daily profile for Press Road was reviewed and is shown in Figure 4.

Figure 4 – Press Road Daily Profile (2019)



It is clear from Figure 4 that the traffic volumes along Press Road are low throughout the day. This is to be expected given the local access function of Press Road and having regard to the limited abutting development and likely low traffic generating intensity of the abutting land uses.

1.6 Estimated Traffic Delays

In order to understand the number of vehicles that would be delayed by the movement of over-dimensional loads, the daily profiles were reviewed for the period 6am-9pm based on the 2019 estimated traffic volumes presented in Section 1.4. Temporary delay periods of 5 minutes, 10 minutes, 15 minutes and 20 minutes were tested to estimate the number of vehicles likely to be delayed as over-dimensional loads cross the public road network. The maximum and average number of vehicles that are likely to be delayed are shown in Table 3 and Table 4, respectively. As discussed in Section 1.5, an assessment of Press Road has been undertaken for information purposes only, as over-dimensional load movements are not expected to use the access corridor.

Table 3 - Maximum Number of Vehicles Delayed (6am-9pm)

Road Name	Maximum Number of Vehicles Delayed (both directions combined)				Peak hour beginning
	5 min delay	10 min delay	15 min delay	20 min delay	
Shack Road	7	13	19	26	5pm
Caroona Road	11	21	31	41	5pm
Press Road	3	6	9	11	12pm
Eyre Highway	20	40	60	79	12pm, 3pm

Table 4 - Average Number of Vehicles Delayed (6am-9pm)

Road Name	Average Number of Vehicles Delayed (both directions combined)			
	5 min delay	10 min delay	15 min delay	20 min delay
Shack Road	5	9	13	18
Caroona Road	6	12	18	23
Press Road	2	4	5	7
Eyre Highway	14	28	41	55

As indicated in Table 3 and Table 4, the roads with greater traffic volumes (e.g. Eyre Highway) have a greater number of vehicles that are likely to be delayed by over-dimensional loads being transported along the access corridor and crossing the public road network. It is also noted that the peak hours for each of the roads vary across the day.

1.7 Summary

Traffic data has been collected and analysed for the roads between the landing facility and the pre-assembly yard that interface with the proposed access corridor, with analysis undertaken to determine the number of vehicles likely to be delayed under numerous delay scenarios. The results indicate that the traffic volumes are greater on the Eyre Highway with a peak in the middle of the day. The traffic survey data suggests that there is an opportunity to consider the movement of over-dimensional loads outside peak periods.