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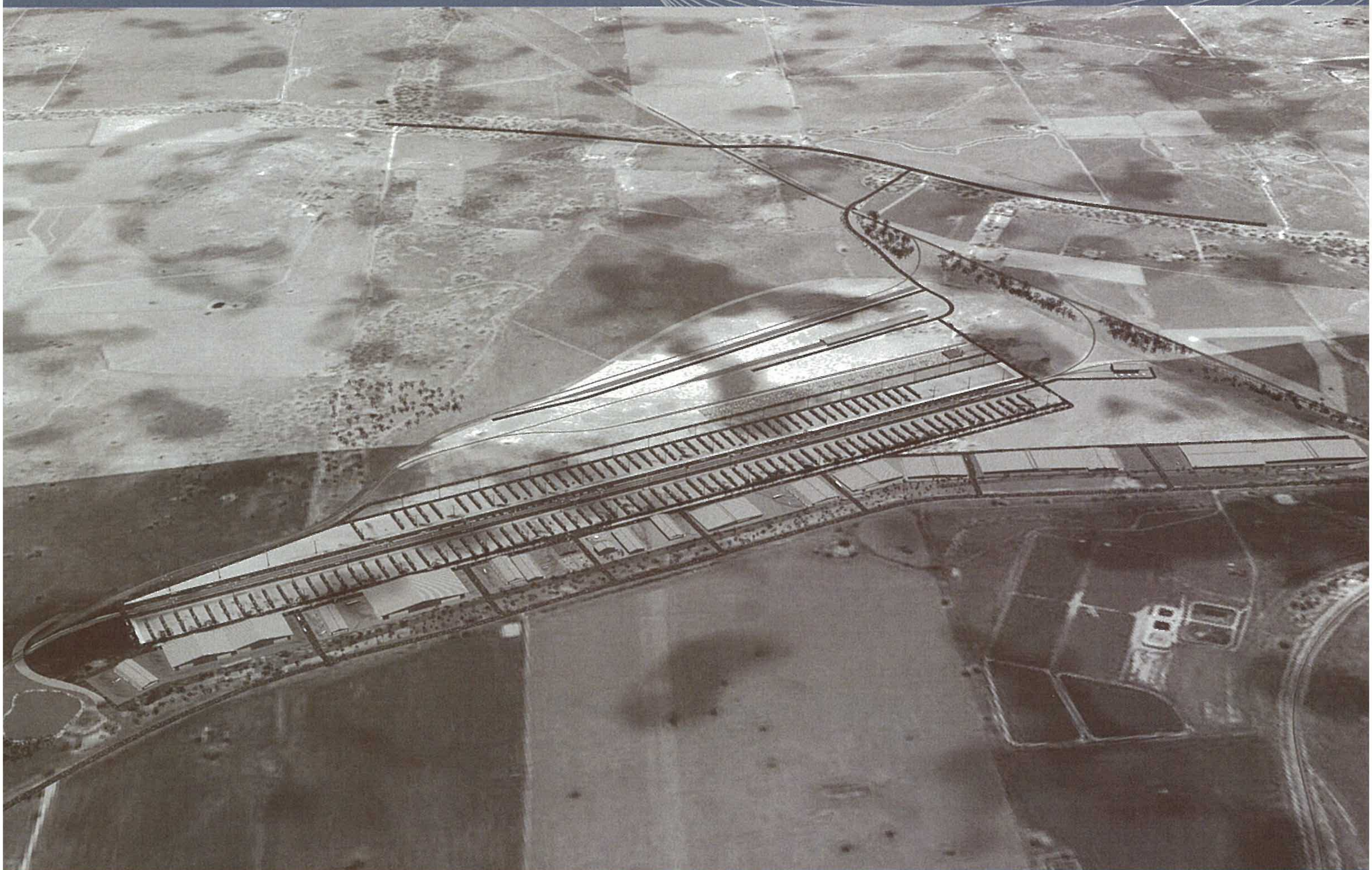
APPENDICES



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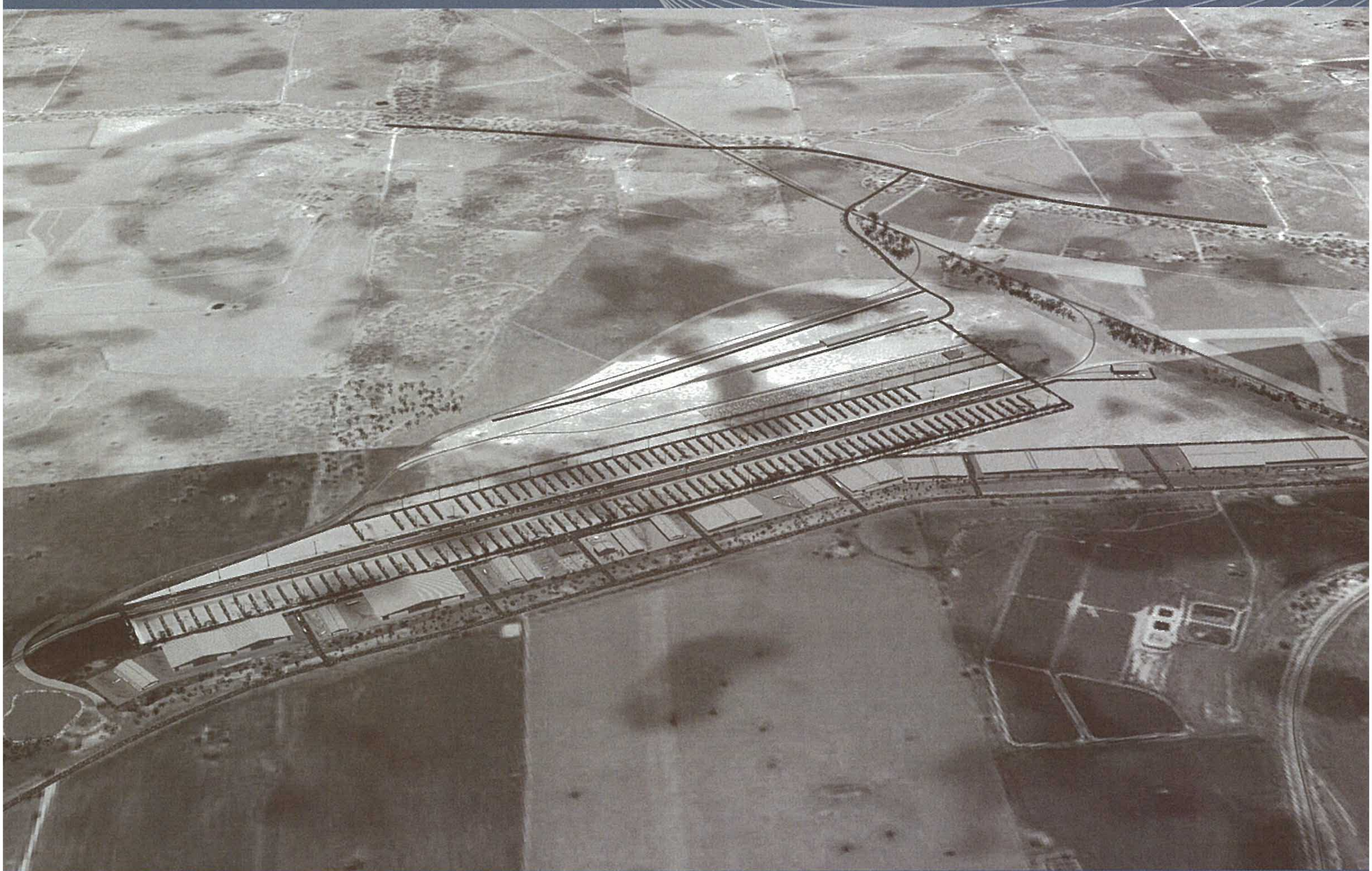
APPENDIX A

DIRECTOR GENERAL'S REQUIREMENTS



NSW GOVERNMENT
Department of Planning

Contact: Keiran Thomas
Phone: (02) 9228 6415
Fax: (02) 9228 6466
Email: keiran.p.thomas@dipnr.nsw.gov.au

Our ref: 9040698
Your ref: 21/13701/116091

Mr Andrew Ginns
Principal Environmental Planner
GHD Pty Ltd
10 Bond Street
SYDNEY NSW 2000

Dear Mr Ginns

Proposed Inter-Modal Freight Terminal, Brolgan Road, Parkes – Parkes Local Government Area

I refer to your correspondence of 2 November 2005 with which you request Director-General's assessment requirements for the preparation of an Environmental Assessment in relation to the above project.

The Director-General's Environmental Assessment Requirements are attached, pursuant to section 75F(2) of the *Environmental Planning and Assessment Act 1979*. It should be noted that the Director-General's requirements have been prepared based on the information provided to date. Under section 75F(3) of the Act, the Director-General may alter or supplement these requirements if necessary and in light of any additional information that may be provided prior to the proponent seeking approval for the project.

You should ensure that you consult with the Department prior to submission of a draft Environmental Assessment to determine:

- fees applicable to the application;
- relevant land owner notification requirements;
- consultation and public exhibition arrangements that will apply; and
- number and format (hard-copy or CD-ROM) of the Environmental Assessments that will be required.

Once you have lodged the Environmental Assessment, the Department will consult with the relevant authorities to determine the adequacy of the Environmental Assessment. Following this review period the Environmental Assessment will be made publicly available for a minimum period of 30 days.

You should keep the contact officer for this project, Keiran Thomas ((02) 9228 6415, keiran.p.thomas@dipnr.nsw.gov.au), up to date with the progress of preparation of the Environmental Assessment, and seek clarification of any issues that may be unclear or may arise during this process.

Yours sincerely

24.11.05

Chris Wilson
A/Deputy Director-General
As delegate for the Director-General

PARKES INTER-MODAL FREIGHT TERMINAL

ENVIRONMENTAL ASSESSMENT REQUIREMENTS UNDER PART 3A OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

Project	Construction and operation of an inter-modal freight terminal at Parkes, including: a) installation of basic infrastructure including master sidings and passing sidings on the Parkes-Narromine rail line, terminal sidings, rail connections and internal roadways; b) construction and operation of a container storage facility and an operational depot; c) construction and operation of warehousing and distribution facilities, engineering facilities, containerised fuel storage facilities and on-site refuelling facilities; and d) construction of minor infrastructure items including administration offices, maintenance sheds, plant storage and landscaping.
Site	Lot 6 DP857631, Lot 1 DP859593, Lot 98 DP750179, Lot 99 DP750179 and Lot 1 DP1082995.
Proponent	Terminals Australia Pty Ltd
Date of Issue	24 November 2005
Date of Expiration	24 November 2007
General Requirements	The Environmental Assessment must be prepared to a high technical and scientific standard and must include: • an executive summary; • a description of the proposal, including construction, operation, and staging; • an assessment of the environmental impacts of the project, with particular focus on the key assessment requirements specified below; • justification for undertaking the project with consideration of the benefits and impacts of the proposal; • a draft Statement of Commitments detailing measures for environmental mitigation, management and monitoring for the project; and • certification by the author of the Environment Assessment that the information contained in the Assessment is neither false nor misleading.
Key Assessment Requirements	The Environmental Assessment must include assessment of the following key issues: • **Strategic Assessment** – the Environmental Assessment must include a strategic assessment of the project in the context of the strategic direction of the locality and region with consideration of Parkes Shire Council's *Parkes Transport Hub: Local Environmental Study*. As part of this analysis, the assessment should have consideration to the surrounding land uses, the scale, scope and location of the project, as well as existing and future rail and road infrastructure, and likely freight demand, volumes and origin/destination. • **Traffic and Transport Impacts** – the Environmental Assessment must assess the traffic implications of the project, with reference to the capacity, safety and design of key haulage routes to and from the project site. Clear details of any road or rail infrastructure upgrades, particularly at the entrance to the site and at any road/rail interfaces, must be provided in the Environmental Assessment. Assessment of road and rail traffic impacts must include consideration of cumulative traffic impacts and the effect of likely and target modal splits (including maximisation of rail haulage), and must be undertaken in accordance with the RTA's *Guide to Traffic Generating Developments*. • **Noise Impacts** – the Environmental Assessment must assess the predicted noise impact resulting from all noise sources associated with project, with a particular focus on traffic noise at night and in the vicinity of residential and sensitive land uses along haulage routes. The noise assessment must be undertaken in accordance with the *Industrial Noise Policy*, the *Environmental Noise Control Manual* and *Environmental Criteria for Road Traffic Noise*; • **Water Quality Impacts** – the Environmental Assessment must assess the implications of the project for surface water and groundwater quality, especially in relation to the storage and transfer of potential contaminants. Clear details of

	the water balance for the site, and the contaminant management processes to be applied to the project must be provided. • **Land Use Safety** – the Environmental Assessment must include a preliminary risk screening completed in accordance with *State Environmental Planning Policy No.33 – Hazardous and Offensive Development* and *Applying SEPP 33* (DUAP, 1994), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the project. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (DUAP, 1997) and *Multi-Level Risk Assessment* (DUAP, 1997). • **General Environmental Risk Analysis (in relation to all components of the project)** – notwithstanding the above key assessment requirements, the Environmental Assessment must include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of these additional key environmental impacts must be included in the Environmental Assessment.
Consultation Requirements	You must undertake an appropriate and justified level of consultation with the following parties during the preparation of the Environmental Assessment: • NSW Department of Environment and Conservation; • NSW Roads and Traffic Authority; • The Australian Rail Track Corporation Ltd; • Parkes Shire Council; and • the local community. The Environmental Assessment must clearly indicate issues raised by stakeholders during consultation, and how those matters have been addressed in the Environmental Assessment.
Deemed refusal period	Under clause 8E(2) of the *Environmental Planning and Assessment Regulation 2000*, the applicable deemed refusal period is 60 days from the end of the proponent's environmental assessment period for the project.

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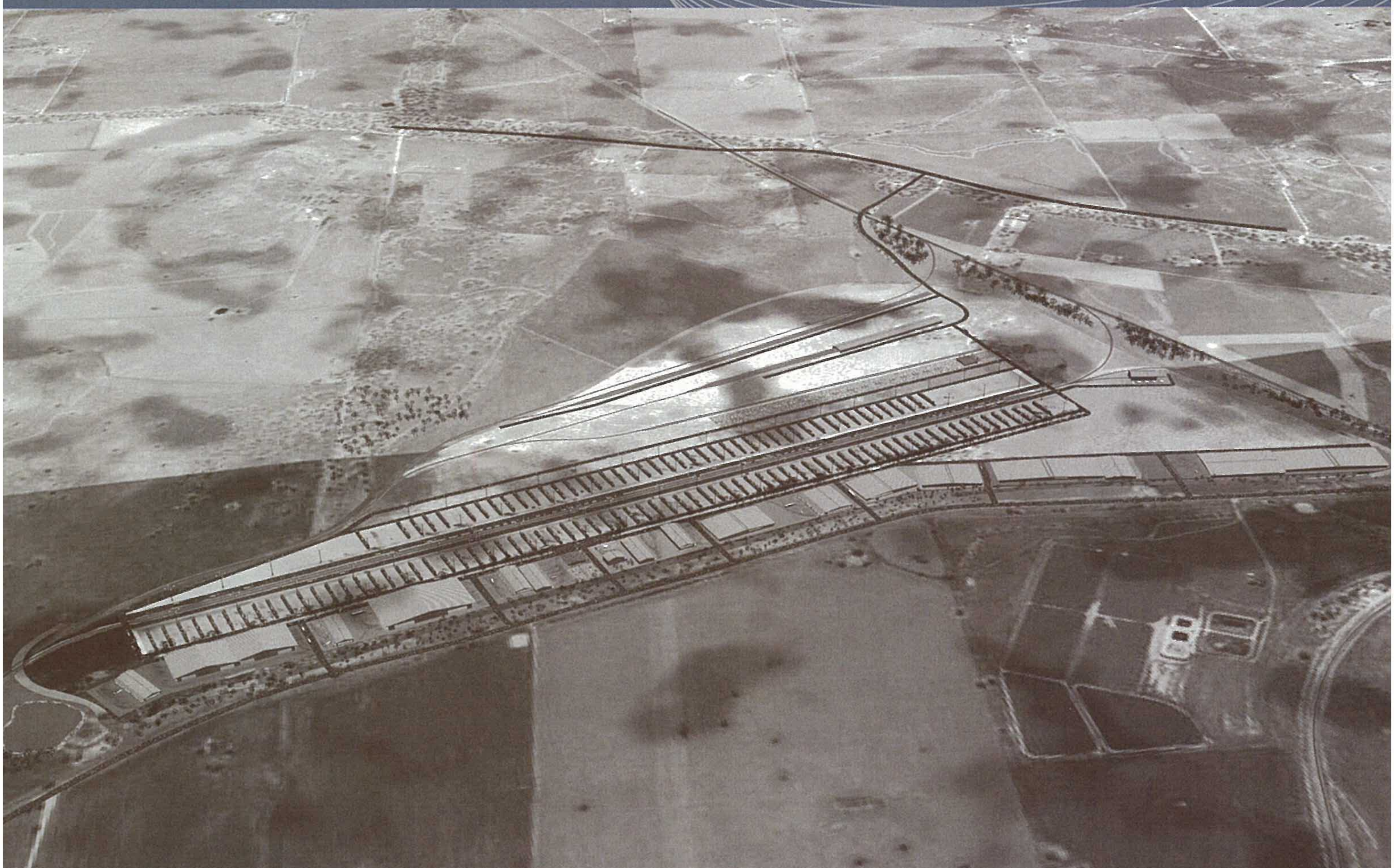
APPENDIX B

DESIGN BRIEF FOR ROAD TRAFFIC INFRASTRUCTURE



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Terminals Australia

Parkes Intermodal Terminal - Concept Design

Design Brief for Road Transport Infrastructure

Final Report

June 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

1.1 Study Purpose

Terminals Australia is proposing to develop a greenfield site in Parkes for the purpose of providing a national road and rail intermodal hub. This facility is identified in this report as the Parkes Intermodal Terminal (PIT).

GHD was engaged by Terminals Australia in 2005 to prepare an Engineering Masterplan for the proposed Parkes Intermodal Terminal, which was to include inputs required to seek development approval for an Ultimate Stage Concept Design.

This Engineering Masterplan was prepared to further develop an understanding of operational and functional requirements for the Intermodal Terminal, its associated facilities and the resulting road based transport infrastructure needs. Relevant findings from the engineering masterplan assessment were used as inputs into the concept design approval process.

The aim of this 'Traffic Assessment' or 'Design Brief for Road Traffic Infrastructure' is to identify the likely impacts from implementing the proposed PIT, as it is known to date, and present mitigation measures that would help to manage and minimise these potential effects.

This study has been undertaken as a desktop assessment, which included a review of background documentation, correspondence with key stakeholders and gaining further knowledge through discussions with other GHD team members.

This e level of analysis completed as part of this investigation exercise

This document provides guidance on Traffic and Transportation elements required as inputs into the Engineering Masterplan and Concept Design planning application.

1.2 Background Documentation

The following guidelines, policy and reports have been reviewed and used as background material in the development of this document

» '*Guide to Traffic Generating Developments'*, Version 2.2, October 2002 (RTA)

» '*Route Assessment Guidelines for B-Doubles and Road Trains'*, Edition 1, Revision 7, February 2000 (RTA)

» Parkes Intermodal Terminal – *'Operational and Functional Brief'*, prepared for Terminals Australia, May 2005 (GHD),

» Parkes Transport Hub – '*Local Environmental Study*', prepared by Parkes Shire Council, March 2002 & September 2003.

» Other relevant guidelines and standards (Austroads and Australian Standards).

1.3 Report Structure

This document as been structured as follows:

Table 1 Document Structure

Report Area	Title	Content
Section 1	Introduction	This Section
Section 2	Existing Conditions	Understanding of the existing context to form part of the Environmental Assessment.
Section 3	Project Description, Objectives & Delivery	Understanding of the project, client and stakeholder expectations, desirable outcomes as a result of delivering this facility, the proposed development stages and approval being sought.
Section 4	Understanding the Traffic Generation Potential	Examination of target throughput, standard traffic generation rates, likely travel patterns and justification of the approach taken.
Section 5	Relationships between Freight Movement and Land Use	Understanding of the target freight task of the proposed development, relationship between activity areas and inbound/ outbound movements by rail and road and potential opportunities to improve efficiency in freight movement by the industry.
Section 6	Project Impacts	Provides the proposed traffic generation in the initial and ultimate stages, road network impacts with and without the development and likely impacts on surrounding level crossings and an understanding of the proposed haulage routes.
Section 7	Relevant Design Standards and Guidelines	Provides an understanding of principles to be applied for the upgrade of the internal and external road networks, intersections and level crossings.
Section 8	Project Summary, Impacts and Recommendations	Identification of key project findings, associated impacts and recommended works and investigations.

2. Existing Conditions

The following section has been developed to provide an understanding of the existing situation.

2.1 Site Location

Parkes is a rural township with a population of approximately 10,000, which is situated approximately 365km west of Sydney. It has established transport connections with a State Highway, two key national rail lines and a regional airport located in the Local Government Area in close proximity to the urban centre. The road and rail networks offer direct connections to Sydney, Brisbane, Melbourne, Adelaide and Perth making Parkes a strategically important for the transporting of freight around Australia and to overseas destinations.

Table 3 presents the proximity and distance of State Capitals and regional centres to Parkes.

Table 2 Travel Distances from Parkes to Major Markets or Ports

Direction	Regional town	Approx Distance (km)	State capital and Ports	Approx Distance (km)
North	Dubbo	115	Brisbane	1000
South	Wagga Wagga Griffith Forbes	290 300 30	Melbourne	720
West	Condobolin	100	Adelaide Perth	1250 3500
East	Orange	95	Sydney	365

Note – all distances are broad estimates rounded to the nearest 5km.

The proposed site for the Parkes Intermodal Terminal (PIT) is located to the west of the township of Parkes in an area recently rezoned as the Parkes Transport Hub (Hub). The ‘Hub’ is zoned for industrial uses and covers an area of approximately 520 hectares. The Hub is located in close proximity to both the rail and road networks that run through Parkes. The ‘Hub’ is situated close to two main rail lines running between Parkes - Brisbane (via Dubbo/ Muswellbrook/ Maitland), Parkes - Sydney (via Orange or Cootamundra), Parkes - Melbourne (via Cootamundra), and Parkes - Adelaide or Perth (via Broken Hill). In terms of supporting road network infrastructure the site is situated in close proximity to the Newell Highway and the Parkes western ring road.

The proposed site is situated at the junction of the Parkes – Narromine and Parkes – Broken Hill rail lines and in the western corner of ‘Hub’. Parkes Shire Council (PSC) envisaged that the 'Hub' is an appropriate location for accommodating transport facilities of regional, state and national importance.

Refer to **Figure 1** for further details of the site proximity to Parkes and the rail and road routes networks.

In terms of boundaries and proximity to Parkes, the site fronts Brolgan Road to the south and Condobolin Road (Main Road 61) to the north, and is situated approximately 4km west of the ring road or 5.5km west of the Newell Highway (State Highway H17) and Parkes CBD.

The proposed site has a 2.8km frontage to the northern side of Brolgan Road located west of the existing Parkes to Narromine rail level crossing. The site also has a 650m frontage to Condobolin Road, which is situated to the east of the Parkes to Narromine rail level crossing.

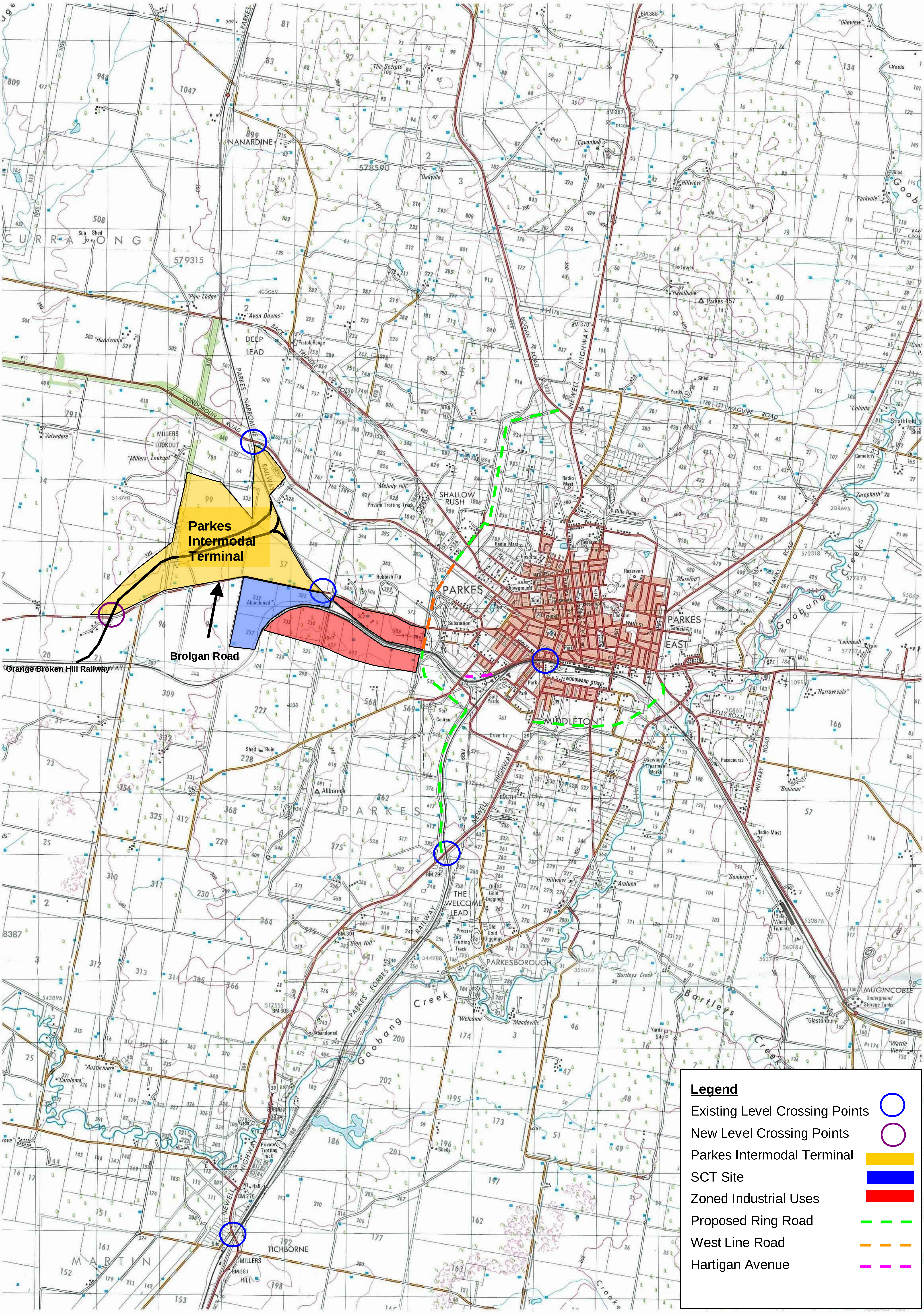


Figure 1 – Locality Plan

2.2 Local and Regional Road Network

Road freight travelling to and from the site is likely to use the State road network, completed sections of the western ring road and Brolgan Road (Refer to **Appendix B**). Currently, the major road freight movement through Parkes is north south along the Newell Highway with movement from the west and east representing significantly lower traffic movement. This report firstly assesses the current operating conditions along the study area road network, and then considers the traffic impacts from the proposed development of an intermodal terminal.

2.2.1 Existing Road Characteristics and Hierarchy

The classification of roads along the existing road network can be used as an indication of the functional role each road plays with respect to the volume of traffic they should appropriately carry.

The NSW Roads and Traffic Authority (RTA) has developed a set of road hierarchy classifications for urban situations, which have typical nominal volumes expressed in terms of average annual daily traffic (AADT) served by various classes of roads.

Table 3 RTA Functional Classifications of Roads

Type of Road	Traffic Volume (AADT)	Peak Hour Volume (vph)
Arterial Road	>15,000	1,500 – 5,600
Sub-Arterial Road	5,000 – 20,000	500 – 2,000
Collector Road	2,000 – 10,000	250 – 1,000
Local Road	<2,000	0 – 250

These classifications can be used in this study to assess the pre and post development capacity levels along urban type roads situated in Parkes. However, it should be noted that the majority of the road sections that are likely to be impacted have rural characteristics and will not attract high urban type traffic volumes.

Brolgan Road

Brolgan Road (Shire Road 40) is a rural road that is maintained under the control of Parkes Shire Council. The Brolgan Road route runs between Middleton Street in Parkes in the east, to Brolgan, Nelungaloo and beyond in the west. The proposed site is located approximately 4km west of the intersection with Coronation Avenue.

Brolgan Road is a typical rural road with a single carriageway and two traffic lanes, one in each direction. The route travels through an area, which is predominantly used for grazing and crops. The sealed carriageway width is approximately 7m with a 1m sealed shoulder for the majority of its length. The signposted speed limit is 100km/h in the vicinity of the site transitioning to 80km/h near to the level crossing with the Parkes to Broken Hill rail line and 50km/h to the east of the ring road (West Lime Road). The road alignment of Brolgan Road consists of a number of base curves that can be negotiated at high speeds and moderate changes in gradient. The pavement is described as suitable for current traffic loads, however, unlikely to be capable of supporting increases in heavy vehicle traffic.

Traffic approaching from the east, currently travel over the Parkes to Broken Hill rail line at a level crossing, which is situated to the southeast of the site. This crossing is currently controlled by type F flashing lights and is known to have some restricted sightlines.

Brolgan Road is planned to become a key road link that will serve the development of the 'Hub'

Brolgan Road is also understood to be influenced by seasonal traffic flows that are associated with agricultural uses and storage facilities situated near to the west of Parkes. These uses generate higher than average traffic volumes and would be expected to consist of heavy vehicles that are transporting goods to markets.

Condobolin Road

Condobolin Road is a State Road (known as MR 61) and falls under the control and maintenance of the Roads and Traffic Authority (RTA). The road is a designated B Double route, which permits road train movements under certain weather, time and period operating restrictions to travel west of Parkes. The alignment of the route runs predominantly east-west between Parkes and the township of Condobolin.

Condobolin Road is a typical rural road with a sealed carriageway width of approximately 8.5m, two 3.25m wide traffic lanes, 1m wide sealed shoulders and appropriate linemarking. The signposted speed limit is 100km/h in all rural areas transitioning to 80km/h then 50km/h in Dalton Street.

Newell Highway

The Newell Highway is known as SH 17 and is under the control and maintenance of the RTA. The route is one of NSW's longest highway stretches, which starts at the Victorian border near Tocumwal and runs north to Goondiwindi on the Queensland border. The highway passes through rich agricultural lands in the Riverina and Hay Plains, crop growing country around West Wyalong and vast sheep, cattle and crop plains near Moree.

The Newell Highway is a typical high quality rural highway with a single traffic lane in each direction and a speed limit of 110km/h in rural areas with a transitioning through to 80km/h and then 50km/h through Parkes. Overtaking opportunities are provided along the route and the typical sealed carriageway width is in the order of 10m including shoulders with generally good pavement conditions. All level crossing points along the Newell Highway are designed to accommodate daily traffic volumes in excess of 2,000 vehicles and B double type vehicles.

On entry to Parkes CBD, both heavy vehicles and through traffic are encouraged to travel along Bogan Street and the recently opened western section of the Ring Road between Condobolin Road and Hartigan Avenue via Brolgan Road.

Parkes Ring Road System

The long-term aim of Council is to protect the amenity of Parkes residents from traffic growth and facilitate the transporting of freight. The development of the Parkes ring road system will address these objectives and is planned to divert heavy vehicle traffic from the Newell Highway and east-west road routes running through existing residential and commercial areas of Parkes.

Refer to **Appendix C** for an understanding of the PSC planned ring road system around Parkes.

Table 4 Staged Development of Ring Road

Stage	Section	Link by colour – Appendix C	Timeframe
1	Hartigan Ave to Brolgan Rd	Dark Blue	Completed
2	Short St/ Clarinda St intersection	Red	Completed
3	Bogan Street	Yellow	Ongoing
4	Brolgan- Condobolin Rd Link (West Lime Rd)	Green	Completed
5	Blaxland St – Saleyards Rd – SH17 link	Brown	By Demand
6	Condobolin Rd – SH17 link (Northern)	Orange	By Demand
7	Rail overbridge and West Lime – Saleyard link road	Pink	By Demand
8	SH17 – MR61 east (Southern)	Purple	By Demand

Source - Parkes Transport Hub – Local Environmental Study, Parkes Shire Council (March 2002)

Note – refer to **Appendix C** for a reference to the road link colours mentioned above.

Table 5 indicates that the Hartigan Avenue and West Lime Road is already completed and provides a connection between the Newell Highway at Forbes Street and Condobolin Road.

The future development of the Northern and Southern sections of the Ring Road will provide significant benefit to the township of Parkes, in that it would improve amenity through the redistribution of existing heavy vehicle traffic movement to more suitably road links. The recent completion of the central Western Section of the ring road will assist in minimising the impact on residential amenity from both existing and future road freight movement through Parkes that could be generated by existing industrial uses, growth in the Goobang Junction Industrial Area and development of the Parkes Transport Hub.

Western Ring Road (completed section)

The western ring road currently consists of Hartigan Avenue and West Lime Road.

West Lime Road section is understood to have recently constructed and opened to traffic by Parkes Shire Council. The route runs north-south, providing access from Condobolin Road to Hartigan Avenue for traffic wanting to travel to the Goobang Junction Industrial Area and the Parkes Transport Hub. This road section of the future ring road system together with Hartigan Avenue has recently been identified in the RTA Classification Review for potential reclassification as a State Road.

The carriageway width is in the order of 10m including a 1m wide sealed shoulder. The completed western ring road section is a designated B Double route, which could in the future potentially accommodate road train movements under certain weather, time and period operating restrictions. The speed limit along the western ring road is 80km/h.

Hartigan Avenue

Hartigan Avenue has recently been extended and upgraded by Parkes Shire Council to become the designated truck route between the Newell Highway and the Goobang Junction Industrial Estate or the Parkes Transport Hub. The works were completed in early 2005 and aimed to provide a continuous route between the Forbes Street level crossing and West Lime Road. The route follows the existing Orange - Broken Hill rail alignment and was aimed at reducing impacts on residential amenity from additional heavy vehicle movement generated by the proposed FCL Intermodal Terminal.

The Hartigan Avenue route fronts residential properties in the east, the rail corridor to the south, land zoned for industrial uses in the west and open space situated to the north. The design of the route is intended to limit access between Forbes Street level crossing and West Lime Road to the collector road system, this being Blaxland Street, Best Street and Hooley Street. Under section 8.2 of the 'Review of Environmental Factors – Access Road for the Goobang Junction Industrial Area' prepared by Parkes Shire Council and through further discussions with Council, it has been identified that the intended upgrade of Hartigan Avenue was for it to act as an arterial road for movement between the Newell Highway and industrial land uses situated to the west.

Hartigan Avenue together with West Lime Road form part of the future Western Ring Road (Newell Highway Bypass) and as a result are constructed to a heavy vehicle standard suitable for B Double access. The road is appropriately linemarked and has a 9 metre sealed carriageway with two 3.5m wide traffic lanes and 1m shoulders. The road is signposted at 50km/h along urban sections of the route.

Proposed Saleyards Road Ring Road Connection (Interim Option)

Blaxland Street crosses a level crossing situated on the Orange – Broken Hill rail line near to the intersection with Hartigan Avenue. This access point offers an alternative road connection via Saleyards Road and Ackroyd Street to the Newell Highway and avoids the level crossing on the Newell Highway to the south of Hartigan Avenue.

.

This interim ring road route requires traffic to travel over two level crossings, the first crosses the Orange – Broken Hill railway near to the intersection with Hartigan Avenue and the second is situated on Saleyards Road and crosses the Parkes – Forbes Railway near to the intersection with Ackroyd Street.

The key movement at the Hartigan Avenue with Blaxland Street intersection is known to be the movement along Hartigan Avenue, however, the priority at the intersection is currently given to Blaxland Street and is to compensate for the lack of storage space between Hartigan Avenue and level crossing.

The Blaxland Street level crossing is understood from the 'Baker Saran Pty Ltd - Road Safety Audit' report to be situated close to Hartigan Avenue and consists of approach warning signs, flashing lights and boom gates. The audit report was included Council's traffic committee meeting minutes dated February 2005. The minutes from this meeting indicate that the Council Committee recommended that priority at the intersection be changed from Blaxland Street to Hartigan Avenue and that the intersection be widened with turning lanes to provide adequate storage for road train movement.

It was also noted in discussions with Council that the section of Saleyards Road between Blaxland Street and Ackroyd Street is narrow and currently not of a suitable standard for B Double type vehicles. It was also noted that a review of the Saleyards Road level crossing maybe required as part of introducing this connection as part of the proposed Parkes Ring Road.

2.3 Road Performance

A criteria for evaluating the operational performance of mid block rural road sections is provided in the *AustRoads - Guide to Traffic Engineering Practice: Part 2 –Roadway Capacity, section 3.4.*

The Level of Service (LOS) is a qualitative measure describing the operational conditions within a traffic stream taking into consideration the perception of motorists and/or passengers and is typically based on typical volume/capacity (V/C) ratio. The characteristic conditions for each level of service can be graded on several measures from level of service A (good) to level of service F (unsatisfactory).

Table 5 Operating Conditions with LOS and V/C comparisons

Level of Service	Description	Volume to Capacity Ratio (V/C)
A	Free flow conditions with drivers unaffected by other movements in traffic stream	<0.65
B	Stable flow with drivers having reasonable freedom	0.65 to 0.75
C	Stable flow, but drivers somewhat restricted	0.75 to 0.85
D	Approaching stable flow limits with drivers significantly restricted	0.85 to 0.95
E	Unstable flow, traffic at or close to capacity with drivers severely restricted	0.95 to 1.0
F	Forced flow, over capacity limits	> 1.0

The following section provides an evaluation of current traffic operations along both rural and urban roads likely to be directly impacted by traffic generated from the proposed development. The criteria for evaluating the operational performance of the road network are provided in **Tables 5** and **7.**

2.4 Rural Road Performance Criteria

The performance guideline used in this assessment for rural roads is taken from the traffic volume design ratio of between 10% and 12% for peak hour traffic against average daily traffic with road conditions being typically flat terrain.

The below performance criteria presented in the table below will be used to evaluate traffic conditions on all rural road approaches into Parkes which includes: the Newell Highway, Condobolin Road, Brolgan Road, Wellington Road, Orange Road and Eugowra Road.

Table 6 Level of Service Criteria for Two Lane Two-Way Rural Roads

Level of Service	Description	Maximum AADT
A	Free flow with low volumes with little or no delay	2,400
B	Stable flow with minimum delays and spare capacity	4,800
C	Stable conditions with spare capacity	7,900
D	Close to the limit of stable flow, operating near capacity	13,500
E	At capacity with high delays for motorists	22,900
F	Forced flow capacity exceeded unsatisfactory operating conditions	>22,900

Source: Austroads (Table 3.9): assuming two lane two-way road, level terrain, K factor = 0.10 and 60/40 directional split

2.4.1 Urban Road Performance Criteria

The below performance criteria presented in **Table 8** will be used to evaluate traffic conditions on the urban road sections within Parkes likely to be impacted by the proposed development. Roads that are urban in character and are evaluated as part of this assessment include Hartigan Avenue, Bogan Street and Dalton Street. All three of these roads are classified under the capacity thresholds for roads as '*urban undivided highways with interrupted flows'*.

Typical mid-block capacities for various lane configurations for urban roads are listed in **Table 7.**

Table 7 Level of Service Capacity Thresholds for Roads

Road Type	Capacity per Lane (veh/hr)	Max V/C for Los D	Max Service Flow Rate per lane for LoS D
Urban Divided/Undivided Highways with Clearways and signal coordination	1,600	0.90	1,440
Urban Divided/Undivided Highways with Interrupted Flow	1,000	0.90	900
Residential Streets	700	0.90	630

The information above indicates that each traffic lane along urban road sections through Parkes can cater for traffic levels of up to 900 vehicles per hour. The performance guideline used in this assessment for urban roads is based on the peak hour representing approximately 10% of the overall average daily traffic volume and a traffic directional split of 60/40.

2.4.2 Study Area Road Network Performance Assessment

Table 8 presents the performance levels of relevant road routes through the Local Government Area of Parkes using traffic volumes provided by the RTA, Council and the LOS criteria set in **Tables 6 and 7.**

Table 8 Performance Level of Key Approach Routes to Parkes (2005)

Rural/ Urban	Road Name	Count Location	Performance Level (LOS)	Traffic Volumes (AADT or ADT)
Rural	Brolgan Road	East of the site and west of the level crossing	A	188
Rural	Condobolin Road	At level crossing, west of Parkes	A	1036
Rural	Newell Highway – north	Parkes, 3.2km north of Court St	B	5337
Rural	Newell Highway – south	At Forbes/Parkes boundary	B	5620
Rural	Orange Road	Parkes, at Billabong Ck bridge	A	2031
Rural	Wellington Road	Parkes, 8km north of SH17, Newell Hwy	A	408
Rural	Eugowra Road	At Forbes/Parkes boundary	A	488
Urban	Hartigan Avenue	West of Forest Street	A	450
Urban	Bogan Street	North of Hartigan Avenue	A	5427
Urban	Dalton Street	West of Bogan Street	A	1943

Sources – AADT volumes for state roads have been taken from RTA Western Region traffic data. ADT volumes for Brolgan Road, Hartigan Street, Bogan Street and Dalton Street have been obtained from Parkes Shire Council supplied information.

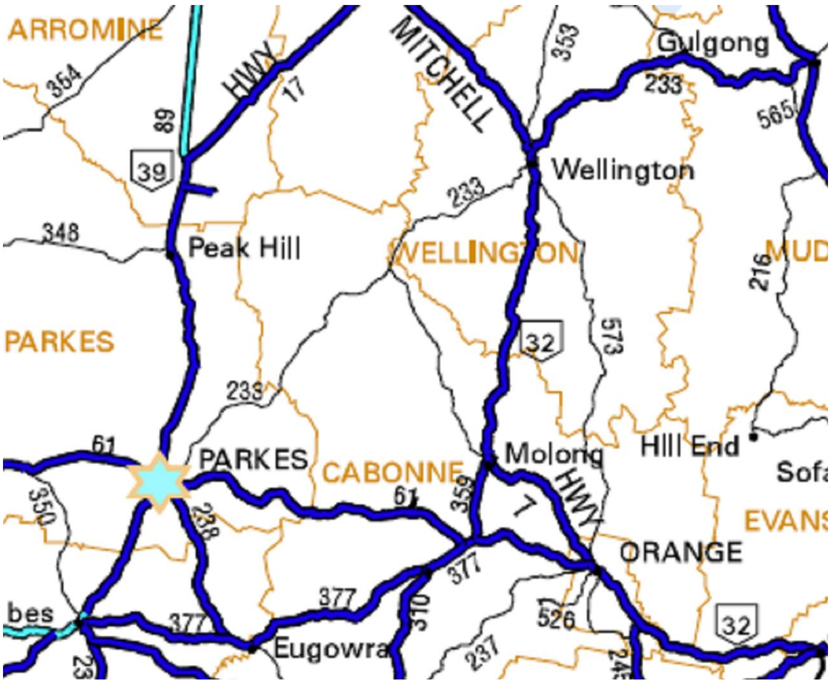
Note - Traffic volumes and performance levels have been factored up for 2005 traffic levels and include estimated per annum (pa) growth rates for background light traffic and a 3.6% pa increase in road freight.

Generally, a road with an operating performance (Level of Service) of A or B is desirable and a road section with an operating performance of Level of Service C is viewed to be acceptable. Using this evaluation criteria, it appears that currently both urban and rural road sections that could potentially be impacted by traffic generated from the proposed development operate satisfactorily.

2.5 Haulage Routes

Access routes in NSW for B Double trucks up to 25m in length and road trains up to 36.5m in length can be obtained from RTA's website. Information for the Parkes area is contained in the country towns and Hunter Valley sections and is presented in **Figures 2** and **3**.

Figure 2 Designated B Double and Road Train Routes in the Region



Source - RTA website – www.rta.nsw.gov.au

Notes

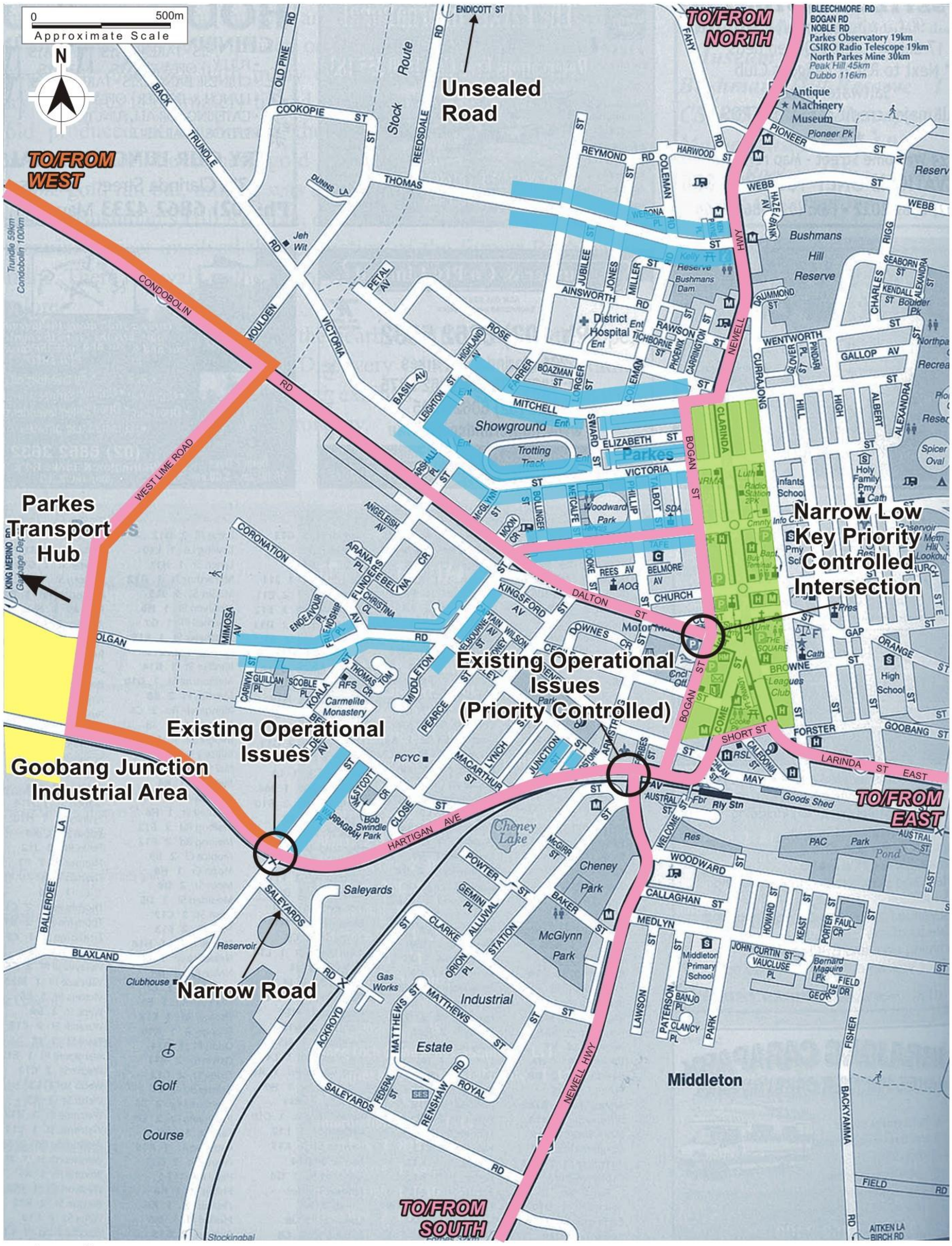
» red bold lines represent roads that are designated B double routes (upto 25m).

» yellow bold lines represent roads that are designated road train routes (upto 36.5m).

Figure 2 indicates that the township of Parkes has good access to the regional road network with the following roads designated as having the ability to accommodate B Double vehicles:

- State Highway (SH) 17 - Newell Highway south of Parkes;
- SH17 - Newell Highway north of Parkes;
- Main Road (MR) 61 – Condobolin Road west of Parkes;
- MR61 – Orange Road East of Parkes; and
- MR 238 – Eugowra Road south east of Parkes.

RTA mapping also indicates that the road network to the west of the Newell Highway at Forbes and to the north of Peak Hill is able to accommodate road trains upto 36.5m in length.



Legend

- Approved B Double Truck Routes
- Approved Road Train Truck Routes
- CBD
- Sensitive Land Use (Residential, Recreational, Educational)
- Industrial Uses

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Parkes Intermodal Terminal

Approved Truck Routes Through Parkes

scale: as shown | date: 24 May 2006

job no: 21-13701-08
file ref: 2113701-08_LTN_02.cdr

Figure 3

10 Bond Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Figure 3 provides an understanding of B double routes through the township of Parkes. These routes have recently changed as a result of opening western sections of the Parkes ring road system.

It is noted from the review of Council's Traffic Committee Meeting Minutes that authorisation has been granted by the Regional Traffic Committee for the use of road trains along roads situated in Parkes. This authorisation for the operation of road trains along public roads is usually restricted to selected road routes, to a haulage operator, a set time period and days of operation. The method for obtaining approval for the use of road trains is provided in RTA's '*Route Assessment Guidelines for Restricted Access Vehicle'* and should be used if a section or a number of sections of the state or local road network is required to be opened for restricted vehicle access.

3. Project Description, Objectives & Delivery

The following section provides a summary of the proposed development, its operating parameters, the client's and key stakeholder expectations, development staging and approval being sought. A conceptual site layout presenting the size and location of functional areas in the initial and ultimate stages is presented in **Appendix A**.

3.1 Project Outline

This section presents relevant information in terms of GHD's understanding of the client's (Terminal Australia) expectations of the PIT. All of the below information has been obtained from a review of the Parkes Intermodal Terminal – *'Operational and Functional Brief'* prepared by GHD.

3.1.1 Functions

The Parkes Intermodal Terminal will provide the following features:

- The most efficient infrastructure for attracting operators, freight forwarders and distributors to the site;
- Open access to common user facilities for both Customers and Clients of Terminals Australia;
- A full range of best practice container handling, storage, warehousing, and logistics facilities;
- Fixed and leading edge technology to support the supply chain transactions;
- Compliance systems for accommodating goods being imported or exported; and
- Appropriate infrastructure linkages to rail and road networks.

3.1.2 Operating Parameters

The operations of the Parkes Intermodal Terminal are likely to be targeted towards the following:

- 6 days a week operation or 312 days per annum;
- A market share of total container movement through Parkes of 25% in the initial stage and 45% at the ultimate stage.
- An average annual growth in market share of approximately 2% per annum between initial and ultimate stages;
- Throughput at the PIT of approximately 240,000 TEU per annum in the initial stage and approximately 530,000 TEU per annum at the ultimate stage;
- Handling between 12 (Initial) and 24 (ultimate) container rail services during a typical week or between 2 to 4 a day;

- Rail services from the west, as the container terminal is likely to be an attractive site for building and dismantling double stacked container services with origins or destinations in the west; and
- Access points that offer vehicle operating cost savings, minimise delay and have functional purposes for entry/exit to/from specific areas of the site.

3.2 Stakeholder Expectations

Consultation was undertaken during April and May 2005 with key stakeholders as part of the processes for assembling the operational and functional brief. The stakeholders involved in these meetings consisted of Parkes Shire Council, Roads and Traffic Authority, Australian Rail Track Corporation (ARTC) and Country RIC (RIC). Comments made by RIC and ARTC will not be considered in this part of this report as they are not deemed to be relevant to road infrastructure upgrades, except in the case of level crossings. Refer to section 5 of the Terminals Australia PIT - Operational and Function Brief for further information on stakeholder consultation during this period.

A review of the key findings from the consultation process has identified the following expectations and concerns:

Parkes Shire Council

- Currently seeking to improve road infrastructure in Parkes by developing a bypass system around Parkes CBD to cater for the future growth in road freight;
- Recognises that both Brolgan and Condobolin Roads currently accommodate low volumes of heavy vehicle traffic and that any future increase in road freight may require the upgrading certain sections of these road links in order to support this type of movement;
- Requires the report to provide an understanding of the potential increases or change in heavy vehicle traffic movement through Parkes as a result of the staged development of the PIT;
- Requires the study to investigate the potential benefits from constructing an alternative local road route through the site for Brolgan Road traffic when the proposed western level crossing is fouled by a freight train;
- Requires the masterplan study to review the minimum upgrade requirements for Brolgan Road from West Lime Road to the western side of the proposed site as a result of its proposed use. Council have suggested that as a minimum two 3.5m wide traffic lanes and 1.5m wide shoulders should be;
- Requires the study to provide an understanding of upgrade requirements at the Brolgan Road level crossing with the Parkes-Narromine Rail line;
- Requires the concept design for the PIT facility ensure that there is no fouling of Brolgan Road by trucks entering and exiting the site; and
- Wants the study to minimise both road safety risks and loss of amenity along Brolgan Road through investigation of the possible benefits from reducing the current signposted speed limit.

Roads and Traffic Authority

- Requires the design to consider access to the site via a single point of access located along Brolgan Road;
- Requires the study to investigate the potential benefits from providing a northern access point to Condobolin Road and the possible timing. However, the authority does not consider that an access to MR 61 (Condobolin Road) would be necessary as the number of trucks moving west are minimal and could be adequately served by a Brolgan Road access;
- Requires the study to investigate the minimal level crossing upgrade requirement as a result of the development. The authority suggested that it expected that a type F level crossing was required as a minimum at level crossing points adjacent to the site. Consideration for boom gates and advanced warning systems should be based on a risk assessment of approach sight distances and heavy vehicle volumes. The authority also indicated that the existing Brolgan Road level crossing is known to be narrow with poor sight distances to the west as a consequence of the angle that the rail line and road cross. This presents a potential need for an early warning system;
- That the '*RTA Guide to Traffic Generating Developments'* be used in the assessment of road infrastructure needs as a result of developing an intermodal facility at Parkes; and
- Requires the study to provide future traffic volumes and freight tonnage values for consideration in the upgrade of Brolgan Road.

3.3 Major Project Elements

The Parkes Intermodal Terminal is understood to comprise of the following elements:

- Site entrances that provide sufficient capacity and allow direct and safe access from Brolgan Road to various operating areas of the site;
- A possible site entrance on Condobolin Road for traffic travelling to and from the north and west;
- A safe and efficient internal road network that services all on-site activities and minimises conflict;
- Nearby off street car parks to support all on-site activities;
- Warehouses and storage areas for truck traffic;
- Stack areas;
- Container transfer vehicles;
- On site level crossings;
- Yards operational depot;
- Administration and security offices;
- Heavy Engineering Facility Area (operations not assessed as part of this application);

- A possible containerised fuel area (operations not assessed as part of this application);;
- New rail lines and spurs to support the proposed activities;
- Upgrade to level crossings situated along Brolgan Road;
- Upgrade to Brolgan Road to a suitable standard that is sufficient for accommodate the worst type vehicles likely to be attracted to the site during normal operations; and
- Other ancillary items to support the overall operation of an Intermodal Terminal.

3.4 Advantages of the Proposal and Desirable Outcomes

The following provides a summary of the cited advantages of the proposed PIT and the client's desired outcomes from the project.

3.4.1 Advantages of the Proposal

The Parkes Intermodal Terminal is expected to provide for a growing freight demand and fulfil a number of strategic aims of State and Federal Governments. Advantages of the proposal include:

- There is an expectation that road and rail freight movement around Parkes will grow at a steady rate in line with what was presented in the *Auslink White Paper 2004*. The *Austlink White Paper 2004* indicates that road freight will grow by 3.6% and rail freight by 3.4% per annum;
- This growth in road and rail freight movement around Parkes will occur with or without the establishment of an intermodal terminal in Parkes;
- The operation of the intermodal terminal in Parkes is likely to capture some of this existing and future movement;
- The facilities at the PIT will offer an opportunity to redistribute, consolidate, store and shift containers between rail and road systems;
- The PIT key operations are unlikely to generate significant volumes of additional road container freight movements along the regional or local road networks, but instead concentrate on the redistribution of existing and identified future demand; and
- The facilities at the PIT will provide State and Federal Government with an opportunity of achieving an improved road rail freight movement mode split.

3.4.2 Desired Outcomes

The land area and design of the proposed PIT and associated infrastructure will offer the following advantages:

- Development approval for large multi purpose industrial type uses;
- Designed in a manner that minimises the impact on established surrounding uses;
- Designed in such a way that it offers clear advantages in supporting efficient and safe movement for freight and other associated hub uses;

» Meet '*Auslink Policy*' objectives in providing national and regional benefits for the efficient movement of container freight; and

» Provides a sufficient area to allow for expansion and attracting other essential uses.

3.5 Project Implementation, Staging and Approval

This sub section provides an overview of the tasks to be delivered as part of this project, the planned staging of the proposed development and the assumed target throughputs of which approval is being sought.

3.5.1 Project Implementation Tasks

The proposed development involves the following:

» The rezoning land from rural to allow industrial type uses (completed);

» Development of new buildings, plant or machinery that will enable the site to achieve the required containerised throughput to both initial and ultimate stage targets;

» Construction of warehouses that will both support the intermodal terminal operations and other associated uses; and

» Installing new structures and equipment that both support and expand on the associated services provided.

3.5.2 Staging of the Facility

The project is expected to be implemented over two time horizons:

» Initial Stage - infrastructure for this stage will be delivered over a 0 to 5 year period with a current target year of 2010.

» Ultimate Stage - infrastructure for this stage will be delivered over a 10 to 15 year period with a current target year of 2020.

3.5.3 Approval Sought

Concept Design approval is sought for an intermodal terminal, which permits a combined rail and road containerised freight throughput of:

» 240,000 Twenty Foot Equivalent Units (TEUs) of road and rail freight in the Initial Stage of development, planned to be operational around approximately 2010 or 5 years after receiving development approval; and

» 530,000 Twenty Foot Equivalent Units of road and rail freight in the Ultimate Stage of development, planned to be construct overtime and fully operational around approximately 2020 or 10 to 15 years after receiving development approval.

4. Understanding the Traffic Generation Potential

This section aims to provide an understanding of the likely traffic generation from the proposed Parkes Intermodal Terminal (PIT) both in the interim and ultimate stages of development.

4.1 Target Throughput

GHD in February 2006 developed an '*Engineering Masterplan'* for planned delivery of internal infrastructure for the PIT. The analysis completed for this exercise examined the likely market demand for this type of facility. This analysis indicated that the target market is current and planned freight movement along the Newell Highway and the transfer of container traffic between east-west and north-south rail corridors. Based on this approach a low and high capture rate was developed. The low capture rate was based on capturing anticipated growth in freight road and rail freight movement and the higher capture rate based on the generation of additional road and rail traffic movement that would be attracted to the site from other transport routes. Based on the high capture rate the throughput potential of freight was calculated to be:

- 240,000 TEU throughput per annum in the '*Interim Stage'* from road and rail; and
- 530,000 TEU throughput per annum in the '*Ultimate Stage'* from road and rail.

The high capture rate for this facility si assumed to be the worst-case scenario in terms of traffic impacts.

4.2 Standard Traffic Generation Rates

The '*RTA Guidelines'* implies the following traffic generation rates for each proposed land use type and land area planned within the PIT under both the initial and ultimate stages are as follows:

Table 11 Daily and Peak Hour Trip Rates – RTA Guideline

Land use	Initial Development			Ultimate Development		
	GFA m^2	Two way veh trips		GFA m^2	Two way veh trips	
		Daily	Peak hour		Daily	Peak hour
Warehousing	20,000m^2	800	100	50,000m^2	2,000	250
Road Transport Terminal	50,000m^2	2,500	500	120,000m^2	6,000	1,200
Office	1,000m^2	100	20	4,000m^2	400	80

Note – That all GFA measurements are assumed to be 50% of total area available.

The above information indicates that the site has the following traffic generation potential:

» It will create a total of 3,400 two-way daily vehicle trips or 620 two way peak hour vehicle trips in the initial stage; and

» It will create a total of 8,400 two-way daily vehicle trips or 1,530 two-way peak hour vehicle trips in the ultimate stage.

» Under the above scenario, it can be assumed that the traffic levels for the transport terminal itself are capable of transferring a throughput of approximately 1,290,000 TEUs per annum. The throughput calculation is based on an average truck carrying 1.5 TEUs (conservative estimate), trucks being empty on one leg of their trip, 500 of the vehicle trips being generated by staff and that all freight will be transferred by road. This TEU throughput is more than what is predicted for the Intermodal Terminal under the Ultimate Stage high capture rate scenario.

» The vehicle generation rate for the warehousing area planned in PIT indicates that it is capable of transferring a throughput of approximately 235,000 TEUs per annum. The throughput is based on an average truck carrying 1.0 TEUs (conservative estimate), trucks being empty on one leg of their trip, 500 vehicle trips are generated by staff and that all freight will be transferred by road. It should be noted that a major supplier to the warehousing situated within the PIT will be both road and rail traffic travelling to the Intermodal Terminal, once this facility is fully operational.

4.3 Likely Travel Patterns Generated from the Site

It should be highlighted, that the land use related average traffic generation rates provided in the '*RTA Guide to Traffic Generating Development'* (RTA Guideline) are not based on an understanding of the terminals purpose and its complex internal relationship between each land use and rail. Generally the traffic generation rates provided in the '*RTA Guideline'* are not associated to an inland intermodal terminal based next to a country town with the following operational characteristics:

» Limited local market catchment area;

» Focused on servicing existing and planned regional and national freight movement to urban markets or ports and between major urban centres;

» On-site freight storage facilities reducing the need to move goods off site. This concentration of facilities and freight movement will be contained onsite for the following inbound freight movement scenarios:

  – road to rail;

  – rail and rail (double stacked to single stacked trains and vice versa); and

  – rail to storage then back to rail.

» Provides access to both rail and road routes of nationally and state importance;

» Not aimed at capturing 'Just In Time' deliveries or high turnover goods due to its proximity to key urban catchments;

» Aimed at attracting goods that benefit from storage space and cost savings from bulk long haul movement by rail or road;

» Aims at offer opportunity to access the rail network from road and improve the current mode split between rail and road; and

» Aimed at benefiting from the potential construction of an inland rail route between Melbourne and Brisbane via Parkes.

4.4 Justification For Approach

When examining the land use traffic generation rates included in the '*RTA Guideline'*, it is apparent that these sites do not operate with similar characteristics to that of the proposed Parkes Intermodal Terminal. This is demonstrated by the proposed development having a maximum target market throughput potential, which is not linked to land area, but instead to market changes and future improvements in National and Regional Infrastructure.

The '*RTA Guideline'* also does not appear to provide a guide average traffic generation rate for an Intermodal Terminal, which is the key activity generator within the Parkes Intermodal Terminal. The '*Guideline'* indicates when source information is not available then a case study and surveys should be undertaken. However, this is not possible due to the following factors:

» The site is unique and does not share similar characteristics with any other known Intermodal Terminal, as it is likely to serve mostly statewide and nationwide distribution of container type freight opposed to local urban area distribution. This is supported by the facility being situated on several key strategic road and rail corridors, in a rural setting and surrounded by an area with potentially limited direct market opportunities.

» The proposed Intermodal Terminal is also unique as it is supported by 'back of house' warehousing and other associated facilities, which are both linked to road and rail access. For instance, in some cases the throughput movement to the facility may just attract rail-to-rail movement via the warehousing, and therefore will not generating road traffic. In these circumstances, this target throughput should be discounted from the anticipated traffic generation as a result of the proposed development.

In order to consider the above demand limitation and target market it is considered appropriate to estimate traffic demand for facilities within PIT, which is based on the maximum market potential throughput (high capture rate).

5. Relationships between Freight Movement & Land Use

This section aims to provide an understanding of the relationship between land uses situated with the proposed Parkes Intermodal Terminal (PIT) and freight movement through the facility.

In providing this understanding it indicates the maximum target throughput levels the facility is likely to achieve (Refer to **sections 4.1)** and how a proportion of this throughput will be contained on-site or be transported by rail only (refer to **section 5.1**) and therefore will not generate any traffic on the external road network. It is also noted that a high proportion of the expected throughput of the facility travelling through the intermodal terminal will pass through associated land uses such as the warehousing. This throughput interconnection means that each of the associated land uses will not generate significant levels of traffic on the external road network, which is not already accounted for by the intermodal terminal.

5.1 Understanding of Freight Movement through the PIT

Figure 4 presents a breakdown of PIT TEU throughput being transferred and handled in the facility after arriving by rail for both the initial and ultimate stages, and **Figure 5** shows a similar breakdown of PIT throughput transfers after arriving by road. These diagrams are used to understand the complex relationships between inbound and outbound road and rail freight movements and associated on-site land uses under the high capture rate scenario.

Figure 4 Annual PIT TEU Throughput by Inbound Rail

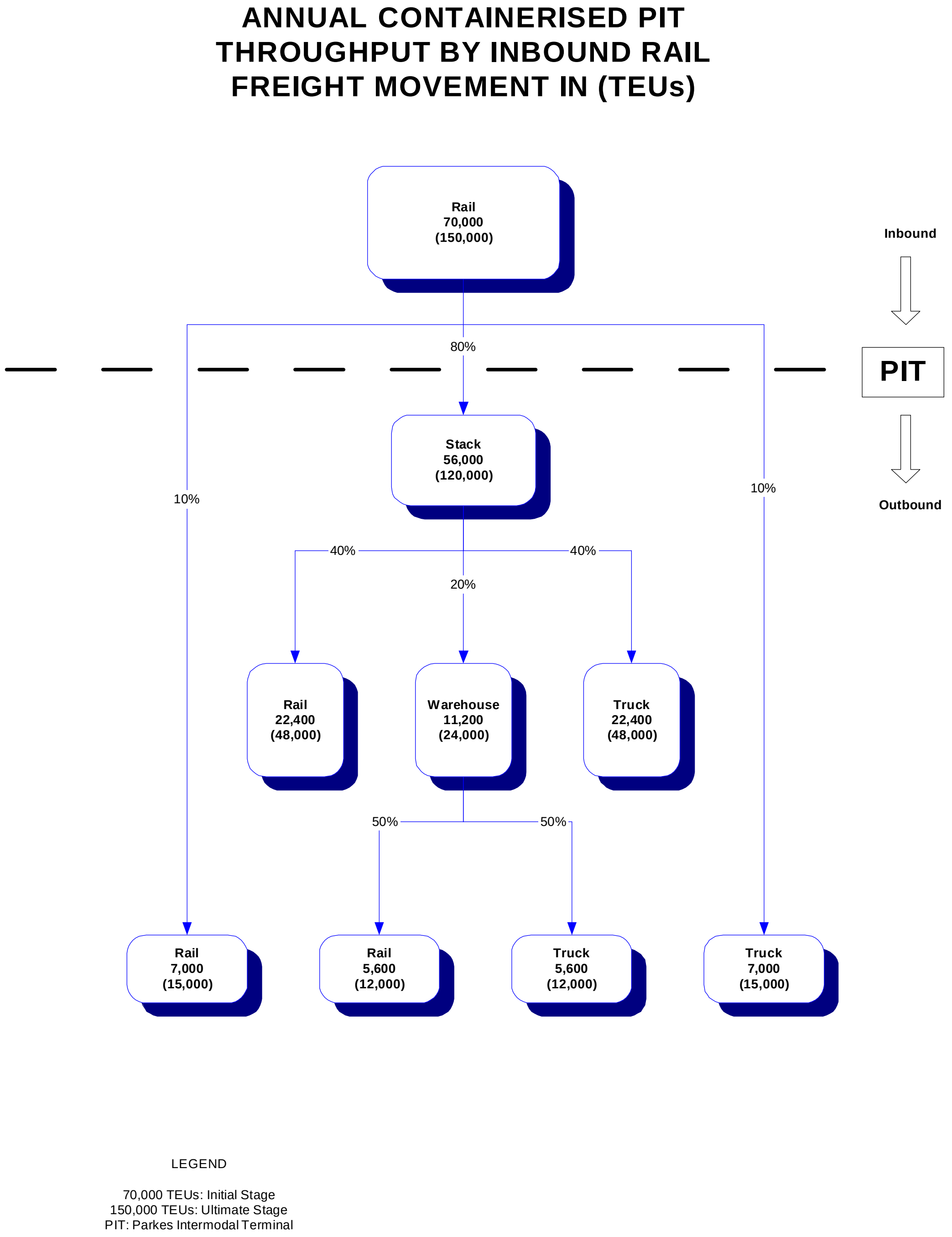
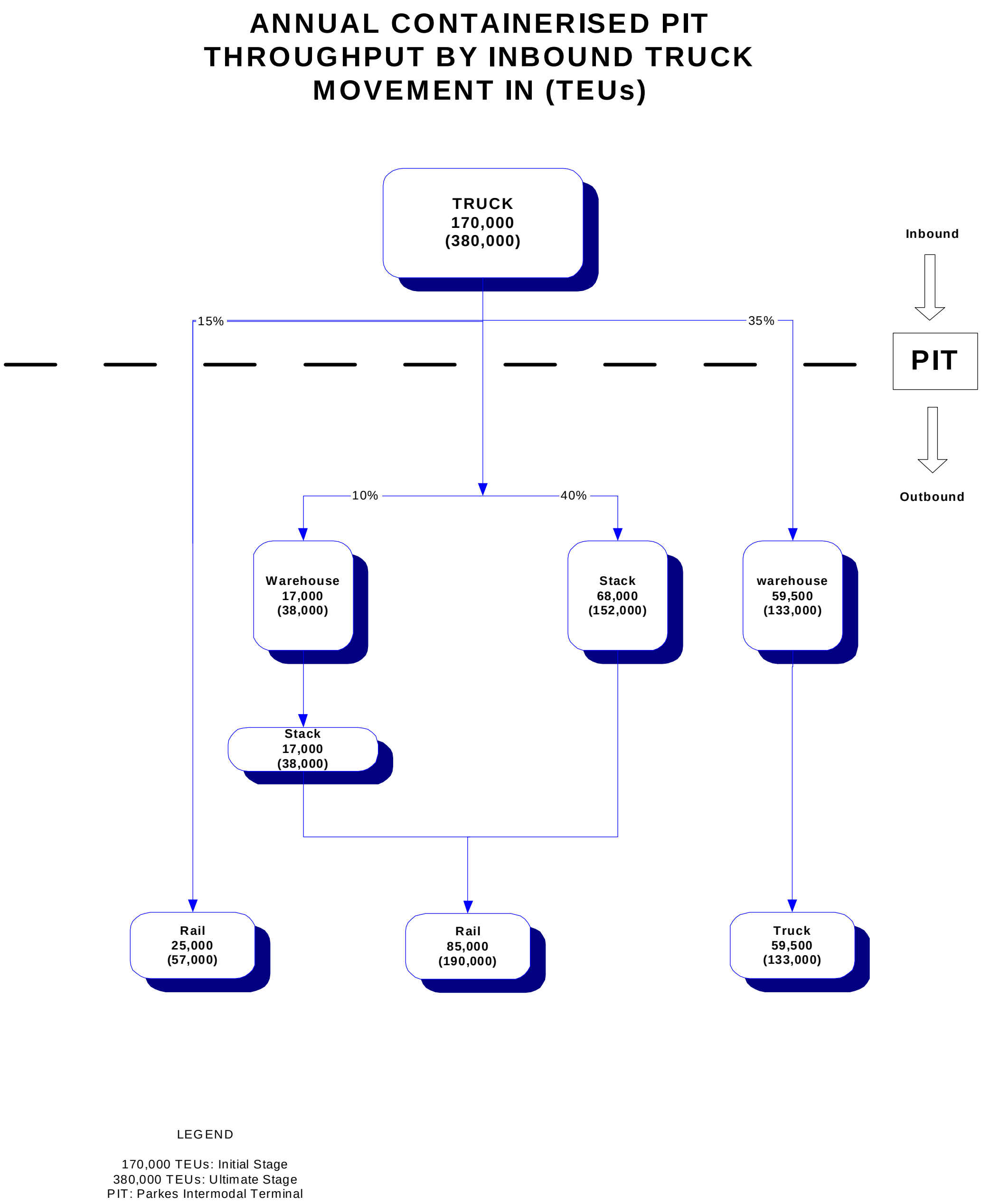


Figure 5 Annual PIT TEU Throughput by Inbound Road



In order to establish the potential infrastructure needs for the proposed facility, we must firstly obtain an understanding of the likely inbound, internal transfers and outbound movements. This can be obtained by further evaluation of the assumed operational movements generated from the arrival of TEU by rail and road, which is presented in **Figures 4** and **5**. The following key movement assumptions and volumes have been obtained from the analysis of on-site transfers and outbound freight movement.

» Inbound Rail

- 10% of TEU arriving by rail will depart directly by truck
- 80% will go to stack, from the stack 32% of the total volume will be transferred onto truck and 32% on to rail and 16% will be transferred to the warehouse areas. The volume transferred to warehouses will be stored and transferred at a later date with a split of 8% going to rail and 8% to road. Thus, 40% is transferred off site via rail and the other 40% by truck.
- 10% will be loaded back onto trains.
- Inbound movement in TEUs by rail will be transferred via a number of activity areas, which leads to the outbound split being shared 50/50 by road and rail.

» Inbound truck

- 55% will go directly to the terminal (rail or stack) and then transferred off site by rail.
- 45% will go to the warehousing with 10% transferred to the terminal and then rail and the remaining 35% will be transported off site by truck at a later date.
- Inbound movement in TEUs by road will be transferred via a number of activity areas, which will lead to the outbound split being 65% by rail and 35% by road.

» The inbound movement in TEUs by rail represents approximately 30% of all inbound freight movement, whilst road provides 70%.

5.2 Comparison of Inbound and Outbound Truck Movement

This section provides an understanding of the major differences between the projected inbound and outbound road and rail movements that could potentially provide load carrying opportunities for other on-site uses. This information is presented in **Table 13,** which provides inbound and outbound movements in TEUs by rail and road and then converts the volume into likely truck movements.

Table 12 Comparison of PIT Inbound & Outbound Movements by Rail & Road

	Throughput Period	Initial Stage		Ultimate Stage	
		Rail	Road	Rail	Road
Inbound	Peak hour movement by mode	N/A	25	N/A	56
	Daily Movements by mode (approx)	1	250	3	560
	Annual TEU throughput	70,000	170,000	150,000	380,000
	% of TEU Annual throughput	29%	71%	28%	72%
Outbound	Peak hour movement by mode	N/A	14	N/A	31
	Daily Movements by mode (approx)	3	140	5	305
	Annual TEU throughput	145,500	94,500	322,000	208000
	% of TEU Annual throughput	61%	39%	61%	39%
Difference	Peak hour movement by mode	N/A	-11	N/A	-25
	Daily Movements by mode	2	-110	2	-255

Note

– Numbers are based on the high market capture rates for all freight movement via the terminal in both the initial and ultimate stages.

The results indicate that there is a significant imbalance between rail and road movement from the facility in both the initial and ultimate stages. This predicted mode shift in freight will result in an approximate 30% imbalance between rail or road inbound and outbound movements with the road/ rail split being approximately 70/30 in favour of road for inbound movements and altering to 40/60 in favour of rail for the outbound movements.

This imbalance indicates that the terminal may not optimise the opportunity offered by outbound road freight movements if it was just based on Intermodal Terminal generated freight movements.

5.3 Planned Improvements in Efficiency

In additional to the TEU throughput at the PIT facility, market trade imbalances are likely to generate traffic through the need to transfer empty containers back to their point of origin. The majority of this movement is assumed to occur by rail with most destinations being interstate or overseas, however, some may be generated as a result of a container being returned to a distributor within the terminal's local catchment. All empty containers being returned locally are likely to be inaccessible by rail and therefore transferred by road. The movement of empty containers to local distributors could be utilised by the PIT as there is an imbalance between the number of trucks required to carry freight to the site and the number of trucks required to move freight off the site.

It is expected that the facility will be operated by either one of the existing stevedores, large haulage companies or rail freight operators. This will mean that the movement of freight into and out of the facility will be coordinated in an attempt to optimise available road and rail resources generated by inbound trips. Haulage companies using this facility are likely to be locked into large national contracts with road trips planned to fit into time slots at the facility and in most cases allowing the truck operator to both drop off and pick up containers in a single visit to the PIT. The warehousing areas that are proposed to be located at the PIT could also take advantage of the spare capacity that is available on outbound road trips.

It can be assumed that the predicted spare or available capacity for outbound movement by road and inbound movement by rail is likely to be utilised to move empty containers or move other warehouse goods not included in the terminal operation calculations.

5.4 Inbound and Outbound Truck Movement to Warehouse

The purpose of this section is to identify traffic movement that is likely to be generated by warehousing situated within the PIT under the high road capture rate scenario. The information presented in **Table 14** provides likely truck movements to and from the warehousing that is associated with the operation of the Intermodal Terminal and has been estimated using inbound and outbound TEU models for rail and road.

Table 13 PIT Generated Vehicle Trips via the Warehouse Areas

PIT Movement Type	Movement Measures	Initial Stage	Ultimate Stage
Inbound Internal and External	Daily One Way Truck Movements (approx)	130	290
	Total TEUs Moved	87,700	195,000
	Proportion of total PIT TEU throughput	37%	37%
Outbound Internal and External	Daily One Way Truck Movements (approx)	130	290
	Total TEUs Moved	87,700	195,000
	Proportion of total PIT TEU throughput	37%	37%
Inbound External Only	Daily One Way Truck Movements (approx)	115	250
	Total TEUs Moved	76,500	171,000
	Proportion of total PIT TEU throughput	32%	32%
Outbound External Only	Daily One Way Truck Movements (approx)	100	215
	Total TEUs Moved	65,100	145,000
	Proportion of total PIT TEU throughput	27%	27%

Note - Numbers are based on the high market capture rates for all road freight movement via the terminal in both the initial and ultimate stages. The internal vehicle movements are assumed to occur within PIT, i.e. between warehouse and rail or stack areas or vice versa. The traffic generation rates are based on an average carrying capacity of 2.18 TEUs per vehicle. All vehicle numbers quoted above are approximate numbers and have been rounded up or down.

The key findings from the information presented above is as follows:

» PIT TEU throughput that will be transferred via the warehouse areas and then travel along Brolgan Road is estimated to comprise of approximately 215 daily and 21 peak hour two way vehicle movements in the initial stage and 465 daily and 46 peak hour two way vehicle movements in the ultimate stage.

» External traffic generation from the warehousing, which is linked to throughput activity generated by the Intermodal Terminal is estimated to represents approximately 80% of the total traffic generated by PIT and transferred via the warehouse areas, with internal truck movements representing 20%. These volumes have been incorporated into the TEU demand based traffic generation for the Intermodal Terminal and should be discounted from the traffic generation calculation for on-site warehousing.

6. Project Impacts

The purpose of this section is to provide a summary of the projects potential impacts on the external road network in terms of traffic generation, road operations and suitability of routes.

6.1 PIT Traffic Generation

The following section provides an understanding of the traffic generation rates used for the assessment of land uses situated within the PIT.

6.1.1 Intermodal Terminal

The intermodal transport terminal is a multi modal facility, which as explained in previous sections will operate under the following conditions:

- Provide an operation that targets existing and estimated growth in road rail freight movement along key transport corridors that travel through Parkes. This will lead to traffic being redistributed along the local road network and minimal changes to predicted traffic levels along the regional road network.
- Provide an operation that targets repackaging of goods and the storage of bulk goods that can be stored for long periods of time,
- Will have a limited market catchment that is focussed on statewide and nationwide freight distribution, thus its market limitations are not associated with the size of the area being developed;
- Aims to carry a large proportion of freight by rail, which will not impact on the external road network; and
- Is demonstrated to generate some level of internal movement, which will also not impact on the external road network.

Based on the above and information presented in previous sections, it is understood that the worst case estimate for truck traffic visiting the Intermodal Terminal can only be based on the set throughput target (i.e. 240,000 TEU in the initial stage and 530,000 TEU in the ultimate stage) for capturing freight. Thus, the traffic generation potential of the proposed Intermodal Terminal has been estimated based on the maximum road freight throughput target plus staff and delivery movements.

The heavy vehicle traffic generation for the proposed intermodal terminal is shown in **Table 22.**

In addition to the above traffic generation for heavy vehicles the site will generate light vehicle movements, which have been estimated to consist of both staff and deliveries movements. The following provides an understanding of likely generation from these activities:

- Initial stage: Assumes 2 shifts of 20 staff travelling to the site during the shift changeover period, which equals 40 vehicle movements during this period. There is expected to be 3 shifts per day, which will generate in total approximately 120 two-way vehicle trips per day plus 6 daily light vehicle delivery movements.

» Ultimate stage: Assumes 2 shifts of 50 staff travelling to the site during the shift changeover period, which equals 100 vehicle movements during this period. There is expected to be 3 shifts per day, which will generate in total approximately 300 two-way vehicle trips per day plus 20 daily light vehicle delivery movements.

It is currently not known if the shift changeover periods will impact on the proposed development, however, for the purpose of this assessment and in order to understand the worst case scenario, the shift changeover period is assumed to occur during the AM and PM peak on the external road network.

Based on the above, the following adjusted rates are presented in **Table 22.**

Table 21 Daily and Peak Hour Two Way Vehicle Trips (Intermodal Terminal)

	Initial Development				**Ultimate Development**			
Period	**Daily**		Peak Hour		**Daily**		Peak Hour	
Vehicle Type	HV	LV	HV	LV	HV	LV	HV	LV
Staff		120		40		300		100
Deliveries		6		0		20		0
Internal movements	200		20		440		44	
External Movements associated with PIT	472		47		1,110		110	
Total per Vehicle Class	672	126	67	40	1,550	320	154	100
Combined Total	***798***		***107***		***1,870***		***254***	
After discounting internal movements	***598***		***87***		***1,430***		***210***	

Notes

» LV represents light vehicles and HV represents heavy vehicles.

» Peak hour heavy vehicle traffic has been estimated to represent 10% of daily heavy vehicle traffic generated by this use.

» Internal movement for the intermodal terminal has been calculated from the following:

  – Initial stage = 125,400 TEUs being transferred between land uses with an assumption that rail to stack and vice versa is undertaken by on-site cranes & the average carrying capacity of each truck is 2 TEUs.

  – Ultimate stage = 274,000 TEUs being transferred between land uses with an assumption that rail to tack and vice versa is undertaken by on-site cranes & the average carrying capacity of each truck is 2 TEUs

6.1.2 Warehousing

It is expected that a large proportion of the on-site warehousing will act as storage facilities for the Intermodal Terminal. As a result, the warehousing has a relationship with the intermodal terminal (refer to Figures 4 and 5), which indicates that approximately 20% of its total demand will be made from internal movements (i.e. TEU movements from rail and stack areas). This internal movement will not impact on the external road network and is not a typical characteristic for warehouse operations. It can therefore be assumed that the average traffic generation rates provided in the *RTA Guideline* for warehousing will not provide a true representation on expected traffic movement for warehousing situated within the proposed development.

Based on the operating characteristics for this type of facility, it is reasonable to assume that the average traffic generation rate for warehousing could be discounted due to internal vehicle movements associated with other PIT uses, and other factors such as:

- Being attractive to bulk transfers by rail,
- Targeting large trucks carrying higher TEU loads;
- Offering the market a facility for long term storage,
- Having good connectivity with the rail system, which increase its ability to capture more goods being transported by rail;
- Having only a small local market catchment;
- The target market being limited to state and nationwide freight movement; and
- Requiring only a small workforce due to the provision of new heavy loading technology to handle the movement of goods.

The heavy vehicle traffic generation for warehousing is based on the above assumptions and shown in **Table 23.**

Apart from the transport of freight by heavy vehicles the site will generate other vehicle movements, which have been estimated to consist of staff (assumed to be all light vehicles) movements. The following provides an understanding of likely generation from this activity:

- Initial stage: Assumes 2 shifts of 30 staff travelling to the site during the shift changeover period, which equals 60 vehicle movements during this period. There is expected to be 3 shifts per day, which will generate in total approximately 180 two-way vehicle trips per day. The overall parking requirement will be based on 67 parking spaces, as specified in the '*RTA guideline*'.
- Ultimate stage: Assumes 2 shifts of 80 staff travelling to the site during the shift changeover period, which equals 160 vehicle movements during this period. There is expected to be 3 shifts per day, which will generate in total approximately 480 two-way vehicle trips per day. The overall parking requirement will be based on 167 parking spaces, as specified in the '*RTA guideline*'.

A similar assumption has been applied for staff working at the proposed warehousing to that shown for the intermodal terminal with the worst case scenario being adopted, which assumes the shift changeover period occurs during the AM and PM peak on the external road network.

Table 23 presents traffic generation rates for the proposed warehousing areas that will be situated within the proposed development.

Table 22 Daily and Peak Hour Two Way Vehicle Trips (Warehousing)

	Initial Development				**Ultimate Development**			
Period	**Daily**		Peak Hour		**Daily**		Peak Hour	
Vehicle Type	HV	LV	HV	LV	HV	LV	HV	LV
Staff		180		60		480		160
Internal movements	45		5		115		12	
External Movements associated with PIT	215		22		465		47	
External Movements not associated with PIT	30		3		68		7	
Total per Vehicle Class	290	180	30	60	648	480	66	160
Combined Total	***470***		***90***		***1,128***		***226***	
Discounted from associated PIT traffic	***210***		***63***		***548***		***167***	

Note

- LV represents light vehicles and HV represents heavy vehicles.
- Peak hour heavy vehicle traffic has been estimated to represent 10% of daily heavy vehicle traffic generated by this use.
- The 68 truck movements that are not associated with the PIT have been estimated to be able to carry approximately 45,000 TEU per annum. This throughput calculation is based on each truck in the future carrying 2.18 TEU per trip. It has also been assumed due to future efficiency improvements in the road freight industry from the planning and scheduling of container freight movements both inbound and outbound movements being fully utilised and the warehousing would be operational 312 days a year.

Based on the above calculations and information presented in **Table 23** the throughput potential for the warehousing area is 195,000 TEU from intermodal terminal related activities plus 45,000 TEU from activities not associated with the Intermodal Terminal.

6.1.3 Offices

The assumed traffic generation rates for office uses situated in the proposed development are as follows:

- Initial stage: Assumes 20 staff travelling to the site during the peak commuter period along the external road network. The total traffic generation from offices uses situated within the proposed development is expected to be approximately 40 two-way vehicle trips per day plus 4 daily light vehicle delivery movements. The overall parking requirement will be based on 25 parking spaces, as specified in the '*RTA guideline*'.
- Ultimate stage: Assumes 80 staff travelling to the site during the peak commuter period along the external road network. The total traffic generation from offices uses situated within the proposed development is expected to be approximately 160 two-way vehicle trips per day plus 10 daily light vehicle delivery movements. The overall parking requirement will be based on 100 parking spaces, as specified in the '*RTA guideline*'.

6.1.4 PIT Traffic Generation

The combined daily and peak hour traffic generation predicted for all the above uses situated within the proposed development is as follows:

Table 23 Total Traffic Generation from the Proposed PIT

Traffic Generators	Initial Stage		Ultimate Stage	
	Peak Hour	Daily	Peak Hour	Daily
Intermodal Terminal Throughput (HV)	48	472	111	1110
Additional Warehouse Movements (HV)	3	30	7	68
Workers and deliveries (LV)	120	350	340	970
Total	***171***	***852***	***458***	***2148***

6.2 Impact on the Regional Road Network

As explained in the previous sections the potential target market for the proposed development is both existing and predicted state and nationwide freight movement travelling along key transport corridors (i.e. Newell Highway and Orange- Broken Hill Railway, Parkes to Forbes Railway and Parkes to Narromine Railway) through Parkes. The following section provides an understanding of the likely distribution of traffic and the resulting impact on both local and regional roads from traffic travelling to the proposed development.

6.2.1 Traffic Distribution

The current distribution of heavy vehicle traffic has been evaluated and is shown in **Table 25.**

Table 24 Daily Truck Movements Through Parkes

Road link	Total Daily HV Traffic (2005)	Proportion of HV Traffic through Parkes
SH17 Newell Hwy (N)	888	33%
SH17 Newell Hwy (S)	1510	56%
MR 61 (W) Condobolin Rd	82	3%
MR 61 (E) Orange Rd	111	4%
MR 233 Wellington Rd – NE	41	2%
MR 238 Eugowra Rd – SE	53	2%
Total	2685	100%

Source: Traffic Volume Data for Western Region, RTA 2002.

Note - Values used for HV movement along the Newell Highway south have been adjusted.

It is clear from **Table 25** that the Newell Highway is key route for road freight travelling through Parkes and represents 89% of all road freight movement along rural sections of the Parkes regional road network.

The following assessment is based on both light and heavy vehicle traffic, which is anticipated to be generated by land uses situated within the proposed development. The estimated vehicle distribution resulting from the operation of proposed development is assumed to be as follows:

Table 25 Assumed Traffic Distribution from PIT for Different Vehicle Types

Roads	Light Vehicles	Heavy Vehicle
Brolgan Road	100%	100%
MR 61 (W) Condobolin Rd	5%	3%
SH17 Newell Hwy (N)	10%	33%
SH17 Newell Hwy (S)	10%	56%
MR 61 (E) Orange Rd	5%	4%
MR 233 Wellington Rd – NE	0%	2%
MR 238 Eugowra Rd – SE	0%	2%
Hartigan Avenue	25%	97%
Bogan Street	40%	33%
Dalton Street	70%	0%

It has been assumed that the majority of workers associated with the proposed development will live within or around Parkes LGA and that 100% will use Brolgan Road to travel to the site. It is expected that the majority of this traffic will then travel to Dalton Road and Bogan Street before accessing the local road network.

Refer to **Figures 2** and **3** for an understanding of designated B double and road train routes within Parkes. Similar to the assumption applied for light vehicle movements, heavy vehicles will access the external road network via Brolgan Road, however due to current road network vehicle restrictions and the location of some sensitive land uses, it has been assumed that all traffic travelling to the Newell Highway and beyond will use Hartigan Avenue. This will result in 97% of the expected heavy vehicle movement traveling to and from the site using the Hartigan Avenue route and only 3% using the West Lime Road and Condobolin Road route.

Refer to **Figure 3** for an understanding of current deficiencies located along the route and **Figure 6** for an understanding of upgrades proposed by Parkes Shire Council. These upgrades are required as a result of the rezoning of a significant area of land for industrial uses, which includes the Parkes Intermodal Terminal and Parkes Transport Hub.

6.2.2 Anticipated Traffic Growth Without PIT

Table 27 presents an estimation of future daily total traffic and truck movements along all road routes likely to be impacted by the proposed development. The estimated traffic volumes through Parkes have been calculated for both 2010 (Initial PIT Stage) and 2020 (Ultimate PIT Stage) by applying annual traffic growth rates as shown in **Appendix H.**

Table 26 Estimated Daily Traffic Movement Without PIT (Two-Way)

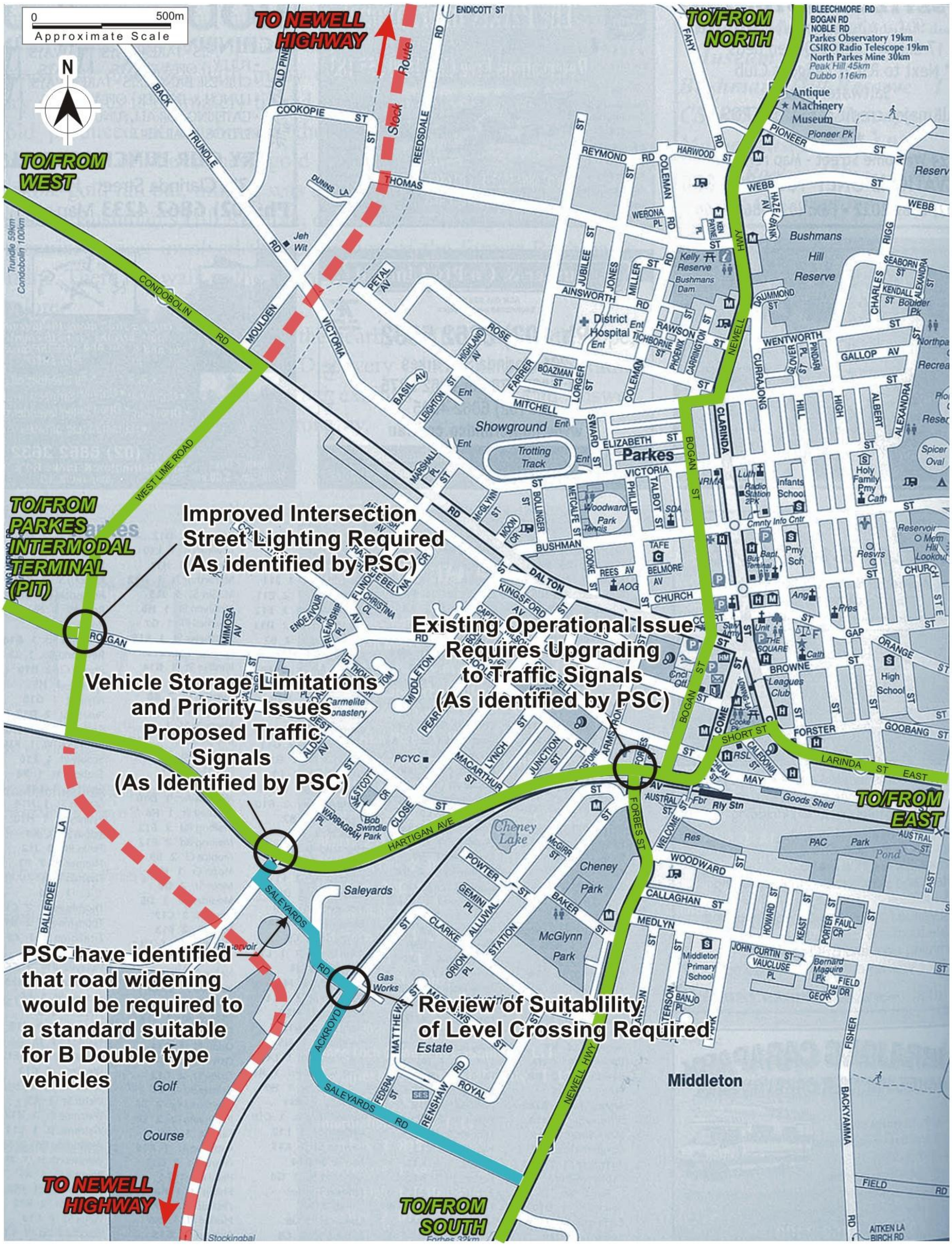
Year	**2010**			**2020**		
Road link	Total	HV	HV%	Total	HV	HV%
Brolgan Road	200	4	2%	227	5	2%
MR 61 (W) Condobolin Rd	1064	97	9%	1138	127	11%
SH17 Newell Hwy (N)	5685	1048	18%	6597	1367	21%
SH17 Newell Hwy (S)	5914	782	13%	6684	2325	35%
MR 61 (E) Orange Rd	2099	131	6%	2276	171	8%
MR 233 Wellington Rd – NE	417	49	12%	441	64	15%
MR 238 Eugowra Rd – SE	500	62	12%	529	81	15%
Hartigan Avenue	690	140	20%	762	155	20%
Bogan Street	5789	984	17%	6587	1252	19%
Dalton Street	1992	100	5%	2094	105	5%

Source: Traffic Volume Data for Western Region, RTA 2002 for all sites situated along regional roads and PSC traffic data for roads situated within Parkes.

It is clear from the above table that the Newell Highway including Bogan Street is predicted to continue to be the key route for road freight traffic travelling through the Parkes LGA.

6.2.3 Proposed Truck Routes

Designated B Double and Road Train Routes that are proposed to be utilised by heavy vehicle traffic travelling to and from the proposed development are shown in **Figure 6.**



Legend

- Proposed Truck Routes to PIT
- Proposed Ring Road
- Interim Truck Route (Option)

GHD CLIENTS PEOPLE PERFORMANCE

Parkes Intermodal Terminal

Proposed Truck Routes to the Parkes Intermodal Terminal

scale	as shown	date	24 May 2006

job no	21-13701-08
file ref	2113701-08_LTN_01.cdr

Figure 6

6.2.4 Future Traffic Levels With PIT

Table 28 provides an understanding of future traffic volumes along the road network with and without the proposed development.

Table 27 PIT Future Road Freight Capture - Two Way Movement 2010

Year	**Without PIT**			**High Capture**		
Road link	Total	HV	HV%	Total	HV	HV%
Brolgan Road	200	4	2%	1052	506	48%
MR 61 (W) Condobolin Rd	1064	97	9%	1087	102	9%
SH17 Newell Hwy (N)	5685	1048	18%	5775	1103	19%
SH17 Newell Hwy (S)	5914	782	13%	6043	876	14%
MR 61 (E) Orange Rd	2099	131	6%	2123	138	6%
MR 233 Wellington Rd – NE	417	49	12%	420	52	12%
MR 238 Eugowra Rd – SE	500	62	12%	503	65	13%
Hartigan Avenue	690	140	20%	1264	627	50%
Bogan Street	5789	984	17%	5984	1039	17%
Dalton Street	1992	100	5%	2237	100	4%

Table 28 PIT Future Road Freight Capture - Two Way Movement 2020

Year	**Without PIT**			**High Capture**		
Road link	**Total**	**HV**	**HV%**	**Total**	**HV**	**HV%**
Brolgan Road	227	5	2%	2375	1183	50%
MR 61 (W) Condobolin Rd	1138	127	11%	1198	139	12%
SH17 Newell Hwy (N)	6597	1367	21%	6824	1497	22%
SH17 Newell Hwy (S)	6684	2325	35%	7001	2545	36%
MR 61 (E) Orange Rd	2276	171	8%	2340	187	8%
MR 233 Wellington Rd – NE	441	64	15%	449	72	16%
MR 238 Eugowra Rd – SE	529	81	15%	537	89	17%
Hartigan Avenue	762	155	20%	2147	1298	60%
Bogan Street	6587	1252	19%	7105	1382	19%
Dalton Street	2094	105	5%	2773	105	4%

Both **tables 28 and 29** indicate the following in terms of expected impacts resulting from the full development of the site:

» Significant growth in heavy vehicle traffic along both Brolgan Road and Hartigan Avenue; and

» Small percentage increases in heavy vehicle traffic above that expected by 2010 and 2020 along Bogan Street and the northern and southern section of the Newell Highway.

It is apparent from this information that the majority of growth in truck movements will occur along the Newell Highway and that this will occur with or without the proposed development. It is also noted that the proposed development of the site is likely to lead to increased heavy vehicle traffic levels along Hartigan Avenue and Brolgan Road.

6.3 Impact on Traffic Network Operations

The purpose of this section is to evaluate the impact on the operation of the road network from the staged development of the proposed development.

Table 30 presents current and future road performance levels along Brolgan Road, urban freight routes through Parkes and approaching regional haulage routes to Parkes without the development of the PIT.

Table 29 Future Performance of Road Freight Routes Without PIT Traffic

Road Type	Road Name	Count Station	2005		2010		2020	
			AADT/ ADT	LoS	AADT/ ADT	LoS	AADT/ ADT	LoS
Rural	Brolgan Road	East of the site and west of the level crossing	188	A	200	A	227	A
Rural	Condobolin Road	At level crossing, west of Parkes	1036	A	1064	A	1138	A
Rural	Newell Highway (N)	Parkes, 3.2km north of Court St	5337	B	5685	B	6597	B
Rural	Newell Highway (S)	At Forbes/Parkes boundary	5620	B	5914	B	6684	B
Rural	Orange Rd	Parkes, at Billabong Ck bridge	2031	A	2099	A	2276	A
Rural	Wellington Rd	Parkes, 8km north of SH17, Newell Hwy	408	A	417	A	441	A
Rural	Eugowra Rd	At Forbes/Parkes boundary	488	A	500	A	529	A
Urban	Hartigan Avenue	West of Forest Street	450	A	690	A	762	A
Urban	Bogan Street	North of Hartigan Avenue	5427	A	5789	A	6587	A
Urban	Dalton Street	West of Bogan Street	1943	A	1992	A	2094	A

Notes

Future predicted traffic levels are based on an annual growth of 3.6% applied to road freight and the average annual growth factor as shown in **Appendix F** has been applied to all light vehicle traffic on each haulage route.

It is noted from the findings presented in the above table that all current road freight routes perform satisfactorily under 2010 and 2020 traffic condition without the proposed development.

The increase in traffic assumes that the haulage routes identified in **Figure 6** will be impacted by trucks travelling to the proposed development. An assessment of road performance has been completed for the worst-case 'with proposed development scenario' and is shown in **Table 31.**

Table 30 Future Performance of Road Freight Routes With PIT Traffic

Rural/ Urban	Road Name	Count Station	2010		2020	
			ADT/AADT	LoS	ADT/AADT	LoS
Rural	Brolgan Road	East of the site and west of the level crossing	1052	A	2375	A
Rural	Condobolin Road	At level crossing, west of Parkes	1087	A	1198	A
Rural	Newell Highway – north	Parkes, 3.2km north of Court St	5775	B	6824	B
Rural	Newell Highway – south	At Forbes/Parkes boundary	6043	B	7001	B
Rural	Orange Road	Parkes, at Billabong Ck bridge	2123	A	2340	A
Rural	Wellington Road	Parkes, 8km north of SH17, Newell Hwy	420	A	449	A
Rural	Eugowra Road	At Forbes/Parkes boundary	503	A	537	A
Urban	Hartigan Avenue	West of Forest Street	1264	A	2147	A
Urban	Bogan Street	North of Hartigan Avenue	5984	A	7105	A
Urban	Dalton Street	West of Bogan Street	2237	A	2773	A

It is apparent from the above assessment that all identified road freight routes will operate with a satisfactory level of service in the future with or without the development.

6.4 Train Frequency and Time Delay at Level Crossings

The following level crossings are situated in close proximity to the proposed development and are likely to be directly impacted by the redistribution of trains and trucks to the site:

» The existing level crossing situated along Brolgan Road to the east of the site;

» A new level crossing to be situated along Brolgan Road to the west of the site; and

» The existing level crossing situated along Condobolin Road to the west of the site access.

Refer to **Figure 1** for an understanding of the location of existing and proposed level crossings likely to be impacted by trains and trucks travelling to the site.

Refer to **Appendix H** for further information on train frequencies and time delays. The following presents a worst-case scenario for train movements and resulting delays to traffic at level crossings with and without the implementation of the proposed PIT:

Initial Stage (Daily Movements)

- The existing Brolgan Road level crossing to the east of the site is expected to cater for approximately 4 train movements with travel speeds of approximately 115km/h and 2 train movements with travel speeds of between 20km/h - 50km/h. The total delay to traffic per day would be approximately 20 minutes with the PIT and approximately 10 minutes without. The longest anticipated delay to road traffic would be approximately 7 minutes and caused by a 1800m long train travelling from the intermodal terminal.
- The existing Condobolin Road level crossing to the west of the site is expected to cater for approximately 4 train movements with travel speeds of approximately 115km/h and 1 train movement with a travel speed of between 20km/h - 50km/h. The total delay to traffic per day would be approximately 13 minutes with the PIT and approximately 10 minutes without. The longest anticipated delay to road traffic would be approximately 7 minutes and caused by a 1800m long train travelling from the intermodal terminal.
- The new Brolgan Road level crossing to the west of the site is expected to cater for 1 train movements with a travel speed of approximately 40km/h and 1 train movement with a travel speed of approximately 10km/h. The total delay to traffic per day would be approximately 16 minutes and the longest anticipated delay to road traffic would be approximately 12 minutes and caused by a 1800m long train travelling into the intermodal terminal.

Note that only the slower moving trains will travel via the new rail lines to the proposed development and of these trains only 4 movements are associated with the operations of the site. All other movements are anticipated rail movements along the existing rail network, some of which will travel through the site to obtain access between north-south and east-west rail lines.

Ultimate Stage (Daily Movements)

- The existing Brolgan Road level crossing to the east of the site is expected to cater for 10 train movements with travel speeds of approximately 115km/h and 4 train movements with travel speeds of between 20km/h - 50km/h assuming the inland rail line is built through Parkes. The total delay to traffic per day would be approximately 45 minutes with the PIT and approximately 25 minutes without. The longest anticipated delay to road traffic would remaining unchanged at approximately 7 minutes and caused by a 1800m long train travelling from the intermodal terminal.
- The existing Condobolin Road level crossing to the west of the site is expected to cater for 10 train movements with travel speeds of approximately 115km/h and 2 train movements with travel speeds of between 20km/h - 50km/h assuming the inland rail line is built through Parkes. The total delay to traffic per day would be approximately

35 minutes with the PIT and approximately 25 minutes without. The longest anticipated delay to road traffic would be unchanged at approximately 7 minutes and caused by a 1800m long train travelling from the intermodal terminal.

» The new Brolgan Road level crossing to the west of the site is expected to cater for 2 train movements with travel speeds of approximately 40km/h and 2 train movements with travel speeds of approximately 10km/h. The total delay to traffic per day would be approximately 33 minutes and the longest delay to traffic would be approximately 12 minutes and caused by a 1800m long train travelling into the intermodal terminal.

Note that only the slower moving trains will travel via the new rail lines to the proposed development and of these trains only 8 movements are associated with the operations of the site. All other movements are anticipated rail movements along the existing rail network, some of which will travel through the site to obtain access between north-south and east-west rail lines.

6.5 Road Network Strategy Issues

In understanding the impacts from truck movement, it should be noted that this proposal is one of several with an industrial focus. These proposed developments have emerged as a result of the rezoning of a substantial area of land in close proximity to the western section of the proposed Parkes Ring Road.

The western section of the ring road is described in the '*Road Improvement Strategy'* section of the '*Strategic Plan for Major Road and Transport Infrastructure for Parkes and Environs*' as being required as a result of '*traffic growth on the Newell Highway*'. This rolling road improvement programme is aimed '*at protecting the amenity of Parkes residents and facilitating freight movement in a manner that protects the integrity of the public roads and bridges*.' It appears that the strategy was developed in response to the impacts created by current heavy vehicle traffic levels on the Newell Highway, which is escalating with continued traffic growth. Recent forecasts by the Auslink program has indicated that this trend will continue resulting in increased pressure on existing infrastructure and a need to protect community (Refer to **Figure 3**) through the delivery of well planned infrastructure. The long term strategy of the traffic strategy mentioned above is to divert *'through highway traffic via a western Ring Road*'. Refer to **Figures 1** and **6** for an understanding of the alignment of the planned western Ring Road and other minor road improvement works.

6.5.1 Issues Identified along the Road Network

Refer to **Figure 6** for an understanding of the proposed access route to be used by trucks travelling to the site. It has been noted from discussions with Council and a preliminary review of the road network that the only desirable route for road freight travelling to the proposed development from the Newell Highway would be via the intersection with Hartigan Avenue. The intersection of Hartigan Avenue and Forbes Street (the Newell Highway) is already highlighted to have operational issues associated with a level crossing situated on the southern approach. The operational issues of this intersection are associated with the Newell Highway, which is planned to accommodate significant growth in road freight movement in the future.

Parkes Shire Council have proposed traffic signals at this intersection to resolve the current road safety issues, which are planned to cater for the anticipated growth in traffic both along the Newell Highway and Hartigan Avenue.

6.5.2 Possible Interim Route Option

A number of route options were examined as part of selecting the preferred freight routes through Parkes, these are shown on **Figure 6**. The examination of the existing conditions as highlighted on **Figure 3,** indicated that the only feasible route option for reducing traffic levels at the intersection of Forbes Street with Hartigan Avenue would be through the proposed upgrade of Saleyards Road route and associated intersections and level crossings. This route is currently not at a standard that can accommodate B double or road train traffic and would require widening along certain sections. This route also passes over two level crossings, one of these is situated in close proximity to the intersection of Hartigan Avenue and Blaxland Street and is identified to require modification by Parkes Shire Council (Refer to **Figure 6**) in order to improve current traffic operations along Hartigan Avenue.

The safety implications from providing this interim truck route, which caters for traffic travelling between the south section of the Newell Highway and the Parkes Transport Hub or Goobang Junction Industrial Area, should be examined as part of the strategy being developed to protect the amenity of Parkes residents, improve road access for regional traffic and access requirements to industrial lands situated to the west of Parkes. As noted in **Figure 6,** the ultimate arrangement would be the construction of the western section of the Parkes Ring Road, which is planned to provide connection from West Lime Road to the Newell Highway to the north and south of Parkes.

7. Relevant Design Standards and Guidelines

The following section provides of the design principles and recommended traffic management measures that will be applied when upgrading the surrounding road system and developing the internal road network.

7.1 Internal Road System

7.1.1 Proposed On-Site Design Principles

The following design principles are relevant to the design requirements of the internal road system only. The masterplanning team have set in place a number of design principles, which aim to minimise conflict, reduce energy consumption and control movement through the site, especially in areas that could potentially handle hazardous goods, require security clearance or are exposed to safety risks associated with conflict between rail and containerised road freight. Using these principles, the following design objectives were set:

- Road system to consist of two-way traffic flows to enable quick and easy access to all warehouse facilities on the site. This should also support the anticipated staged growth of the site;
- The road system should be designed to minimise conflict between pedestrians, through light vehicle and heavy vehicle movements, the movement of containers between the intermodal terminal and warehouses, vehicles manoeuvring in parking areas and the loading or unloading of goods;
- Limit the number of rail crossings;
- Limit the number of vehicles required to cross rail tracks by locating higher traffic generating land uses close to Brolgan Road and restricting access to locations across rail tracks;
- Restrict the number of vehicles required to cross the main rail line running through the site;
- Should provide direct access to warehouse areas;
- Should provide direct access to the intermodal terminal; and
- All parking areas and loading areas should be located within the property boundary.

Refer to **Appendix E** for a further understanding of access and road internal road network design principles developed for the site.

7.1.2 Internal Access Requirements

The internal traffic arrangements. The internal road layout should be designed with a 3.5m traffic lane and a shoulder width of 1.0m along straight roadway sections, where two-way traffic is permitted and where freight traffic is likely to be accommodated. Along one-way roads the traffic lane width should be increased to 4.5m. All dimensions should be adjusted for curved sections of the roadway with the specification being dependent of the inside radius curve. In all other situations where freight traffic is not expected to travel, a lower design specification can be provided.

7.1.3 Traffic management

Access on to the external road network and on site movement will be controlled through the following:

» Construction of appropriate internal access roads that directly service different functional areas of the site and can easily accommodate the worst case vehicle types;

» Construction of appropriate intersections along the external road network and internally that accommodate both the worst case vehicle type and peak hour volumes expected at the site during both the initial and ultimate stages and ensure that the impact on through traffic movement along Brolgan Road is minimised;

» Providing several alternative access points along Brolgan Road to both minimise delays to traffic entering the site and to ensure that the proposed site does not force vehicles to travel unnecessary distances to gain access to on-site facilities;

» Minimise the number of on-site level crossings and traffic that need to cross these conflict points to access on-site facilities;

» Separation of staff and heavy vehicle access points to on-site facilities along the internal road network;

» Containment of loading and unloading activities, parking and vehicle manoeuvres that are not in a forward direction off the internal and external road network;

» The use of on-site access control points at the entry to the Intermodal Terminal to both restrict access and limit movement across on-site level crossings and through the *Intermodal Terminal's* loading and unloading areas;

» The use of one way internal roads to circulate container traffic to and from the Intermodal Terminal and along loading and unloading areas for the temporary and long term stack areas; and

» If required, grade separation of a northern access road over the Parkes-Narromine rail line.

7.2 External Road System

The following details having been extracted from relevant road design standards and should be used to understand the resulting road upgrade needs of Brolgan Road.

7.2.1 Lane Widths

Both traffic lanes along Brolgan Road should be widened to 3.5 m, which is the desirable lane width on rural roads to accommodate B double and road train traffic. The carriageway width should include a shoulder width of at least 1.5m with 1.0m of this being sealed.

7.2.2 Auxiliary Lane Widths

The same widths as for through lanes should be applied for the upgrade of Brolgan Road. However, if the available carriageway width is restricted then the turning lanes widths would be reduced. A turning lane width of 2.5 m can be accepted in constrained situations.

7.2.3 Sight Distances at Intersections and Level Crossings

All external and internal intersections should be designed to meet the sight distance criteria as specified in the latest Austroads Intersection at Grade publication. It is also noted that the sight distance requirements are dependent on travel speeds and that a lower designated travel speed would result in a reduction in the sight distance specification. Therefore, the sight distance requirements for Brolgan Road are likely to be different if the signposted travel speed was reduced from 100km/h. Due to the high volumes of heavy vehicles anticipated to be generated by the site, it would be desirable to achieve the Truck Stopping Sight Distance (TSSD) as a minimum for all intersections and level crossing points.

7.2.4 Level Crossing Standards

Both Australian Standards and the Rail Infrastructure Corporation (RIC) Level Crossing Assessment Model provide guidelines for level crossing control treatments. The need for either manual or flashing lights control at a level crossing is determined by the railway level crossing assessment committee or rail authority. However, it is expected that active controls with flashing lights, boom gates, warning signs and pavement markings will be required to be installed at all three level crossings surrounding the site and the two crossings within the intermodal terminal when the ultimate stage land uses are delivered.

8. Construction Impacts

The proposed development will be built over a series of staged construction periods, which are likely to be dictated by market conditions. A preliminary understanding of the staged on-site construction activities and management techniques adopted to mitigate the impacts are provided in the following section.

8.1 Construction methods

The majority of the built structures to be erected on the site would involve the assembling prefabricated elements. Once the footings have been established, prefabricated beams and support structures would be transported to the site and erected prior to cladding being fixed in place.

Utilising prefabricated components will not only minimise the length of the construction period and the required number of construction vehicles, it will also reduce the potential for conflict between construction and operational activities during the ultimate stages of the development. This approach will enable normal ‘Intermodal Terminal’ and warehouse operations to continue whilst construction is in progress. The mixing of construction and normal operations has been successfully achieved on other similar large-scale industrial sites in rural areas around NSW, and is not expected to create conflict. Any areas on site that are identified to be potential conflict points will be managed, if possible through the separation from other site activities. The proposed site layout, the planned progressive development of the site and the size of the area appear to assist this approach.

8.1.1 Civil works

Civil works are expected to include minor excavation and filling will occur on parts of the site to provide a suitable building platform for the construction of foundations.

Earthworks are required to allow for the construction of new rail tracks, sidings and hardstand areas. In the later development stages, the removal of earth material is likely to be focused around areas identified to be part of the PIT ‘ultimate stage’ and is unlikely to impact on normal Intermodal Terminal operations. All excavations would be undertaken using conventional earthmoving equipment and blasting is not considered to be required. Spoil from this area would be re-used as subgrade material around different areas of the site.

All soil extracted, as part of the civil works is expected to be reused on-site and will therefore not generate off site traffic movements.

8.2 Timetable for development

The construction of all new initial stage elements is expected to occur before 2010 or 0 to 5 years after receiving development approval.

Construction elements in the initial stage is expected to consist of the following:

» Land Use
  - – 4 hectare (ha) area for warehousing;
  - – 10 ha area to be located on the southern side of the intermodal terminal sidings, of which approximately 50% is hardstand that will be used for the sorting and stacking of containers; and
  - – 1000m^2 GFA of administration buildings.

» Rail Infrastructure
  - – New master sidings running into the site from the Parkes-Narromine and Parkes-Broken Hill rail lines;
  - – Rail sidings serving the intermodal terminal; and
  - – A gantry crane.

» Road Infrastructure
  - – A new level crossing and a level crossing upgrade on Brolgan Road;
  - – An internal road network serving functional areas of the site to the south of the intermodal sidings;
  - – New access points to Brolgan Road from the site; and
  - – Widening of Brolgan Road between the western end of the site and West Lime Road and.

The modifications to the '*initial stage'* Intermodal Terminal and construction of new elements would occur in a staged manner for all '*ultimate stage'* facilities and would be in response to market demand.

On site alterations, expansion, duplication and new facilities will be undertaken in the following areas:

» Land Use
  - – Expansion – additional 6 hectare (ha) area for warehousing;
  - – Duplication - 14 ha area to be located on the northern side of the intermodal terminal sidings, of which approximately 50% is hardstand that will be used for the sorting and stacking of containers; and
  - – Expansion – additional 3,000m^2 GFA of administration buildings.

» Rail Infrastructure
  - – Rail sidings serving the heavy engineering facility;
  - – Rail sidings serving the containerised fuel facility; and
  - – Additional gantry cranes.

» Road Infrastructure
  - – Expansion of the internal road links to serve additional land uses located in the southern section of the site,
  - – The construction of new internal road links to serve new land uses located in the central and northern sections of the site;
  - – New access points to Brolgan Road from the site; and

– Widening of Brolgan Road between the western end of the site and West Lime Road.

It is anticipated that all elements associated with the proposed upgraded would be operational by 2020 or 10 to 15 years after development approval is received. It is also expected that the '*ultimate stage'* would involve the construction of new internal level crossings and an access road to Condobolin Road, as well as a heavy engineering facility, stabling yards and containerised fuel centre if market forces indicate that these types of facilities would be beneficial.

8.2.1 Construction and Workforce Traffic Generation

The construction of the *'initial stage'* facility and then the staged upgrading of the PIT site's operating areas to deliver the '*ultimate staged'* developments will generate small increases in external traffic. The majority of these additional traffic movements will be as a consequence of delivering plant, track and machinery or construction staff shift movements.

As all construction activities would not be undertaken concurrently, and there will not be a defined period of intense construction traffic movement.

All construction activity and associated truck movement will occur before the PIT reaches the desired throughput of 530,000 TEU as these PIT site upgrades are required to enable the *Intermodal Terminal* to receive a higher throughput.

8.2.2 Work hours

Construction activities will generally be undertaken within the hours recommended in the DEC Environmental Noise Control Manual as follows:

» Monday to Friday: 7 am – 6 pm;

» Saturday: 8 am – 1 pm; and

» Sunday and Public Holidays: no work.

It is noted, that these proposed construction shift times may conflict with '*initial stage'* PIT operations and may need to be managed through the control of PIT shift periods and were possible a prohibited period for the movement of container freight by road and rail.

8.2.3 Construction vehicles and equipment

Table 25 provides an indicative list of construction vehicles and equipment that would be used during the construction and future staged upgrades of PIT operating areas. As the exact number of machines to be used on-site will only be determined when the works are planned in detail and a construction Contractor is selected, these details are unavailable at the time of the preparing this *Environmental Assessment*.

Table 32 Indicative List of Construction Equipment and Vehicles

Equipment	Purpose
Dozer	Stripping vegetation and constructing the building platform
Roller	Compacting the building platform
Scraper	Placement and leveling of the building platform
Grader	Leveling the surface
Water truck	Watering bare surfaces to suppress dust
Trucks	Transport of construction materials
Loader	Loading material into trucks
Mobile crane	Erecting buildings, structures and rail track, installing heavy plant and machinery
Asphalt paving machine	Leveling the surface of the asphalt
Bitumen sprayer	Applying bitumen to the road base
Cherry pickers	Installing equipment at high levels above ground
Forklifts	Loading, unloading and stacking building materials

8.2.4 Parking

Parking for construction equipment and staff vehicles would be accommodated on-site during the construction period and in the initial stage it would be situated in locations that are clearly separated from normal PIT operating areas. The proposed location of this parking area should minimise conflict between construction and '*initial stage'* PIT operating traffic.

8.2.5 Summary

From the information contained above the following is apparent:

» External construction traffic movement is unlikely to conflict with peak hour road or initial stage PIT operating periods and can be managed;

» The majority of traffic generated during the staged construction periods will be internal movement at the time of excavating material to provide a suitable building platform for the structures and hardstand areas; and

» The assessment of the throughput of 530,000 TEU per annum is the worst-case evaluation of external road network impacts for both construction and '*Intermodal Terminal'* operations. This is because the traffic movements during the construction periods are likely to be lower than those experienced during operation of the '*Intermodal Terminal's* at a throughput of 530,000 TEU per annum.

8.3 Traffic Management During Construction

An on-site traffic management plan will be prepared as part of the Construction EMP.

9. Key Findings and Recommendations

9.1 Project Summary

The following provides a summary of the proposed development, road freight market conditions and road network conditions around Parkes:

Proposed Development

- The proposed Parkes Intermodal Terminal (PIT) is a land parcel within the area rezoned by Council for industrial uses associated with “Multi Modal Transport Hub” activities;
- The PIT will be developed in two stages:
  - In the initial stage (2010) the facility will consist of a 10 hectares (ha) intermodal terminal (stack areas and rail sidings), 1000m^2 Gross Floor Area (GFA) of offices and 4ha of warehousing; and
  - In the ultimate Stage (2020) the facility will consist of an additional 14 hectares (ha) intermodal terminal (stack areas and rail sidings), 4000m^2 Gross Floor Area (GFA) of offices and 10ha of warehousing as the primary functional areas within the site.
- Other potential on-site uses in the ultimate stage, such as a containerised fuel centre, heavy engineering facility, stabling yards, etc.. would all be ideally suited to this type of site. However, due to the level of uncertainty on the type of facilities, their market need and potential size, for the purpose of this study these areas have been identified as being future potential uses and do not form part of this application.
- The assessment has indicated that the potential traffic generation of the site will be dictated by the likely target throughput, which can be used to assess the worst-case scenario for traffic impacts.
- The planned throughput of the Intermodal Terminal is 240,000 TEUs in the initial stage (2010) and 530,000 TEUs in the Ultimate Stage (2020), both targets are based on the planned growth in the movement of road and rail freight as indicated by Auslink and the potential for establishing a inland rail corridor via Parkes.
- The PIT key operations are unlikely to generate significant volumes of additional road container freight movements along the regional or local road networks, but instead concentrate on capturing and redistributing both existing and identified future demand;
- There will be a significant gain in the movement of containerised freight by rail in both the initial and ultimate stages with the predicted mode shift in freight being approximately 70/30 in favour of road traffic for inbound movements and 40/60 split in favour of rail for outbound movements.
- There is an imbalance between throughput generated inbound truck or rail movements and outbound truck or rail movements with road freight carrying approximately 70% of inbound freight movement to the facility and rail carrying approximately 60% of outbound freight movements from the PIT. Thus inbound truck

movement with no return trip is assumed to be available to accommodate other goods that could be generated by the site.

» Road access arrangements to the PIT would be designed:

  – Via Brolgan Road only;
  – As separate access points to various on-site uses and enables light and heavy vehicles to be separated; and
  – To minimise the impact on through traffic.

Road Freight

» Growth in road and rail freight movement around Parkes will occur with or without the establishment of an intermodal terminal in Parkes. Federal Government's Auslink White Papers has predicted a 3.6% pa for growth in national road freight.

» The operation of the intermodal terminal in Parkes is likely to capture some of this existing and future containerised road freight movement.

» The facilities at the PIT will offer an opportunity to redistribute, consolidate, store and shift containers between rail and road systems.

» The facilities at the PIT will provide State and Federal Government with an opportunity of achieving an improved road rail freight movement mode split.

Road Network Conditions around Parkes

» B double and road train type vehicles are likely to be generated and attracted to facilities located in both the Parkes Transport Hub and Goobang Industrial Area.

» Similar to other future uses located within the 'Parkes Transport Hub', truck traffic from the proposed development is likely to travel along the six established haulage routes via Parkes. These routes consist of the following:

  – Newell Highway (SH17) south of Parkes;
  – Newell Highway (SH17) north of Parkes;
  – Orange Road (MR61);
  – Condobolin Road (MR61);
  – Wellington Road (MR 233); and
  – Eugowra Road (MR 238).

» All of the above routes are RTA designated B Double routes, except Wellington Road and Condobolin Road has the ability to accommodate road trains.

» Currently 89% of all truck traffic that travels through Parkes will use the Newell Highway, which is an existing designated B double route. It is estimated that the distribution of truck traffic from the proposed PIT would be similarly weighted to that of the existing conditions as the target market is to capture future demand along routes.

» Both intersection and level crossing are critical points along the road network, which could be impacted from growth in traffic levels. Both level crossings and intersection situated along the Newell Highway will be impacted by the anticipated future growth in both rail and road freight movement. The proposed development will target this anticipated demand and redistribute onto Hartigan Avenue and Brolgan Road. The impacts from this will be as a direct result of the proposed development and other industrial sites situated in the Parkes Transport Hub and Goobang Junction Industrial Estate.

9.2 Impact

- All traffic generated by the PIT will travel via Brolgan Road and will be in addition to the existing traffic volumes along the local road network.
- The proposed development will generate 350 two-way light vehicle movements per day in the initial stage and 970 light vehicle movements per day in the ultimate stage.
- The proposed development is expected to generate the following truck traffic volumes along the local road network:
  - Initial Stage - 502 daily two way truck movements, which could potentially generate approximately 50 truck movements during the peak hour along Brolgan Road; and
  - Ultimate Stage – 1,178 daily two-way truck movements, which could potentially generate approximately 118 truck movements during the peak hour along Brolgan Road.
- The proposed development is expected to generate 4 train movements (includes inbound and outbound movements) in the initial stage and 8 train movements in the ultimate stage.
- The site is likely to generate some additional traffic along regional road network as well as redistributing planned growth in road freight traffic. The worst-case increase in traffic on the regional road network is shown in **Tables 30** and **31.** These tables indicate both the regional and local road network will operate satisfactory with or without the proposed development in the future.
- The construction of a new level crossings on Brolgan Road to the west of the proposed development will lead to some delay to through traffic travelling along this route.
- Further delays will be experienced at the following two existing level crossings as a result of train movement to and from the site:
- The level crossing situated on Brolgan Road to the west of the proposed development; and
- The level crossing situated on Condobolin Road to the west of the proposed development.

9.3 Recommendations

The following assessments and infrastructure upgrades are likely to be required as a result of developing the Parkes Intermodal Terminal on Brolgan Road, Parkes and other similar traffic movement to industrial uses associated with the Parkes Transport Hub and Goobang Junction Industrial Area.

- The proposed truck route through Parkes is shown in **Figure 6** along with upgrades identified by Parkes Shire Council these recommendations should be further assessed as part of delivering of haulage route strategy for Parkes and its surrounding industrial development lands;
- Upgrade of existing level crossings situated along Brolgan Road to the east of the proposed development and along Condobolin Road to the west of the proposed development to incorporate road design specification to accommodate B double and road trains, advanced warning signs and flashing lights.
- Construct a new level crossing point on Brolgan Road to the west of the proposed development to assist train movement into the Parkes Intermodal Terminal. This level crossing should include advanced warning signs, boom gates and flashing lights.
- Upgrade Brolgan Road between the western section of the Parkes Ring Road system to the proposed western site access point to incorporate road design specification to accommodate B double and road trains. It is understood that it would be desirable to provide two 3.5m wide traffic lanes with a shoulder width of 2.0m and 1.0m of this being sealed and would also benefit other land uses situated along this route.
- Provide appropriate high quality intersections along Brolgan Road, which provide multiple opportunities to gain direct and efficient access to the internal warehouse service road and the intermodal terminal access points. These intersections should be designed to accommodate frequent movement with a worst-case vehicle design standard being a B double and road train type vehicle. Based on the guidelines specified in the *Austroads Part 5: 'Intersections at Grade'* it would be desirable to provide types 'AUR' and 'CH' intersection layouts for access points along Brolgan Road to the PIT.
- The location of proposed access point to the Parkes Intermodal Terminal should be planned in conjunction to access points with other surrounding development.
- Provide appropriate high quality intersection along Condobolin Road. The intersection should be designed to accommodate B double and road train type vehicle. Based on the guidelines specified in the *Austroads Part 5: 'Intersections at Grade'* it would be desirable to provide types 'AUR' or 'CH' intersection layout.
- All of the above except the new access point onto to Condobolin Road should be undertaken in the initial stage of site development with the Condobolin Road provided in the Ultimate Stage.
- Intersections that should be further evaluated and are deemed to be directly impacted by container movement generated or redistributed to the PIT are as follows:
  - Brolgan Road with the West lime Road (Western Section of the Parkes Ring Road);
  - Condobolin Road with West Lime Road;
  - Newell Highway (Forbes Street) and Hartigan Avenue; and
  - Hartigan Avenue with Blaxland Street.

- Further investigation into an interim or ultimate route option for trucks travelling between Hartigan Avenue to the southern section of the Newell Highway. The Saleyards Road route would reduce traffic impacts on the intersection of Hartigan Avenue with Forbes Street (Newell Highway), however this route is current not designed to B double or road train specifications and would require some upgrade.

The study identifies that the analysis was a desktop investigation based on a preliminary level of information and a series of assumptions, which will only be confirmed once an operator for the facility is identified. The proposed operator will provide further confirmation of the resulting traffic impacts produced from each stage of the proposed development. These impacts should be identified and addressed with the submission of Development Applications for each proposed activity to be located in the Parkes Intermodal Terminal. The supporting detailed traffic impact statement would address issues associated with the following:

- Proposed truck routes at each stage of the development;
- Traffic generation for each activity at both the initial and ultimate stages of development;
- Intersection upgrades required at each stage of the development; and
- Level crossing upgrades required at each stage of the development.

Appendix A

Site Layout

Development of the Site under Initial and Ultimate Stages

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Scale	1-5000	DO NOT SCALE	
Drawn	CT	Designed	CC
Drafting Check	CC	Design Check	KT
Approved	D ROBERTS		
Date	18/01/06		

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Client **TERMINALS AUSTRALIA PTY LTD**
Project **PARKES INTERMODAL TERMINAL**
Title **CONCEPT LAYOUT PLAN AT ULTIMATE STAGE**

Original Size	Drawing No:	Rev:
A0	21-13701-R020	A

Appendix B

Existing Road Network – Parkes

Map taken from the Parkes Transport Hub (March 2002 & September 2003), Local Environmental Study, Parkes Shire Council.

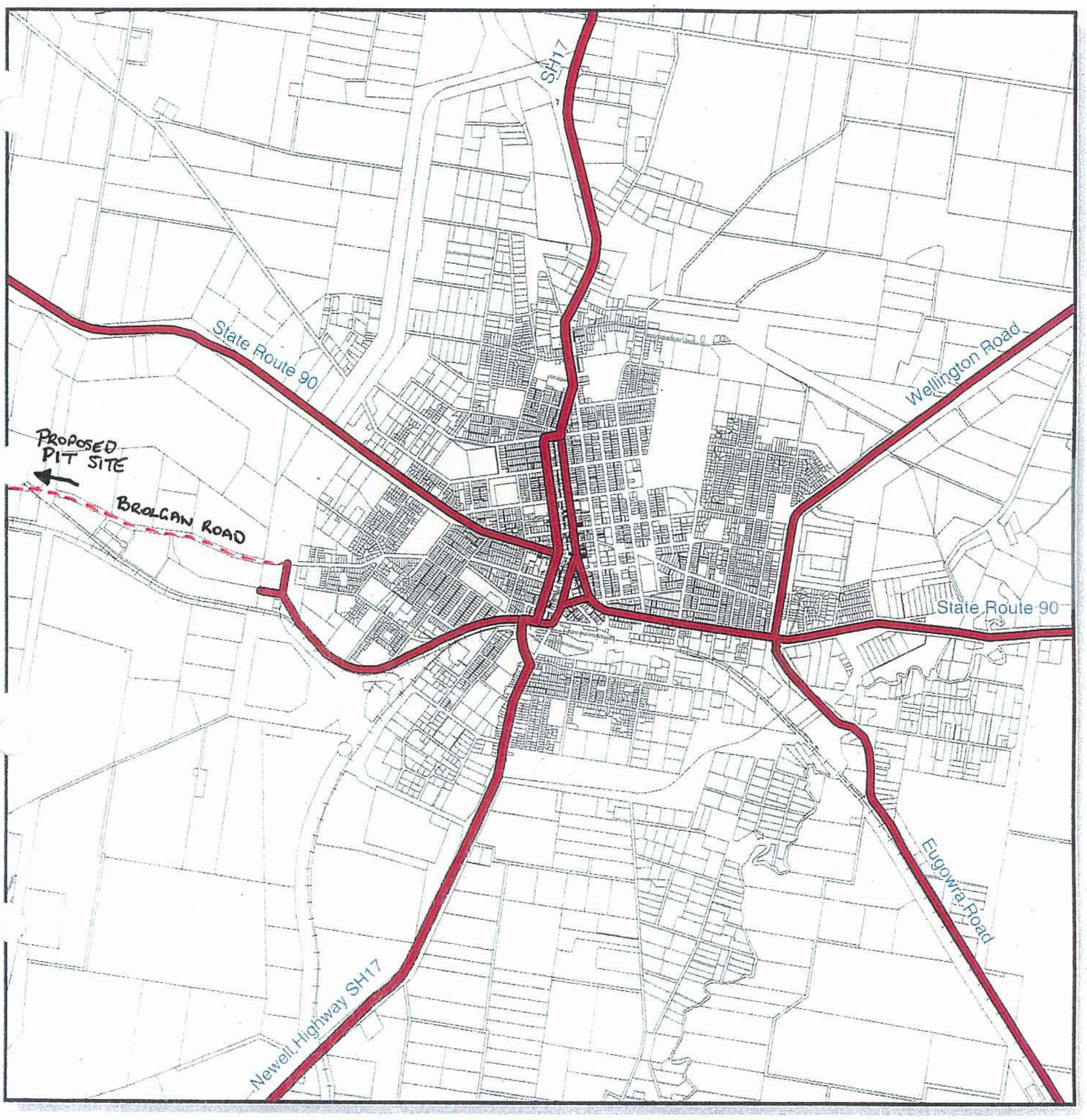


FIGURE
4.1

Parkes Existing Road Network

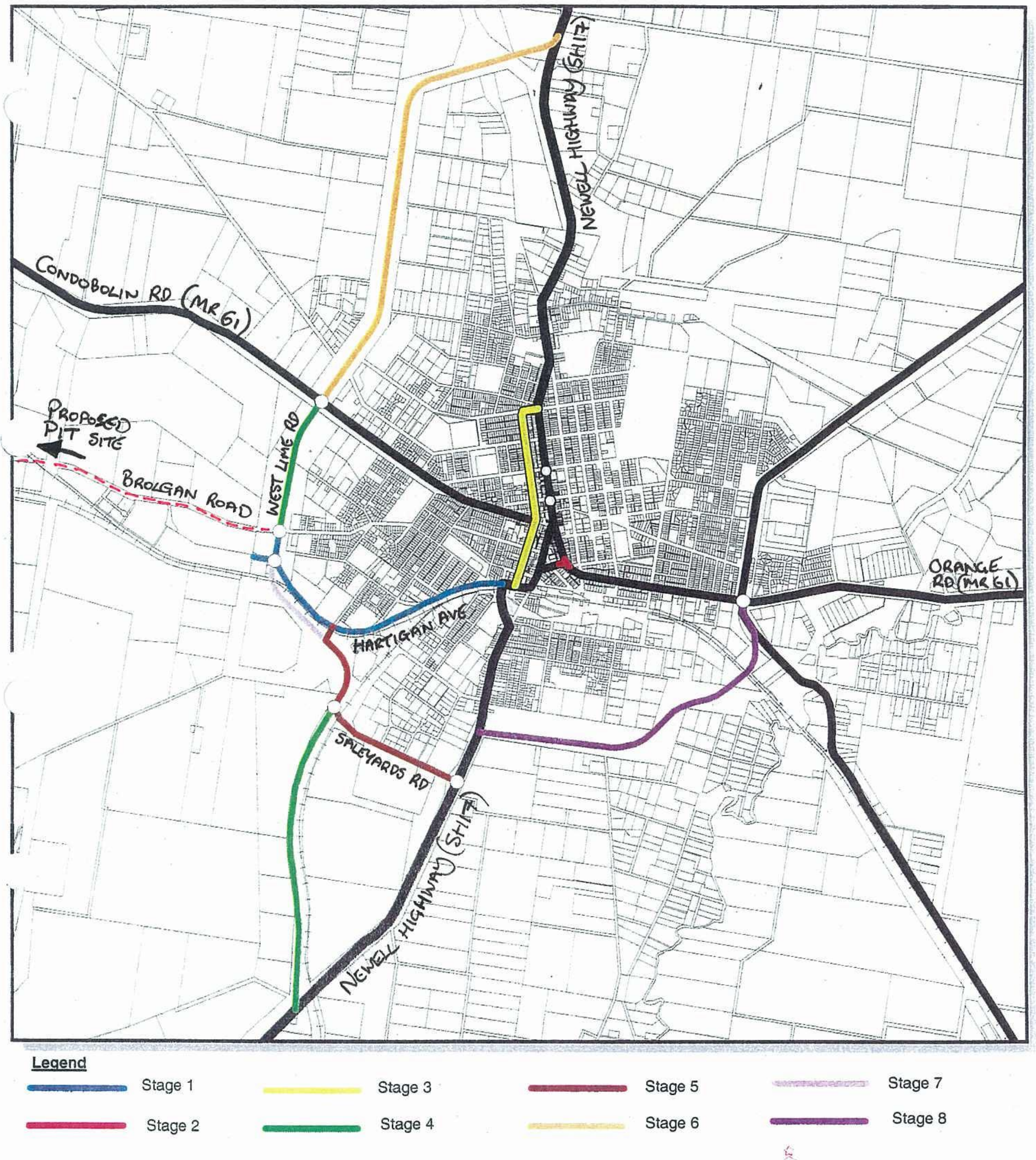
Appendix C

Planned Ring Road System for Parkes

Map taken from the Parkes Transport Hub (March 2002 & September 2003), Local Environmental Study, Parkes Shire Council.

Rezoning Submission

Parkes Transport Hub



FIGURE

4.2

Parkes Ring Road System

Appendix D

Site Road Access Plan

Plan showing site access needs and critical control points

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Scale 1-5000	DO NOT SCALE
Drawn CT	Designed CC
Drafting Check CC	Design Check KT
Approved D ROBERTS	
Date 18/01/06	

This Drawing must not be used for Construction unless signed as Approved

Client **TERMINALS AUSTRALIA PTY LTD**
Project **PARKES INTERMODAL TERMINAL**
Title **CONCEPT LAYOUT PLAN AT ULTIMATE STAGE INTERNAL ACCESS ROAD LAYOUT**

Original Size A0 | Drawing No: 21-13701-R020B | Rev: A

Appendix E

Design Considerations For Parkes Intermodal Terminal

The following section reviews the design criteria for the proposed PIT facilities and evaluates both the internal and external road infrastructure needs as a result of its proposed operations.

Key Operator Characteristics of Intermodal Terminals

The NSW Sea Freight Council produced a document dated 8th March 2004 and titled Regional intermodal terminals – Indicators for commercial sustainability. The appendices for this report highlights time sensitivity issues associated with the operation of typical intermodal terminals, which should be used in the planning of intermodal terminals.

The document implies that typically existing intermodal facilities are set up to service the movement of heavy and not particular time sensitive products. The report also indicates the following observations from the transfer of goods via such a facility:

» Rail has the ability to move more weight per vehicle journey than that offered by road.

» Multiple handling activity of intermodal operations means that time sensitivity can be an important service issue, affecting the viability of rail for perishables and the competitive movement of consumer goods to/ from rural areas.

» Storage, internal movement and sorting are an important component of this type of facility.

» Most rail-based journeys exceed 7 hours, with average transit times of 18 hours or have average trip distances in the order of 600km. The actual use of rail is particularly sensitive to rail line height restrictions, the number of rail services and the quality of the rail line, which impact on the availability of the line and journey speeds.

» Goods that are attracted to rail are likely to be transported in large quantities and stored for longer periods than those that are typically transported by road.

» Road freight provides the operator and producer greater flexibility, control of delivery timings, minimal diversions, choice of direct routes to the market place and minimal interference from external factors. However, the unit cost associated with transporting by road is higher.

Access Needs of Onsite Facilities

Primary function of an intermodal terminal facility is to provide a network that efficiently serves the movement of containers by road and rail. **Table 26** provides an indication of the required access arrangements for each of the proposed on-site facilities served by rail and/or road during both the initial and ultimate development stages of PIT.

Function Areas and Access Requirements

Function areas	Access Needs			Road Traffic Demand
	Road	Rail	Road Access Restrictions	
Initial stage				
Container stack and intermodal terminal sidings	Yes	Yes	Yes– due to rail conflict/ operational and safety issues.	Significant
Warehousing and distribution facilities	Yes	No	No	Significant
Administration Buildings	Yes	No	No	Significant
Ultimate stage				
Container stack and intermodal terminal sidings	Yes	Yes	Yes – due to rail conflict/ operational and safety issues.	Significant
Warehousing and distribution facilities	Yes	No	No	Significant
Administration Buildings	Yes	No	No	Significant
Storage and wagon inspection sidings (potential use only)	Yes	Yes	Yes – due to rail conflict	Low
Temporary fuel storage and distribution centre (potential use only)	Yes	Yes	Yes – due to rail conflict	Low
Heavy engineering facilities (potential use only)	Yes	Yes	Yes – due to rail conflict	Low
Yards operations depot (potential use only)	Yes	Unknown	Yes – due to rail conflict	Unknown

Based on the above information the following can be understood:

» Both warehousing and distribution facilities and administration buildings do not require linkages to rail and would benefit direct access to the external road network.

» Storage and wagon inspection sidings, temporary fuel storage and distribution centre, heavy engineering facilities generate low volumes of road traffic and would be suited to be better situated away from land uses that generate high volumes of traffic and in close proximity to rail.

» The container stack and intermodal terminal sidings is primary functioning area of the site and requires direct access to both road and rail.

Access routes within the site;

Refer to **Appendix C** for an understanding of the vehicle access plan for the site. The following principles have been applied for access around the site:

» All roads that are proposed to be situated in the southern section (i.e., warehouse and office areas) of the site will be have two way options to allow flexibility to all users of this area. This applies to all roads in the southern section except in the case of the designated western and eastern access routes to the intermodal terminal, which will be one way and designed to accommodate oversized vehicles.

» One-way road operations will operate between the southern section of the site and the central section of the site. This will be implemented in order to control movement into areas that should be restricted due the potential for conflict with large vehicles loading and unloading containers, rail movement through the site and the machinery used to transport containers. A one way restricted route would ensure that security level are sufficient, movement around the site is safe, controlled and coordinated in the most efficient manner with all vehicles moving forward in a single direction around critical areas of the site.

» Two-way road operation will be allowed north of the Intermodal Terminal (ultimate stage stack areas), were access will be provided via a single access road, which travels between the heavy engineering facility, containerised fuel and distribution centre and the stabling yards. All these facilities will generate low levels of traffic activity and require a higher level of restricted access.

Appendix F

RTA Traffic Counts Information

Approach Road Traffic Count Summaries and Estimated Vehicle Classification Breakdowns.

RTA WESTERN REGION

July 2004 update

Traffic Count Summary and Estimated Vehicle Classification Breakdowns

MetroCount information
Estimated values - no information available
ESA's calculated using Method 2 - Austroads Pavement Design Guide

Road No.	Site No.	RoadLoc Distance (km)	LGA	From	Towards	Description of Site	Average Annual Daily Traffic (AADT) 1976	1992	1996	1999	2002	pa %'age trend	%'age cars	Heavy Vehicle Breakdown - ESA's %'age Rigids	%'age Semis	%'age Multi Artics
17	93.122	15.87	Parkes	Forbes	Parkes	At Forbes/Parkes bdy	2430	3900	4442	4517	5241	1.91%	*73.9%*	*4.0%*	*16.0%*	*6.0%*
17	93.002	3.27	Parkes	Parkes (Town)	Dubbo	Parkes, 3.2km north of Court St	2120	3337	4339	4509	4945	2.07%	*67.3%*	*4.9%*	*17.5%*	*10.3%*
61	93.238	96.45	Parkes	Orange	Parkes	Parkes, at Billabong Ck bridge	1380	*1299*	1631	1637	1957	0.78%	*83.9%*	*8.8%*	*6.3%*	*1.0%*
61	93.243	5.91	Parkes	Parkes (Town)	Condobolin	At level crossing, west of Parkes	880	*1034*	965	964	1009	0.45%	*86.9%*	*6.9%*	*5.4%*	*0.7%*
233	93.388	101.10	Parkes	Wellington	Parkes	Parkes, 8km north of SH17, Newell Hwy	250	*359*	319	*389*	*389*	1.33%	*88.9%*	*6.4%*	*4.7%*	*0.0%*
238	93.883	21.63	Forbes	Eugowra	Parkes	At Forbes/Parkes boundary	*213*	445	470	474	456	2.13%	*88.4%*	*4.5%*	*6.8%*	*0.2%*

Brolgan Road
Analysis of Brolgan Road is based on a 7 day 24 hour classification counts conducted between 9 December 2005 and 16 December 2005

ADT	188
%HV	9%
Growth Rate /Annum	1%

Time Period	2005			Assumed Annual Growth Rate	Road Type
Vehicle Category	Total	HV	%HV		
Brolgan Road	188	4	2%	*Assume 1% growth from 2005 to 2020	Rural 100km/h
MR 61 (W) Condobolin Rd	1036	82	8%	0.5%	Rural 100km/h
SH17 Newell Hwy (N)	5337	888	17%	1.3%	Rural 100km/h
SH17 Newell Hwy (S)	5620	1510	27%	1.0%	Rural 100km/h
MR 61 (E) Orange Rd	2031	111	5%	0.7%	Rural 100km/h
MR 233 Wellington Rd – NE	408	41	10%	0.4%	Rural 100km/h
MR 238 Eugowra Rd – SE	488	53	11%	0.5%	Rural 100km/h
Hartigan Avenue	450	32	7%	*Assume 1% growth from 2010 to 2020	Urban 50km/h
Bogan Street	5427	868	16%	* Assume same growth as Condobolin Road	Urban 50km/h
Dalton Street	1943	97	5%	*Assume same growth as Newell Highway North	Urban 50km/h

Appendix G

Growth in Road Freight

Background Information

The purpose of this section is to provide an understanding of the potential trip capture and generation from the Parkes Intermodal Terminal (PIT). This document will provide inputs into the likely facility needs in terms of ‘road infrastructure standards’ being set in the engineering masterplan and traffic volume data required for comparison purposes in the environmental assessment being prepared for the ‘concept design’.

National Road Freight

The Federal Government through the Auslink section of the Department of Transport and Regional Services (DOTARS) has published a White Paper, which identifies the Nation’s future road and rail freight requirements. These requirements are currently being pursued and in some cases implemented in the form of the ‘Auslink Policy’. The DOTARS White Paper indicated that the predicted growth in national road freight is likely to be 3.6% per annum. This estimated annual growth rate in future road freight will be used in this assessment to understand the infrastructure needs of the facility and affects on surrounding road network.

Definition of Non-Bulk Freight

Non-bulk freight is defined in the DOTARS White Paper as being “Containerised or packaged freight cargo, generally transported on pallets”. This type of freight is typically referred to in terms of a “Twenty Foot Equivalent Unit” (TEU), which is the standard unit of measure for palletised or packaged goods.

The primary function of the PIT is the handling of non-bulk freight and thus road infrastructure will need to be related to growth in TEU and the shifting of freight between rail, road and on-site storage areas. The terminal operations will also include the breaking down of shipments and repackaging of containers, this will occur in the warehouse areas.

Appendix H

Level Crossing Specifications and Rail Movements

Expected Train Frequencies

The following table presents a broad level understanding of existing and future daily rail movements of both passenger and goods trains using the existing rail network without the PIT and passing over level crossings in close proximity to the site. The existing train movements have been sourced from the ARTC Standard Working Timetables for each appropriate rail line. The future estimates are based on current train volumes factored by the 3.4% pa, which is the anticipated growth for rail freight as presented in the 'Auslink White Paper'.

Estimated Growth in Daily Train Frequency without Proposed Terminal

Year	Orange -Broken Hill Line (Approx)	Parkes-Narromine Line without inland rail line (Approx)	Parkes-Narromine Line with inland rail line (Approx)	New Master Siding (Linking Western Line to Parkes-Narromine Line)
2005 (Present)	5+1*	2 + 1*	2 + 1*	N/A
2010 (Initial Stage)	6+1*	3 + 1*	3 + 1*	1
2020 (Ultimate Stage)	7+1*	4 + 1*	9 + 1*	2

Notes:

» 5+ represents the maximum number of goods train movements operating along the line.

» 1* represents the number of passenger train services operating along this line.

» N/A indicates that trains travelling along these lines do not impact on level crossings surrounding the site during that time period.

» The Parkes – Narromine railway with the inland rail link (Brisbane to Melbourne) assumes that 50% of freight trains currently using the coastal line will be transferred on to the Parkes – Narromine rail line when opened. It is assumed that if the inland route is constructed, then it will be operational by the Ultimate Stage.

» The train frequencies also assume that some trains would be diverted through the site as a consequence of opening of the master siding to general rail traffic and providing a direct rail link between the Parkes - Narromine (Brisbane) and the Orange – Broken Hill (Sydney - Adelaide - Perth) rail lines.

Additional Train Movements Generated by the Proposed Terminal

Based on information presented in the '*Operations and Functional Brief*' it can be assumed that the proposed Parkes Intermodal Terminal will generate the following:

» 2 additional inbound daily rail movements in the initial stage; and

» 4 additional inbound daily rail movements in the ultimate stage.

The following table presents a broad level understanding of existing and future daily rail movements of both passenger and goods trains using the existing rail network with the PIT.

Estimated Growth in Daily Train Frequency with the Proposed Intermodal Terminal

Year	Orange Parkes-Broken Hill Line (Approx)	Parkes-Narromine Line without inland rail line (Approx)	Parkes-Narromine Line with inland rail line (Approx)	New Master Siding (Linking Western Line to Parkes-Narromine Line)
2005 (Present)	5+1*	2 + 1*	2 + 1*	N/A
2010 (Initial Stage)	6+1*+ 2^	3 + 1* + 2^	3 + 1* + 2^	1 + 1^
2020 (Ultimate Stage)	7+1*+ 4^	4 + 1* + 4^	9 + 1* + 4^	2 + 2^

Note – 2^ represents the number of additional train movements generated from the proposed development.

Based on the above information and operation scenario assumptions, the following is apparent:

» The busiest level crossings will be on Brolgan Road to the east of the site and on Condobolin Road to the west of the site where 6 train movements will occur during the initial stage and 9 during the ultimate stage without the inland rail line;

» If the inland rail line was built and the chosen route passed through Parkes then the number of train movements at the above level crossings would increase to 14 train movements in the ultimate stage; and

» The number of train movements on the new level crossing on Brolgan Road to the west of the site would be 2 during the initial stage and 4 during the ultimate stage.

Assumed Time Delay to Traffic at Level Crossings

The assumed level of delay for traffic at level crossings is dependent upon the following:

» Travel speed of trains passing through the level crossing:

» The length of the train passing through the level crossing;

» The number of trains passing through the level crossing; and

» The number of vehicles that could potentially want to pass through the level crossing during the closure.

The assessment assumes that the following level crossings will be impacted by general growth in rail and road movement generated by the site and growth in background road and rail traffic:

» The existing level crossing situated along Brolgan Road to the east of the site;

» A new level crossing to be situated along Brolgan Road to the west of the site; and

» The existing level crossing situated along Condobolin Road to the west of the site.

The assessment assumes that all the above level crossings will be upgraded to active controls with flashing lights. The following table presents likely overall delay to road based traffic as a result of the level crossing being closed and is based on an assumption that all trains would be 1800m in length with train travel speeds across the level crossings varying between 10km/h and 115km/h. The travel speed of trains is likely to vary and is dependent origin and destination of the train movement, train type and track design.

Assumed Time Delays to Traffic from Level Crossing Closures

Travel speed (km/h)	Pre Train Delay time	Train Crossing Delay time	Reopening Delay Time	Total delay time
10	1min 0 secs	10min 48 secs	0min 30 secs	12min 18 secs
20	1min 0 secs	5min 24 secs	0min 30 secs	6min 54 secs
40	1min 0 secs	2min 42 secs	0min 30 secs	4min 12 secs
50	1min 0 secs	2min 10 secs	0min 30 secs	3min 40 secs
115	1min 0 secs	0min 56 secs	0min 30 secs	2min 26 secs

Notes

- Pre train Delay Time – time delay caused by the lights starting to flash at the level crossing before the arrival of a train.
- Train Crossing Delay Time - time delay caused by the train passing over the level crossing at the specified travel speed.
- Reopening Delay Time – time delay caused by the time taken for the lights to stop flashing at the level crossing after the train has passed over the level crossing.

Based on discussions with stakeholders, review of rail track designs and expected operations at the PIT the following is understood to be the worst-case scenario for resulting delays at level crossings from anticipated train movements. The worst-case scenario assumes that the inland rail route is constructed and as a result expected number of train movements increases.

Appendix I

Freight Routes for Oversized Vehicles

Heavy Vehicle Routes

Assessment criteria for proposed B-Double routes.

Appendix 3 of the *'Route Assessment Guidelines for B-Doubles and Road Trains'* indicates the assessment criteria for proposed B-Double routes.

The appendix provides a section on dimension capacity and consists of the following elements:

- Lane and shoulder widths.
- Vehicle swept path requirements
- Railway level crossings and adjacent intersections
- Terminals

All of the above have a common theme in that the route should be adequately designed for accommodating vehicles of this size and provide allowance for their mobility deficiencies.

Under the dimensional capacity section of this document, a number of desirable standards for lane and shoulder widths for B Double routes are presented.

According to the RTA '*Route Assessment Guidelines for Restricted Vehicle Access'* when daily traffic levels increase above 500 vehicle per day (vpd) and up to volumes of 6,000vpd, it is desirable to provide traffic lane widths of 3.0m and shoulder widths between 1.0m-1.2m in order to provide suitable conditions for B Double type vehicles; and

Based on Austroads '*Rural Road Design Guide'*, the desirable traffic lane width on rural roads should be in the order of 3.5m. Lane widths as narrow as 3.0m may, however, be used on low volume roads. The '*Austroad Rural Road Design Guide'* also indicates that the minimum width of a road shoulder on a two lane rural road should be 1.0m, it also indicates that a width of between 1.5m-2.0m ensures that capacity of the adjacent lane is unaffected by obstructions outside the shoulder. If the road reserve is restricted then the lane width may be reduced to a minimum of 3m.

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
D1	G.Hughes	S.Smyth				19/1
D2	G.Hughes	S.Smyth				24/1

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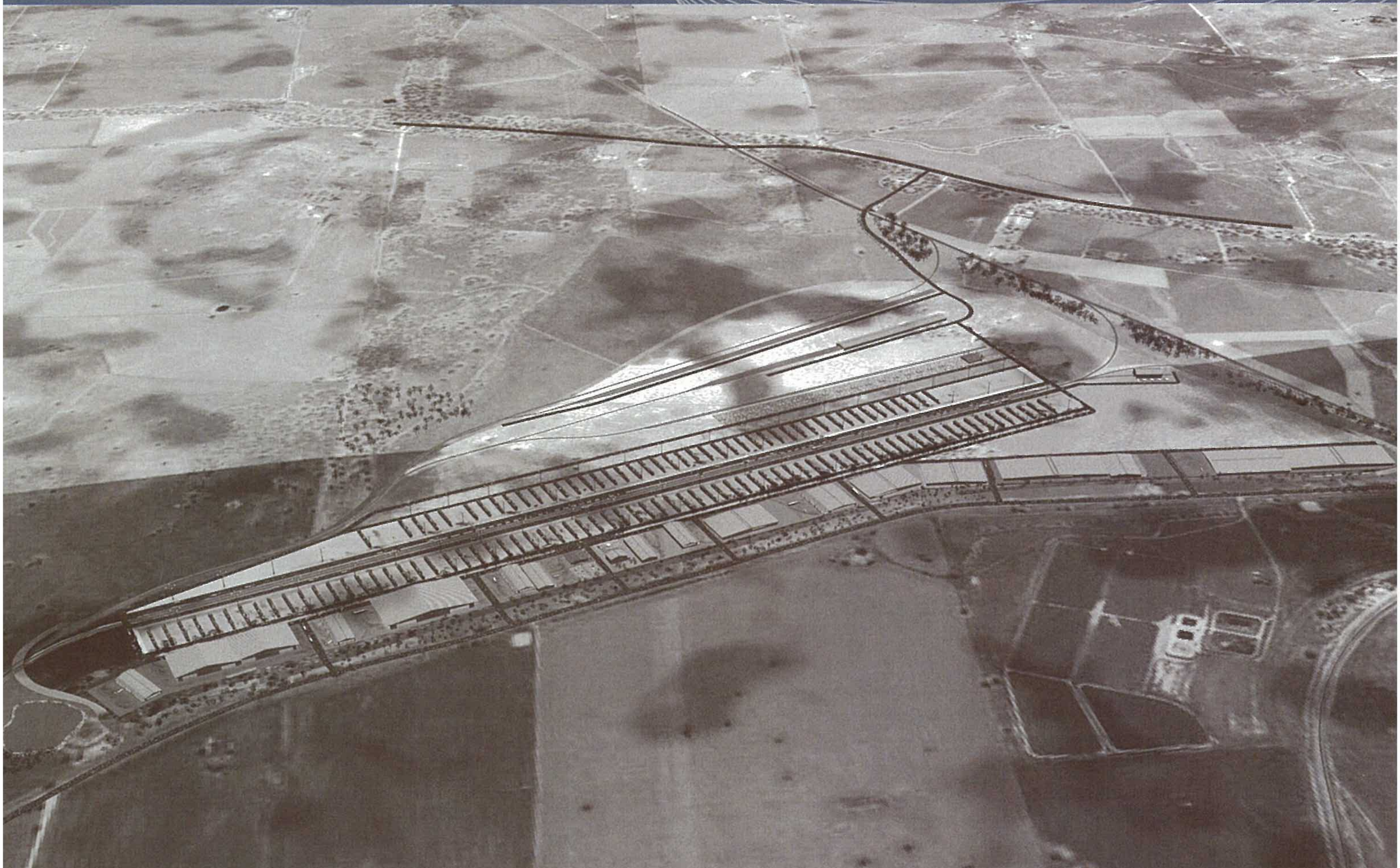
APPENDIX C

NOISE ASSESSMENT



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Terminals Australia

Noise Assessment, Proposed Intermodal Terminal, Parkes NSW

January 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Glossary

dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels.
L_N	Statistical sound measurement recorded on the linear scale.
L_{AN}	Statistical sound measurement recorded on the "A" weighted scale.
$L_{A10\ (Time)}$	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
$L_{A10\ (1\ hour)}$	The L_{A10} level measured over a 1-hour period.
$L_{A10\ (18\ hour)}$	The arithmetic average of the L_{A10} levels for the 18-hour period between 0600 and 2400 hours on a normal working day. It is a common traffic noise descriptor.
$L_{Aeq\ (Time)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{Aeq\ (15\ hr)}$	The L_{Aeq} noise level for the period 7 am to 10 pm. (Day and Evening)
$L_{Aeq\ (9\ hr)}$	The L_{Aeq} noise level for the period 10 pm to 7 am. (Night)
$L_{Aeq\ (1\ hr)}$	The L_{Aeq} noise level for a one-hour period. It represents the highest tenth percentile hourly A-weighted L_{eq} during the period 7 am to 10 pm, or 10 pm to 7 am, (whichever is relevant).
$L_{A90\ (Time)}$	The A-weighted sound pressure level that is exceeded for 90 per cent of the time over which a given sound is measured. This is considered to represent the background noise e.g. $L_{A90\ (15\ min)}$
$L_{AMax\ (Time)}$	The maximum sound level recorded during a specified time interval
$L_{AMin\ (Time)}$	The minimum sound level recorded during a specified time interval
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24 hour period used for the assessment background level). This is the level used for assessment purposes. It is defined as the median value of: All the day assessment background levels over the monitoring period for the day; (7 am to 6 pm) All the evening assessment background levels over the monitoring period for the evening; (6 pm to 10 pm) or All the night assessment background levels over the monitoring period for the night. (10 pm to 7 am)

Executive Summary

GHD Pty Ltd (GHD) was commissioned by Terminals Australia, as part of a Masterplan and Environmental Impact Statement (EIS), to assess the acoustic impacts for the construction and operation of an Intermodal Terminal for the large-scale transport, warehousing, manufacturing and storage of freight located at Parkes, western NSW. The basis of the assessment was to ascertain whether the proposed facility would have an acoustic effect on the amenity of nearby sensitive noise receptors within close proximity of the site, during both construction and operation of the terminal.

Unattended noise monitoring was undertaken to determine the existing background and noise environment in the vicinity of the proposed facility. Detailed noise modelling was undertaken based on the predicted maximum sound power levels of primary noise sources for the facility. The noise model undertook a worst-case scenario with all plant items listed operating at their maximum sound power levels with wind directed at the nearest residences.

Results of the noise modelling suggest that noise emanating from the proposed Parkes intermodal terminal will meet the DEC Industrial Noise Policy (INP) project specific noise goals.

Construction noise has the potential to exceed the project specific noise criteria in a worst-case scenario, however this can be mitigated through the utilisation of best management practices as outlined in this assessment.

Results of the noise modelling based on the increase in expected rail movements at the site suggest that 24hr L_{Aeq} levels in the vicinity of the intermodal terminal will remain below the NSW DEC 24hr recommended guidelines.

Predicted future traffic noise resulting from the haulage routes associated with the proposed terminal were modelled using information for future traffic counts. Based on the information provided and modelling under various day and evening scenarios, it is unlikely that traffic noise levels due to the predicted haulage routes associated with the proposed terminal will exceed the noise guidelines.

Therefore, based in the findings of this acoustic assessment, it is considered that operational, construction and traffic noise generated from the proposed Parkes intermodal terminal can meet the relevant noise guidelines.

1 Introduction

GHD Pty Ltd (GHD) was commissioned by Terminals Australia, as part of a Masterplan and Environmental Impact Statement (EIS), to assess the potential acoustic impacts for the construction and operation of an Intermodal Terminal for the large-scale transport, warehousing, manufacturing and storage of freight located at Parkes, western NSW. The assessment was to ascertain whether the proposed facility would have an acoustic effect on the amenity of nearby sensitive noise receptors within close proximity of the site, during both construction and operation of the terminal.

1.1 Scope of Works

- Review of supplied background data (i.e. Details of all plant and equipment and their specified noise levels, proposed operation times and review of available traffic data);
- Development of sampling methodology and identification of suitable monitoring locations through consultation with the client;
- Site inspection and noise monitoring assessment. This included:
  - Long-term background noise monitoring at two representative locations (in the vicinity of the proposed development area), of the ambient noise environment for a period of 7 days;
  - Noise levels were recorded and assessed against the statistical parameters L_{Amax}, L_{Amin} $L_{A10,}$ L_{A90}, and $L_{Aeq,}$ with consideration to the DEC's guidelines; and
  - Noise modelling was undertaken for this project to ascertain the acoustic contribution of the development with consideration to project specific noise goals.
- Data Interpretation;
  - Noise data was assessed and filtered to remove invalid data due to extraneous noise or adverse weather conditions;
- Preparation of report with consideration to NSW DEC publications Environmental Noise Control Manual Chapter 171 Construction site noise (ENCM), Environmental Criteria for Road Traffic Noise (ECRTN), and Industrial Noise Policy (INP), including:
  - A brief description of the project;
  - A brief description of the ambient noise environment;
  - A brief description of the items to be used on site likely to emit noise;
  - Location of the noise monitoring with respect to the proposed terminal;
  - Charts of the noise parameters including L_{Amax}, L_{Amin} $L_{A10,}$ L_{A90}, and $L_{Aeq,}$ for the unattended noise monitoring;

– Based on monitoring results, establish project specific noise goals for the operation of the proposed new intermodal terminal with consideration to the NSW DEC publications Environmental Noise Control Manual Chapter 171 Construction site noise, (ECRTN), and (INP);
– Discussion of the noise monitoring and modeling results with relation to project specific noise goals and guidelines; and
– Proposing possible noise mitigation measures if the noise assessment suggests that project specific noise goals may be exceeded.

1.2 Approach

The following steps were undertaken:

- Compliance criteria determined;
- Existing ambient noise sources identified and classified as operational (local or tonal), extraneous or construction;
- New noise sources identified: including plant noise sources;
- Site noise monitoring locations selected for permanent monitoring (2);
- Site noise monitoring measurements undertaken;
- Assessment of noise measurements made leading to the determination of background and various time related noise levels;
- Evaluation of extraneous noises and constant noise;
- Projection of new noises to the surrounding sensitive noise receptors;
- Summation of existing and projected noise;
- Assessment of compliance; and
- Comment on noise control requirements.

1.3 Limitations

This report has been prepared for Terminals Australia. The purpose of the report is to provide an independent review of the proposed intermodal terminal at Parkes.

It is not the intention of the assessment to cover every element of the acoustical environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the noise assessment represent the findings apparent at the date and time of the monitoring and the conditions of the area at that time. It is the nature of environmental monitoring that all variations in environmental conditions cannot be accessed and all uncertainty concerning the conditions of the ambient noise environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for noise were referred to. This work has been conducted in good faith with GHD's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2 Project Description

The purpose of the Intermodal Terminal would be to provide a strategic location between the freight service user and a destination such as a port, where by freight operators could take advantage of the road/rail transport modes. In addition, the freight operators could utilise terminal facilities such as cold storage, refuelling facilities and long/short-term storage. The Intermodal Terminal would have the primary function of:

- Container stack and storage facilities, including storage capacity for empty containers;
- Warehousing and distribution facilities; and
- Associated rail and road infrastructure to support the Terminal.

The potential users of the Intermodal Terminal would include:

- Importers who are dependent on a single port of call shipping service; and importers wanting to uses a single port rather than multiple ports. Importers could build supply chains around Parkes warehouse and terminal;
- Major refrigerated facilities could be developed for cold storage;
- The Terminal could provide a consolidation point for East Coast wool handling, packaging and distribution for export;
- Terminal for rail freight moving on the East Coast freight corridors and for double stacking and reconfiguration of trains for West Coast services; and
- Bulk freight, including fuel and minerals could benefit from the facility.

It is envisaged that the Parkes Intermodal Terminal will be developed on a progressive basis driven by market forces.

2.1.1 Initial Stage

The initial stage, as outlined in GHD's Engineering and Infrastructure report (January, 2006), contains the essential facilities and associated infrastructure to enable the commencement of operations within the intermodal terminal facility within 5 years of project initiation, which comprises of the following:

- Intermodal Terminal Facility infrastructure:
  - 2 intermodal terminal sidings (including connections to both the Parkes-Narromine rail line and the proposed Master Siding);
  - Container storage area (14 Ha);
  - Administration office and carpark (5,000 sq.m);
  - Terminal plant refuelling & maintenance facility (5,000 sq.m); and
  - Rail mounted gantries including structural foundations and rails.

To support the initial stage facilities, the following major infrastructure is also planned for construction:

- Mainline Siding on the Parkes-Narromine rail line;
- Master Siding connecting the Parkes-Narromine rail line to the Main Western rail line;
- Internal Access roads to the facility including multiple intersections at Brolgan Road;
- Required initial stage public utilities and services;
- Initial stage stormwater drainage which includes the expansion of the existing dam at the south east corner of Lot 200 DP 627302; and
- Landscaping of designated areas.

The proposed initial stage development for the Parkes Intermodal Terminal is presented in the *Engineering and Infrastructure Report* (Drawing No. 21-13701-R020A).

2.1.2 Ultimate Stage

It is envisaged that the remaining facilities and infrastructure required to satisfy the outstanding functional requirements of the Parkes Intermodal Terminal will be provided in a piecemeal approach with the provision of these facilities and associated infrastructure being dependent on market forces and the organic growth of the intermodal terminal facility.

The remaining facilities and associated infrastructure to be delivered by the ultimate stage in 2020 comprises of the following:

- Intermodal Terminal Facility infrastructure:
  - Additional 2 intermodal terminal sidings;
  - Additional container storage area (Additional 10 Ha);
  - Train refuelling & sanding facility (5,000 sq.m); and
  - Additional rail mounted gantry.
- Warehousing (Stage 1 = 4 Ha; Stage 2 = additional 6 Ha; with future provision for an additional 16 Ha to be developed as required);
- Containerised Fuel Storage Facility;
- Heavy Engineering Facility; and
- Wagon Storage Sidings.

To support the remaining facilities for the site to achieve the ultimate stage functional requirements, the following major infrastructure will also be delivered:

- Internal Access roads to the facilities including a northern access road to MR61 (Condobolin Road) which also requires a grade separated crossing (in the form of a road over rail bridge) and further multiple intersections at Brolgan Road;

- Remaining public utilities and services not installed, or requiring capacity increases since initial stage; and
- Remaining stormwater drainage structures not installed in the initial stage.

2.2 Location

The proposed site for the Intermodal Terminal facility is located approximately 5 kms west of the urban centre of Parkes. The site is located south of the State Route 90, north of Brolgan Road and west of the Parkes Narromine Railway. The primary access to the site will be via Brolgan Road.

Dominant features of the landscape includes the Parkes-Narromine rail line, derelict dwellings, agricultural fields and associated dwellings/fences, Brolgan Road, the Sydney-Adelaide-Perth rail line and a predominant ridge on the western side of the site. The subject site is shown in Figure 1.

2.3 Previous Reports

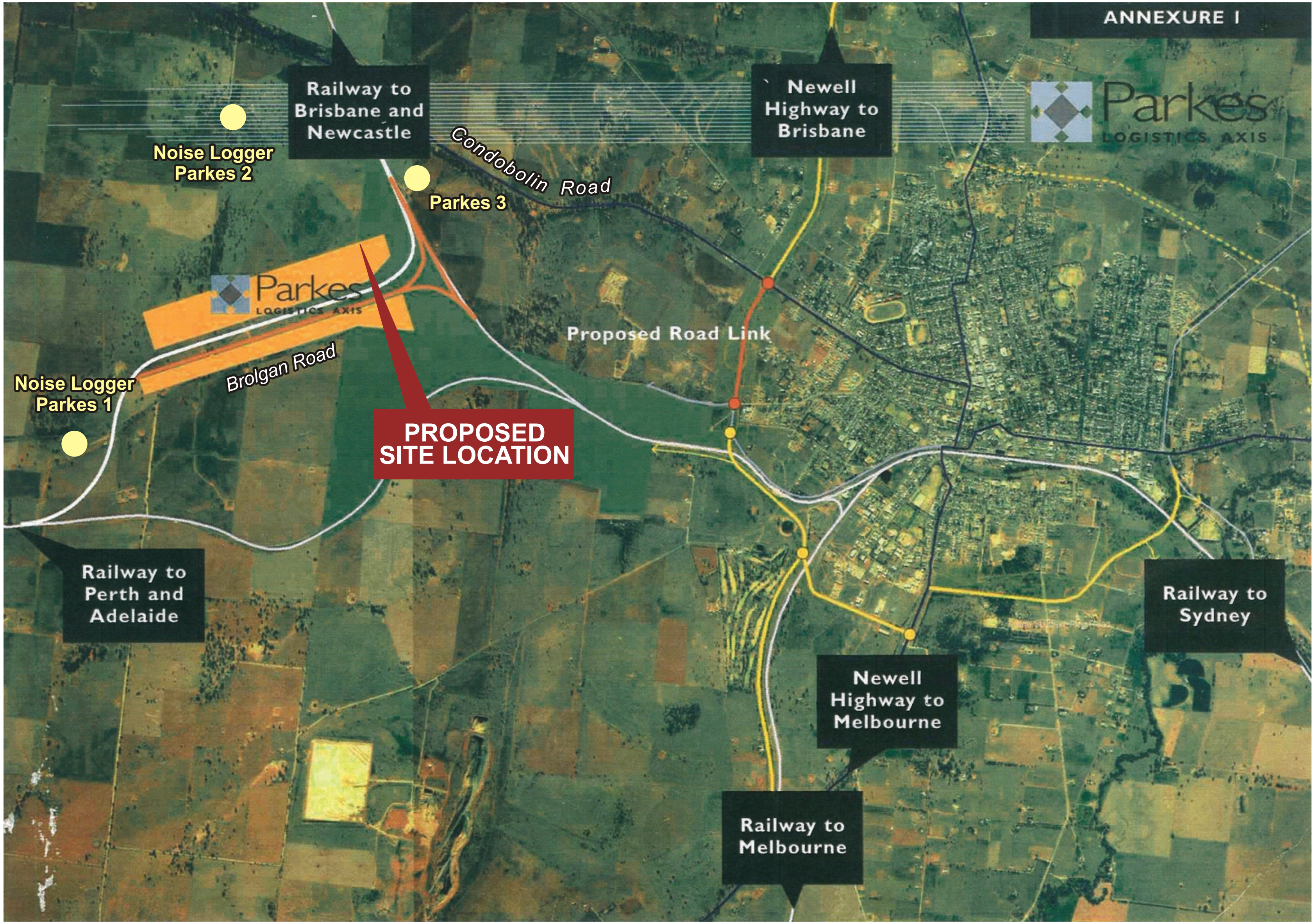
A number of previous noise assessment reports have been undertaken detailing the potential acoustic impacts of the proposed expansion of the Parkes industrial area and the use of local roads as heavy vehicle haulage routes.

Background noise monitoring has been undertaken at various locations surrounding the proposed PIT site, with the most recent acoustic assessment undertaken in 2002 investigating noise restrictions that may potentially limit the available area of land surrounding the proposed Parkes industrial hub following its commissioning and operation.

Road traffic noise for a number of traffic scenarios, in particular the use of Hartigan Avenue as a heavy vehicle transport route has also been assessed. Previous assessment of potential road traffic noise has taken into consideration existing traffic data at the time of the assessment and potential impacts of increased road traffic noise at residential receiver locations along the proposed traffic routes.

A list of previous background reports available at the time of this assessment is provided below:

- Parkes Shire Council, *Review of Environmental Factors, Access Road for the Goobang Junction Industrial Area;*
- Parkes Shire Council, *Strategic Plan for Major Road and Transport Infrastructure for Parkes and Environs,* April 2006;
- Indigo Acoustics, *Parkes Hub, Environmental Audit Noise Assessment,* March 2002;
- Civil Design and Modelling Consultants, *Noise Prediction Study for Proposed Subdivision Development at Parkes,* February 2000; and
- RTA Technology, *Traffic Noise Modelling of the Proposed upgrade of Hartigan Avenue, Parkes as a heavy vehicle route,* August 1997.



Date: 11 November 2004

Site Location

Figure 1

3 Noise Monitoring and Results

3.1 Monitoring Locations

Two Acoustic Research Laboratories EL215 Type 2 continuous noise loggers were used to monitor the noise environment at the following locations:

- **Location 1** (also known as Parkes 1): Keith Residence, Brolgan Road, south west of the subject site; and
- **Location 2** (also known as Parkes 2): Clifton Residence, off Condobolin Road, north of the subject site.

Noise monitoring locations are shown in Figure 1.

A site inspection was conducted to determine appropriate long term noise monitoring locations for the assessment. The two locations chosen were deemed to be sites that were indicative of the local residential noise environment with the Keith residence being closest to the subject site while the Clifton residence provided an additional location indicative of the local ambient noise environment.

It is acknowledged that the Keith resident will be relocating during operation of the proposed terminal, however the exact location of the new residence was not yet confirmed, therefore the noise logger was placed within the property boundary of the existing residence.

Following the completion of long term monitoring at the two nominated locations, it was understood Parkes Shire Council had approved a development application for the construction and occupation of a third residence within close proximity to the terminal site. Background noise monitoring was not undertaken at this location (as the rating background level is anticipated to be similar to that at the tow original noise monitoring locations), however the location of the proposed residence was included in noise modelling.

The anticipated third residence adjacent to the site is known as Parkes 3.

Long term noise monitoring took place between the 25 August and 2 September 2005. The instruments were programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes for the entire monitoring period. Internal software then calculated and stored the Ln percentile noise levels for each sampling period, which was later retrieved for detailed analysis. The instruments were calibrated before and after the logging periods. Table 3.1 provides details of the noise loggers and their locations.

Table 3.1 Continuous Noise Logger Details

Measurement Title	Parkes 1	Parkes 2
Monitoring Location	Keith Residence - Brolgan Road	Clifton Residence - Off Condobolin Road
Logger Serial No.	194560	193400
Measurement Started at	09:15 August 26, 2005	17:30 August 25, 2005
Measurement Stopped at	09:45 September 2, 2005	09:15 September 2, 2005
Pre-measurement Reference	110.1 dB(A)	110.2 dB(A)
Post-measurement Reference	110.0 dB(A)	110.0 dB(A)
Frequency Weighting	A	A
Engineering Units	dB(A) SPL	dB(A) SPL

3.2 Weather Results

Meteorological data (wind speed, direction, rainfall) was recorded continuously at noise monitoring location 1, using a Davis Instruments Vantage Pro Weather Envoy weather station set to record 15-minute averages. The details of the weather data are provided in Table 3.2. Wind speed is presented graphically in Figure 2.

Table 3.2 Weather Data

Data File Name	Clifton Residence
Measurement Started at	17:00 August 25, 2005
Measurement ended at	09:15 September 2, 2005
Percentage of non weather affected data	65%

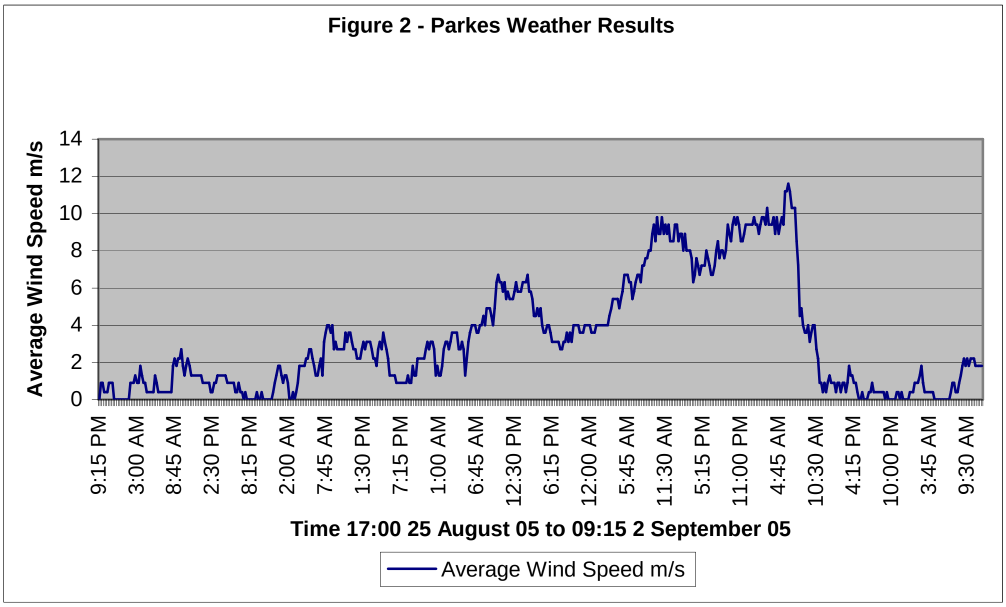


Figure 2 Windspeed Results Clifton Residence

No rainfall was recorded for the duration of the monitoring period.

3.3 Noise Monitoring Results

Figures 3 and 4 provide a graphical summary of the long term noise monitoring conducted at the Keith residence and the Clifton residence.

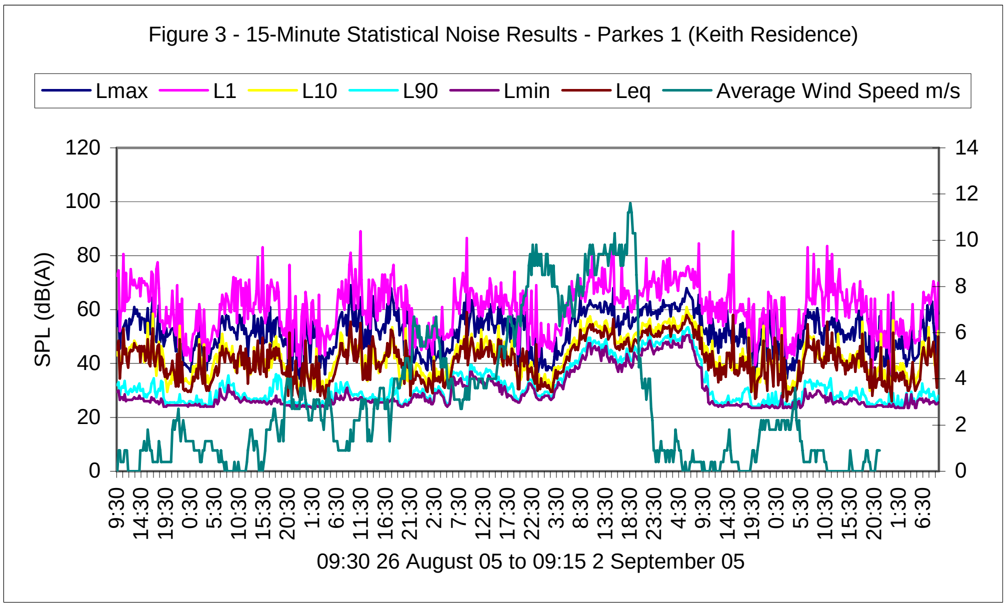


Figure 3 Results of Noise Monitoring Keith Residence

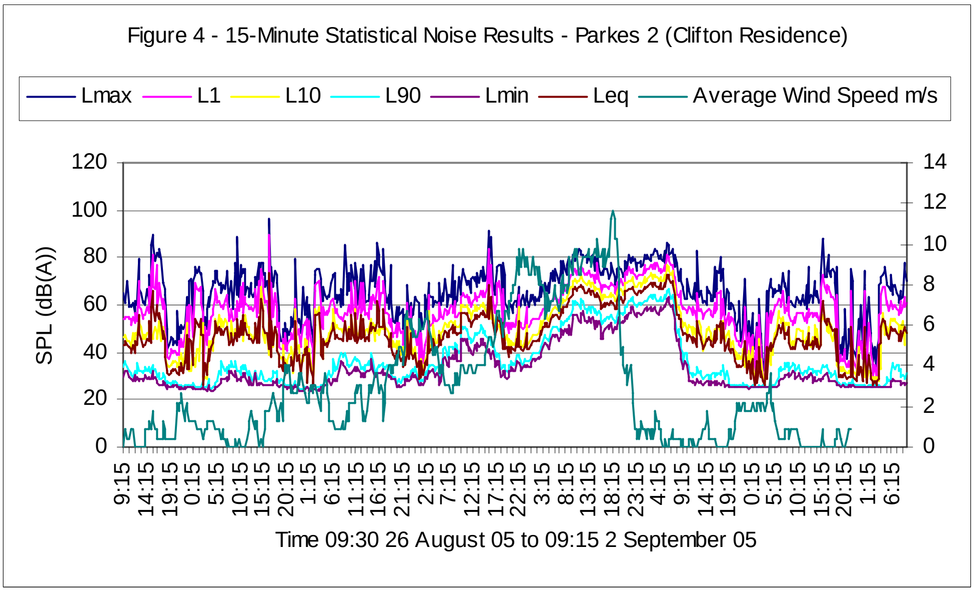


Figure 4 Results of Noise Monitoring Clifton Residence

Noise data from the daytime period of the 29 August and between day and night time periods of 30 August were excluded from the analysis due to the influence of wind speeds greater than 5 m/s.

Long term noise monitoring indicates a noise environment typical of a rural or suburban environment.

Calculated background L_{A90} day, evening, and night, $L_{Aeq(15hr)}$, $L_{Aeq(9hr)}$, $L_{Aeq(24hr)}$, $L_{Amaxeq(15hr)}$, $L_{Amaxeq(9hr)}$, and $L_{A10(18hr)}$ for the monitoring period are provided in the following tables[1].

[1] Refer to Glossary page for definition of these parameters

Table 3.3 Noise Monitoring Results – Background L_{A90} Noise Levels at Brolgan Road (Parkes 1)

Date	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
26/08/05	27.8	25.0	ND
27/08/05	26.5	25.0	24.3
28/08/05	26.7	24.8	24.3
29/08/05	30.5	26.8	25.5
30/08/05	25.5	ND	ND
31/08/05	ND	24.0	ND
01/09/05	27.0	24.8	24.0
02/09/05	ND	ND	24.0
RBL	26.8	24.9	24.3

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.4 Noise Monitoring Results – Background L_{A90} Noise Levels at Condobolin Road (Parkes 2)

Date	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
25/08/05	30.7	24.5	ND
26/08/05	29.7	25.5	24.5
27/08/05	28.2	25.5	25.0
28/08/05	33.0	27.0	24.5
29/08/05	38.5	32.3	27.8
30/08/05	ND	ND	ND
31/08/05	29.5	25.5	ND
01/09/05	31.0	26.3	25.5
02/09/05	ND	ND	25.5
RBL	30.7	25.9	25.3

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.5 Noise Monitoring Results – $L_{Aeq(15hr)}$ 7:00 am to 10:00 pm

Date	Parkes 1	Parkes 2
25/08/05	ND	49.9
26/08/05	44.8	52.2
27/08/05	42.9	56.7
28/08/05	46.3	50.5
29/08/05	46.3	55.7
30/08/05	ND	ND
31/08/05	45.1	48.1
01/09/05	44.3	50.0
Average	45.1	53.0

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.6 Noise Monitoring Results – $L_{Aeq(9hr)}$ 10:00 pm to 7:00 am

Date	Parkes 1	Parkes 2
25/08/05	ND	51.6
26/08/05	ND	48.1
27/08/05	39.8	48.9
28/08/05	38.1	44.4
29/08/05	36.6	51.0
30/08/05	ND	ND
31/08/05	43.5	44.3
01/09/05	39.6	46.6
Average	40.2	48.7

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.7 Noise Monitoring Results – $L_{A10(18hr)}$ 6:00 am to 10:00 pm

Date	Parkes 1	Parkes 2
26/08/05	ND	45.3
27/08/05	46.1	48.5
28/08/05	42.7	52.4
29/08/05	44.6	50.0
30/08/05	44.9	51.6
31/08/05	ND	ND
01/09/05	45.3	50.2
02/09/05	44.9	48.4
Average	44.8	50.0

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.8 Noise Monitoring Results – $L_{Aeq(24hr)}$ 12:00 am to 12:00 am

Date	Parkes 1	Parkes 2
26/08/05	ND	49.9
27/08/05	44.5	51.8
28/08/05	42.0	55.1
29/08/05	44.5	50.0
30/08/05	43.9	53.2
31/08/05	ND	ND
01/09/05	44.9	47.6
02/09/05	43.7	48.6
Average	43.9	51.6

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Data from 30 and 31 August was excluded on some occasions due to the extraneous influence of wind speed, which affected the overall noise levels.

Field observations noted that the ambient noise environment at both locations (Parkes 1 and 2) were dominated by relatively low background noise levels with intermittent noise such as dogs, wildlife and local residential noise. Intermittent traffic noise was also noted as being part of the ambient noise environment but not being a dominant factor. The Narromine train line was intermittently apparent at location 2, the Clifton residence.

4 Environmental Noise Criteria

4.1 Construction Noise Criteria

Criteria for the construction phase applied to the assessment were sourced from Section 171 of the DEC's Environmental Noise Control Manual. The criteria was established using the measured background noise levels and applying a conversion factor based on the expected construction period. Construction noise criteria based on Tables 3.3 and 3.4 background noise levels are shown in Table 4.1.

Table 4.1 Construction Noise Criteria

Construction Period	Level Restrictions	Parkes 1 – Keith Residence L_{A10}	Parkes 2 – Clifton Residence L_{A10}	Parkes 3 – Proposed Residence
Less than 4 weeks	Background + 20 dB	55	55	55
Less than 26 weeks	Background + 10 dB	45	45	45
More than 26 weeks	Background + 5 dB	40	40	40

Normal construction hours are 7 am to 6 pm Monday to Friday, and 8 am to 1 pm Saturday. Construction activity outside those hours is not preferred but can usually occur provided the normal operational noise criteria are met and construction noise is not substantially audible or intrusive inside a dwelling.

4.2 Operational Noise Criteria

The INP provides guidance on the assessment of operational noise impacts. The guidelines include both intrusive and amenity criteria that are designed to protect receivers from noise significantly louder than the background level and to limit the total noise level from all sources near a receiver.

Intrusive noise limits set by the INP control the relative audibility of operational noise compared to the background level. Amenity criteria limit the total level of extraneous noise. Both sets of criteria are calculated and the lowest of the two in each time period normally apply. Table 2.2 in the INP provides modifications to the amenity criteria for existing levels of industrial noise. Attended observations noted that existing levels of industrial noise in the area are not a significant contributor to the existing ambient noise level in the vicinity of the development therefore no Table 2.2 adjustments are necessary for the amenity noise criteria. Intrusive criteria are simply 5 decibels above the measured (or adopted) background level with a minimum of 35 dB(A).

Amenity criteria are determined based on the overall acoustic characteristics of the receiver area and the existing level of noise excluding other noises that are uncharacteristic of the usual noise environment. Residential receiver areas are characterised into ‘urban’, ‘suburban’, ‘rural’ or other categories based on land uses, the existing level of noise from industry, commerce, and road traffic.

Nearest residents to the proposed terminal are considered to live in a ‘rural’ area as it is an area that is defined by an acoustic environment that is dominated by natural sounds, having little or not traffic. The INP specifies that a suburban area may be located in either a rural, rural-residential, environmental protection zone or scenic protection zone, as defined by an LEP or other planning instrument.

The project specific noise levels are provided in Table 4.2.

Table 4.2 Project Specific Noise Levels

	Parkes 1 – Keith Residence			**Parkes 2 – Clifton Residence**		
Criterion	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
A: Rating Background Level	27* $L_{A90(day)}$	25* $L_{A90(evening)}$	24* $L_{A90(night)}$	30 $L_{A90(day)}$	26* $L_{A90(evening)}$	25* $L_{A90(night)}$
B: Intrusiveness Criteria (A + 5dB)	35 $L_{Aeq(day)}$	35 $L_{Aeq(evening)}$	35 $L_{Aeq(night)}$	35 $L_{Aeq(day)}$	35 $L_{Aeq(evening)}$	35 $L_{Aeq(night)}$
C: Rural Amenity Criteria (Table 2.1 INP)	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$
D: Amenity Criteria: (INP Table 2.2 Adjusted)	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$
E: Project Specific Noise Level (Pg 21 INP)	**35 $L_{Aeq(15min)}$**	**35 $L_{Aeq(15min)}$**	**35 $L_{Aeq(night)}$**	**35 $L_{Aeq(15min)}$**	**35 $L_{Aeq(evening)}$**	**35 $L_{Aeq(night)}$**

* Note – The INP states that where the rating background level is found to be less than 30 dB(A), then it is set at 30 dB(A), therefore these values have been adjusted to 30dB for further calculations.

The rating background level at Parkes 3 (the proposed new residence) is anticipated to be similar to that existing at locations Parkes 1 and Parkes 2. As such, similar project specific noise levels were adopted for location Parkes 3.

4.3 Road Traffic Noise Criteria

Road traffic noise criteria are sourced from the DEC’s Environmental Criteria for Road Traffic Noise. (ECRTN). The ECRTN contains a number of criteria applied to residential receivers near roads, depending on the situation and the road classification.

Road classifications and relevant criteria can be seen in Table 4.3.

The ECRTN criterion additionally states that if the noise limits are already exceeded then the traffic noise arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Table 4.3 ECTRN Road Traffic Noise Criteria L_{Aeq}

	Day	Night	Road Classification
Brolgan Road	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road
Condobolin Road	$L_{Aeq(1hr)}$ 60	$L_{Aeq(1hr)}$ 55	Collector
Newell Highway (north)	$L_{Aeq(15hr)}$ 60	$L_{Aeq(9hr)}$ 55	Arterial Road
Newell Highway (south)	$L_{Aeq(15hr)}$ 60	$L_{Aeq(9hr)}$ 55	Arterial Road
Orange Road	$L_{Aeq(15hr)}$ 60	$L_{Aeq(9hr)}$ 55	Sub-arterial Road
Hartigan Avenue	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road
Dalton Street	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road
Bogan Street	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road

4.4 Rail Noise Criteria

The NSW DEC publication Environmental Noise Control Manual (ENCM) Chapter 163 provides guidance for rail traffic noise. The noise criteria are set for residential receivers and are specified as 24hr L_{Aeq} and as a maximum pass-by level.

The project specific noise levels are provided in Table 4.4.

Table 4.4 Operational Project Specific Noise Levels

Planning Levels	Maximum Levels
$L_{Aeq, 24hr}$ = 55 dB(A)	$L_{Aeq, 24hr}$ = 60 dB(A)
L_{Amax} = 80 dB(A)	L_{Amax} = 85 dB(A)

4.5 Sleep Disturbance Criteria

The NSW DEC publication ENCM, Chapter 19 provides consideration for sleep arousal levels. It states that noise control should be applied with the general intent to protect people from sleep arousal. The purpose of sleep arousal guidelines is to address short high level noise likely to cause awakening during night time period 10 pm to 7 am and 8 am on Sundays and Public Holidays. To achieve this, the L1 level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) when measured outside the bedroom window.

5 Assessment of Potential Impacts

5.1 Construction Noise Assessment

The construction noise criteria are set for noise levels determined as $L_{10(15min)}$. During a full 15-minute period, the machinery items to be used on site will operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power.

In addition, mobile machinery will likely move about during the 15-minutes, variously altering the directivity of the noise source with respect to individual receivers.

As it has been indicated, that initial construction activities at the site are expected to occur in stages over a 5-year period (ie. more than 26 weeks), and the site is expected to be operational by the year 2020, the construction noise criterion should be considered as being Background + 5 dB(A). As a consequence, in a worst case configuration, noise levels have the potential to exceed project specific noise levels during construction. However, it is highly unlikely that all of the machinery would be operating at full power at the same time for an extended period.

Typical noise levels produced by construction plant anticipated to be used on site were sourced from AS 2436 – 1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites and from GHD's internal database. The power levels were then distance attenuated from the proposed construction site. Propagation calculations take into account sound intensity losses due to spherical spreading, with additional minor losses such as atmospheric absorption, directivity and ground absorption were ignored in the calculations. As a result, predicted received noise levels are expected to slightly overstate actual received levels and thus provide a measure of conservatism. Received noise at each assessed distance, from each item of plant on site, is added (where appropriate) to determine the total received noise at that distance from construction activities and compared to the criteria.

Received noise produced by anticipated activities, during the construction of the upgraded facility is shown in Table 5.1 for a variety of distances to a typical receiver, with no noise barriers or acoustic shielding in place and with each plant item operating at full power.

It should be noted that the INP requires trucks and other mobile machinery including forklifts to be assessed as site sounds other than traffic. This means vehicles serving the facility change their status from road traffic to site noise as they enter the site then change back to road traffic as they leave the site.

Table 5.1 Predicted Plant Item Noise Levels, dB(A) L_{10}

Plant Activity SWL dB(A)	160 m	320 m	640 m	1280 m
Crane 110	58	52	46	40
Backhoe 108	56	50	44	38
Compressor 100	48	42	36	30
Concrete Pump 109	57	51	45	39
Dump Truck 108	56	50	44	38
Water Tanker 109	57	51	45	39
Compactor 110	58	52	46	40
Concrete Saw 118	66	60	54	48
Paver 113	61	55	49	43
Rock Breaker 118	66	60	54	48

The sound power levels shown in Table 5.1 are maximum levels produced when machinery is operated under full load.

5.2 Operational Noise Assessment

Acoustic modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of industrial noise generated by the proposed intermodal terminal.

CadnaA is a computer program for the calculation, assessment and prognosis of noise exposure. CadnaA calculates environmental noise propagation according to ISO 9613-2.

Modelling results are based on available information provided and should only be used as a guide for comparative purposes.

Modelling was based on vehicle movements provided by the Roads and Traffic Authority (RTA) and rail movements provided by Australian Rail Track Corporation (ARTC).

According to the road traffic assessment, the current throughput likely to use the proposed intermodal terminal was a net number of approximately 12 trucks per hour through the terminal, or 1 truck every 5 minutes.

An assessment of rail freight movements predicted that an average of 8 trains would arrive into the terminal every day.

The model took into account the sound power levels of the primary noise sources to be used at the facility and onsite traffic, based on information provided by the client. Where no noise data was provided for equipment or machinery, sound power levels were sourced from GHD's internal database, based on a rail facility located at Hornsby which undertakes similar engineering maintenance to the proposed rail siding. Estimated power levels for primary noise generating equipment at the fleet centre are provided in Table 5.2.

Table 5.2 Estimated Sound Power Levels for Primary Noise Generating Equipment SWL dB(A)

Item	SWL dB(A)
Shunting Tractor	110.6
Forklift – Fantuzzi FDC 450 G4[1]	96.0
KONE 15-Tonne Crane during Operation	97.0
Overhead Crane 20-Tonne during Operation	81.7
Train Approaching Facility (approximately 20 km/h)	75.9

[1] – Sound power level provided by client

CadnaA noise prediction software considers topography, weather conditions, site sources and the location of the receiver areas to predicted received noise levels from the proposed terminal facility. The location of the noise sources within the site was done with reference to site layout plans.

5.2.1 Noise Modelling

Assumptions undertaken for the modelling are listed below:

- Sources were modelled using:
  - 15 x Fantuzz forklifts;
  - 1 x shunting tractor;
  - train approaching at approximately 20 km/h from the north and the west;
  - 1 x 15-tonne overhead crane;
  - 2 x 20-tonne overhead crane[2];
  - assumed 50 private vph during peak hour conditions; and
  - 12 commercial vph during peak hour conditions.
- All noise sources were modelled without any noise barriers or building attenuation in place and modelled as external point sources;
- Day, evening and night time periods have been modelled under the same scenarios;
- Modelling was undertaking using a ground absorption of 0.8;
- Temperature was modelled at 10°C and relative humidity of 70 %; and
- Average warehouse heights were approximately 15 m.

[2] Note that numbers of anticipiated equipment (cranes and forklifts) were provided and modelled according to predicted numbers. Sound power levels were only provided for forklifts, and therefore a measure of conservatism has been applied for modelling of the anticipated cranes during site operation based on data from GHD's internal database.

The above scenarios were modelled under four differing meteorological conditions as follows:

- Scenario 1 – calm weather conditions, neutral, with no wind;
- Scenario 2 – Class F[3] concawe weather conditions, wind speed 2 m/s towards north west, noise monitoring location 2 (Clifton residence) under worst case conditions during the evening period;
- Scenario 3 – Class F concawe weather conditions, wind speed 2 m/s towards south west, noise monitoring location 1 (Keith residence) under worst case conditions during the evening period; and
- Scenario 4 – Class F concawe weather conditions, wind speed 2 m/s towards north east, proposed residential dwelling under worst case conditions during the evening period.

Results of the noise modeling are provided in Figures 5, 6, 7 and 8 and are based on a worst-case scenario with all plant items operating at their maximum levels including wind direction toward both the residences and calm weather conditions.

5.3 Modelled Operation Results

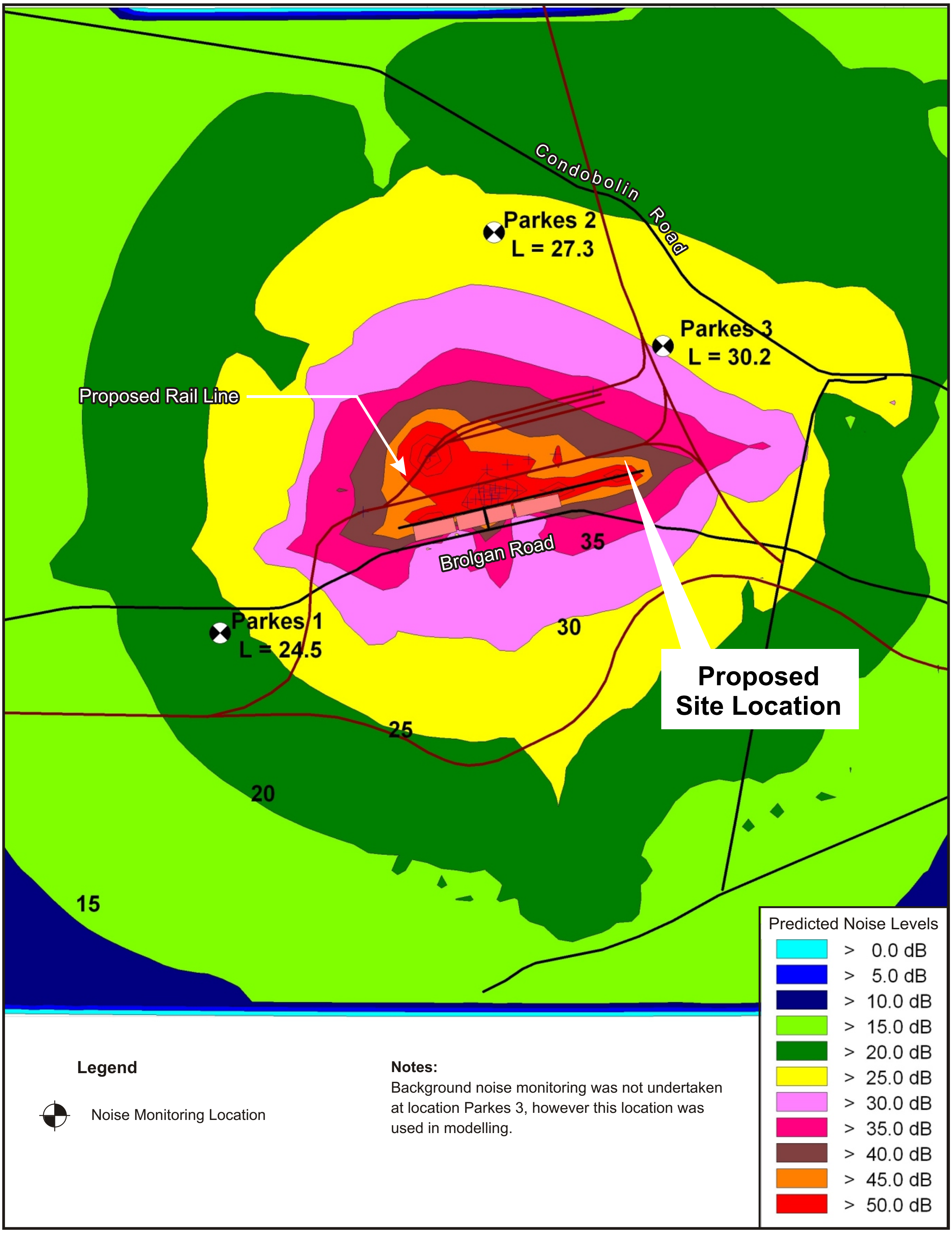
Modelled sound pressure levels at the residential receiver locations for the three different scenarios are summarised in Table 5.3.

Table 5.3 Modelled Receiver Sound Pressure Levels dB (A)

	Scenario 1 dB(A)	**Scenario 2 dB(A)**	**Scenario 3 dB(A)**	**Scenario 4 dB(A)**
Parkes 1	24.5	24.5	29.2	24.5
Parkes 2	27.3	31.6	27.3	31.6
Parkes 3	30.2	33.0	30.2	33.0
Project Specific Noise Goals (Day)	**35**	**35**	**35**	**35**
Project Specific Noise Goals (Evening)	**35**	**35**	**35**	**35**

Project specific noise levels for monitoring locations were based on the intrusive noise criteria. Modelled results, as shown in Figures 5, 6, 7 and 8 suggest that project specific noise goals can be met at both monitoring locations under the four meteorological conditions as specified.

[3] The default inversion parameter Class F has been used based on the area classified as a non-arid area.



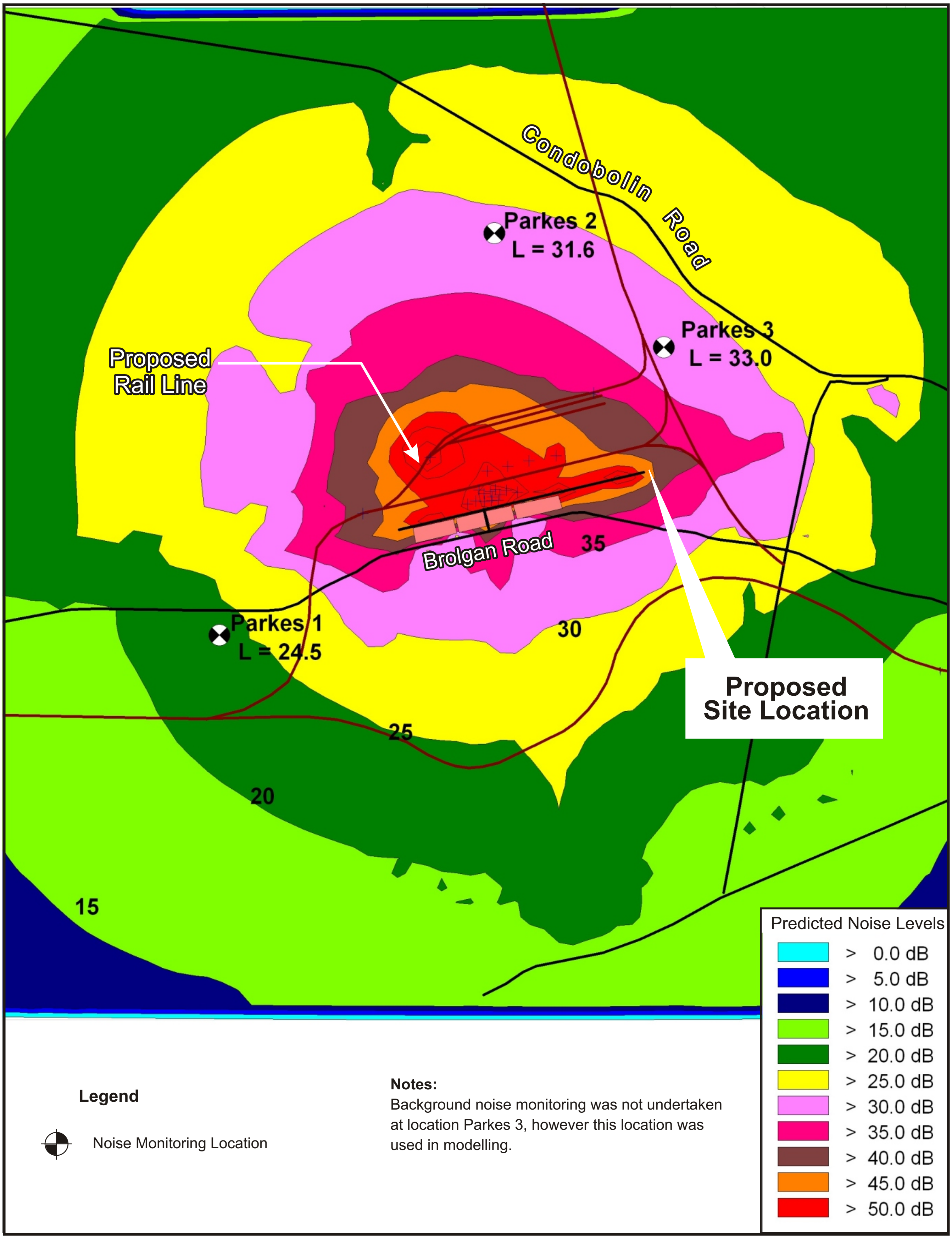
Notes:
Background noise monitoring was not undertaken at location Parkes 3, however this location was used in modelling.

Date: 2 February 2006

Predicted Noise Levels - Scenario 1

File Name: 2212447_LTN_02.cdr

Figure 5



Notes:
Background noise monitoring was not undertaken at location Parkes 3, however this location was used in modelling.

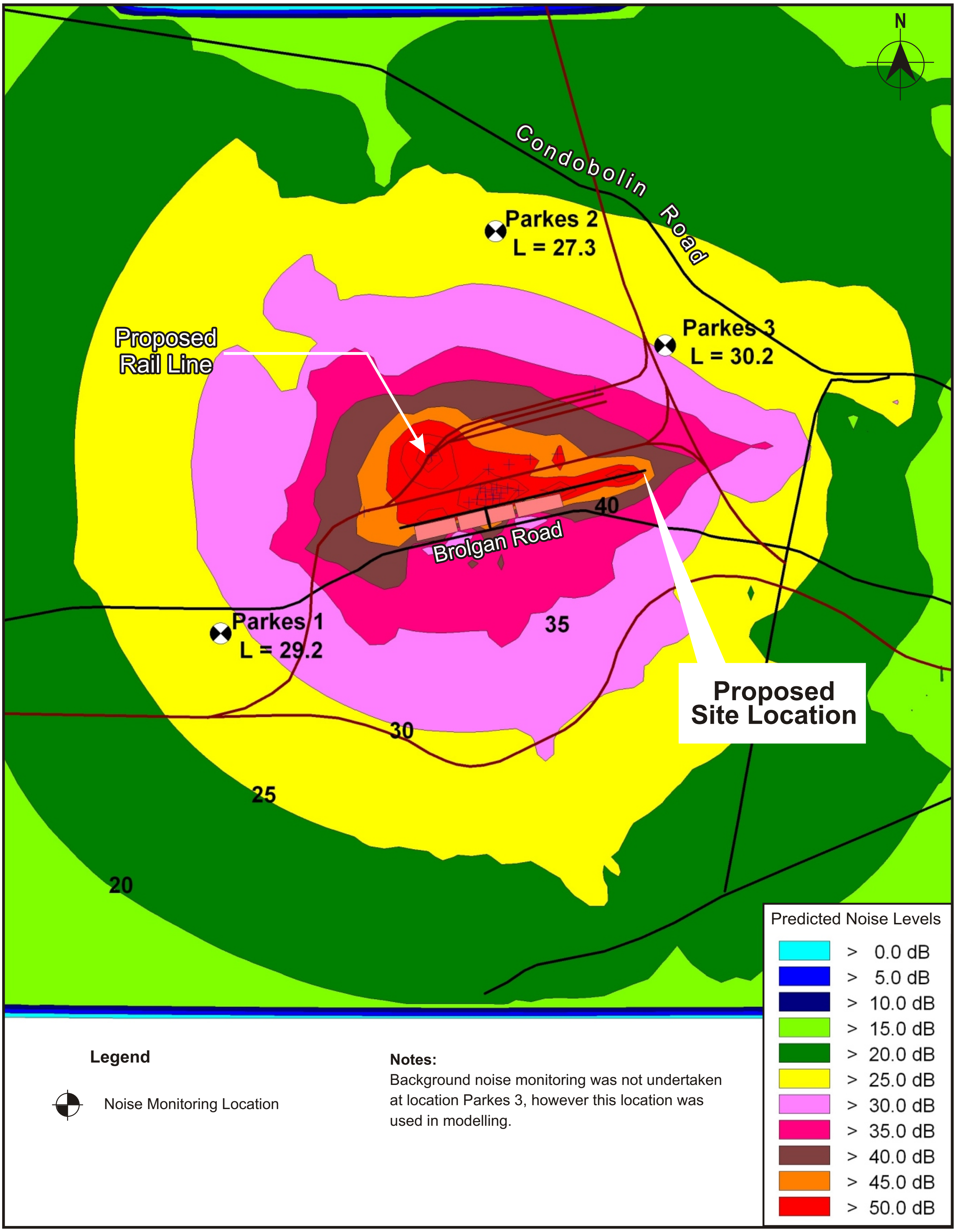
Date: 2 February 2006

Predicted Noise Levels - Scenario 2

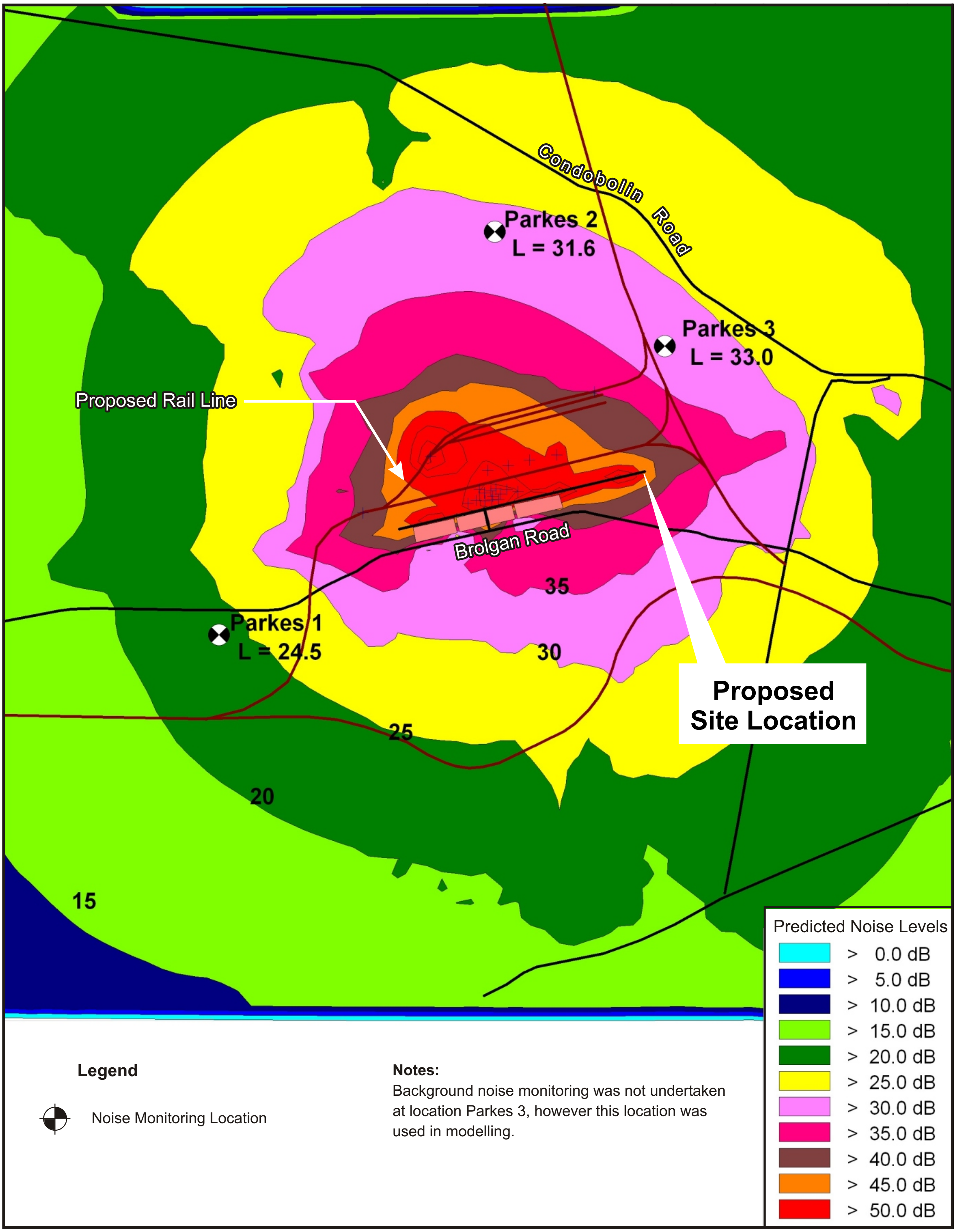
File Name: 2212447_LTN_03.cdr

Acoustic Assessment - Proposed Intermodal Terminal, Parkes

Figure 6



Notes:
Background noise monitoring was not undertaken at location Parkes 3, however this location was used in modelling.



Notes:
Background noise monitoring was not undertaken at location Parkes 3, however this location was used in modelling.

5.4 Operational Road Traffic Noise Assessment

An operational traffic noise assessment was undertaken using the Calculation of Road Traffic Noise (CoRTN)[4] algorithm, which is implemented in CadnaA to determine the traffic noise generated from the PIT traffic.

Operational traffic movements are primarily attributed to freight transport and delivery vehicles.

5.4.1 External Haulage Routes

External haulage routes were modelled based on information provided in GHD's traffic assessment report.

Both current and predicted intermodal traffic data used for modelling are presented in Table 5.4 below.

[4] CoRTN algorithim is published by the UK Department of Transport, 1998.

Table 5.4 Existing and predicted traffic data

	Existing – No PIT Traffic						Predicted - Including PIT traffic			
	2005		2010		2020		2010		2020	
	AADT	%HV	AADT	%HV	AADT	%HV	AADT	%HV	AADT	%HV
Brolgan Road	188	2	200	2	227	2	1052	48	2380	50
Condobolin Road	1036	8	1064	9	1138	11	1087	9	1200	12
Newell Highway – north	5337	17	5685	18	6597	21	5780	19	6842	22
Newell Highway – south	5620	27	5914	13	6684	35	6051	15	7032	37
Orange Road	2031	5	2099	6	2276	8	2124	7	2342	8
Hartigan Avenue	450	7	690	20	762	20	1264	50	2302	63
Bogan Street	5427	16	5789	17	6587	19	6095	19	8615	34
Dalton Street	1943	5	1992	5	2094	5	2237	4	2878	7

Notes AADT = average annual daily traffic

%HV = percentage of heavy vehicles

5.4.2 Initial road traffic noise assesment

The ECRTN criterion states that if the noise limits are already exceeded then the traffic noise arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Since residential receivers along the haulage routes have not been provided nor have background measurements been taken an initial qualitative assessment has been undertaken to assess whether the predicted traffic as a result of haulage routes associated with the proposed terminal will lead to an increase of 2 dB or more on any of the roads.

Note that it is unknown whether any of the roads currently exceed the ECRTN criteria however if the increase is less than 2 dB then further detailed assessment at the residential locations is not required.

The CoRTN algorithm implemented in CadnaA models road traffic emission as $L_{10(18hr)}$ or $L_{10(1hr),}$ however the respective road criteria are given as $L_{eq(period)}$. Therefore the $L_{eq(15hr)}$ day and $L_{eq9(hr)}$ night as specified in the NSW ECRTN emission levels, were determined by using traffic noise descriptor conversion factors of –2.2 dB and -5.1 dB respectively. These noise descriptor conversion factors were obtained from Table 2 of Austroads Research Report, "*Modelling, Measuring and Mitigating Road Traffic Noise*", 2005.

The emission levels for each road is reported as sound pressure levels at a reference distance of approximately 10 m from the edge of the carriageway. Emission levels for day and evening periods for the respective roads are shown in Table 5.5 and Table 5.6 for existing traffic and predicted traffic as a result of haulage routes associated with the proposed terminal for the years 2005, 2010 and 2020.

Table 5.5 $L_{eq(1h)}$ Day - Emission Level at 10 m from edge of the carriageway

Road Name	Existing dB(A)			PIT dB(A)	
	2005	2010	2020	2010	2020
Brolgan Road	53.1	53.4	53.9	65.3	69.2
Condobolin Road	61.6	61.9	62.4	61.9	62.8
Newell Highway – north	69.9	70.3	78.2	70.5	71.5
Newell Highway – south	71.1	69.9	72.5	70.2	72.9
Orange Road	64.0	64.3	65.0	64.5	65.1
Hartigan Avenue	53.5	57.8	58.2	63.4	67.0
Bogan Street	66.1	66.6	67.5	67.1	70.5
Dalton Street	59.3	59.4	59.6	59.6	61.5

Table 5.6 $L_{eq(1hr)}$ Night - Emission Level at 10 m from edge of the carriageway

Road Name	Existing dB(A)			PIT dB(A)	
	2005	2010	2020	2010	2020
Brolgan Road	50.2	50.5	51.0	62.4	66.3
Condobolin Road	58.7	59.0	59.5	59.0	59.9
Newell Highway – north	67.0	67.4	68.3	67.6	68.6
Newell Highway – south	68.2	67.0	69.6	67.3	70.0
Orange Road	61.1	61.4	62.1	61.6	62.2
Hartigan Avenue	50.6	54.9	55.3	60.5	64.1
Bogan Street	63.2	63.7	64.6	64.2	67.5
Dalton Street	56.4	56.5	56.7	56.3	58.6

Based on modelled results and data provided, traffic emissions should not increase by more than 2 dB on any of the haulage routes except Brolgan Road and Hartigan Avenue as a result of the proposed predicted traffic due to haulage routes.

Brolgan Road and Hartigan Avenue emission levels are predicted to increase, due to the large percentage increase in predicted traffic associated with the haulage routes, in particular, the increase in percentage of heavy vehicular movement (up to 300% increase in heavy vehicle traffic). Therefore, further assessment and modelling needs to be undertaken to determine whether ECRTN criteria are exceeded.

5.4.3 Brolgan Road traffic noise assesment

The initial assessment indicated that Brolgan Road and Hartigan Avenue emission levels increase considerably due to the large percentage increase in predicted traffic as a result of haulage routes associated with the proposed terminal. Therefore further assessment of the predicted road traffic noise impacts on Brolgan Road and Hartigan Avenue has been undertaken to determine whether the ECRTN criteria is satisfied.

According to the ECRTN, both Brolgan Road and Hartigan Avenue are classified as local roads with a road traffic noise criteria of 55 $L_{eqmax(1hr)}$ day and 50 $L_{eq(1hr)max}$ night at potential noise sensitive receivers. The CoRTN algorithm implemented in CadnaA is used to calculate the respective $L_{eq(1hr)}$ levels and is depicted on a contour plots to graphically represent the land areas that exceed the criteria levels.

Parkes Shire Council recorded existing hourly traffic data, including vehicle class, on Brolgan Road for Friday, 9 December 2005 to Friday, 16 December 2005, which is used in this assessment.

According to this data the existing day $L_{eq(1hr)max}$ is expected to occur during the afternoon peak-hour between 5 pm – 6 pm with a weekday average of 16 vehicles with approximately 10% HV. The existing Night $L_{eq(1hr)max}$ is expected to occur during the late evening period between 10 pm – 11 pm with a weekday average of 4.4 vehicles with approximately 32% HV.

The corresponding predicted hourly traffic resulting from the haulage routes associated with the proposed terminal on Brolgan Road, obtained from Tables 39 and 40 of the GHD traffic report, are as follows:

- 2010 peak-hour PIT traffic – 48 hvph[5] (two-way);
- 2010 24 hour average PIT traffic – 20 hvph (two-way);
- 2020 peak-hour PIT traffic – 110 hvph (two-way); and
- 2020 24 hour average PIT traffic – 46 hvph (two-way).

Since no hourly traffic data was available for Hartigan Avenue, the following assumptions have been made:

- For the $L_{eq1hr(max)}$ Day, the afternoon peak hour is assumed to be 10% of the AADT; and
- For the $L_{eq1hr(max)}$ Night, the evening period is assumed to be the 24 hour AADT average.

The CoRTN algorithm calculates the $L_{10(1hr)}$ therefore the following general conversion factor was used for converting between road traffic noise descriptors:

$L_{eq(1hr)} = L_{10(1hr)} – 3$ dB[6].

The following scenarios were modelled:

- Existing traffic noise level (2005) – Day $L_{eq(1hr)max;}$
- Existing traffic noise level (2005) – Night $L_{eq(1hr)max;}$
- Predicted traffic noise levels associated with the proposed terminal (2010) – Day $L_{eq(1hr)max;}$
- Predicted traffic noise levels associated with the proposed terminal (2010) – Night $L_{eq(1hr)max;}$
- Predicted traffic noise levels associated with the proposed terminal (2020) – Day $L_{eq(1hr)max}$; and
- Predicted traffic noise levels associated with the proposed terminal (2020) – Night $L_{eq(1hr)max}$.

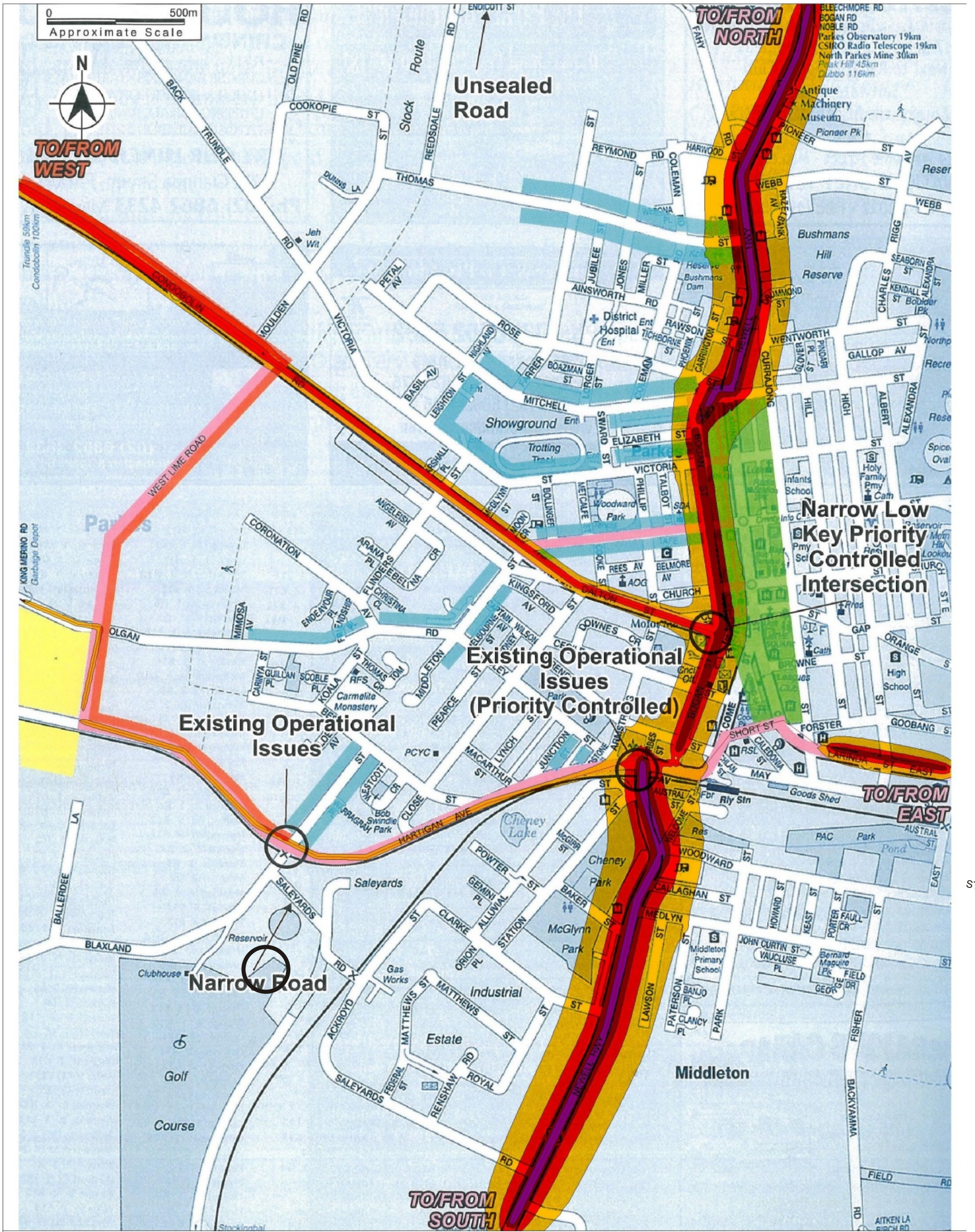
[5] Note – hvph = heavy vehicles per hour

[6] This relationship was originally derived based on short term noise measurements an is also used as a formula for converting between L_{Aeq} and L_{A10} (*Burgess, 1978*)

The modelled scenarios are presented in Figures 9 – 14 below as contour plots to graphically represent the land areas that exceed the criteria levels. Sensitive land use areas (residential, recreational and educational dwellings) were documented in GHD's traffic assessment report and identified on the following road traffic noise figures (identified by blue shading).

The predicted traffic noise levels indicate that areas exceeding the ECRTN criteria along Brolgan Road and Hartigan Avenue are unlikely to overlap any noise sensitive locations that have been specified or provided.

Therefore based on the information provided it is unlikely that traffic noise levels due to the predicted haulage routes associated with the proposed terminal will exceed the noise guidelines at the nearest potentially sensitive receptors.



Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 9 - Existing traffic noise level (2005) Day Leq(1hr)max

31 May 2006
JN 22 12447

GHD
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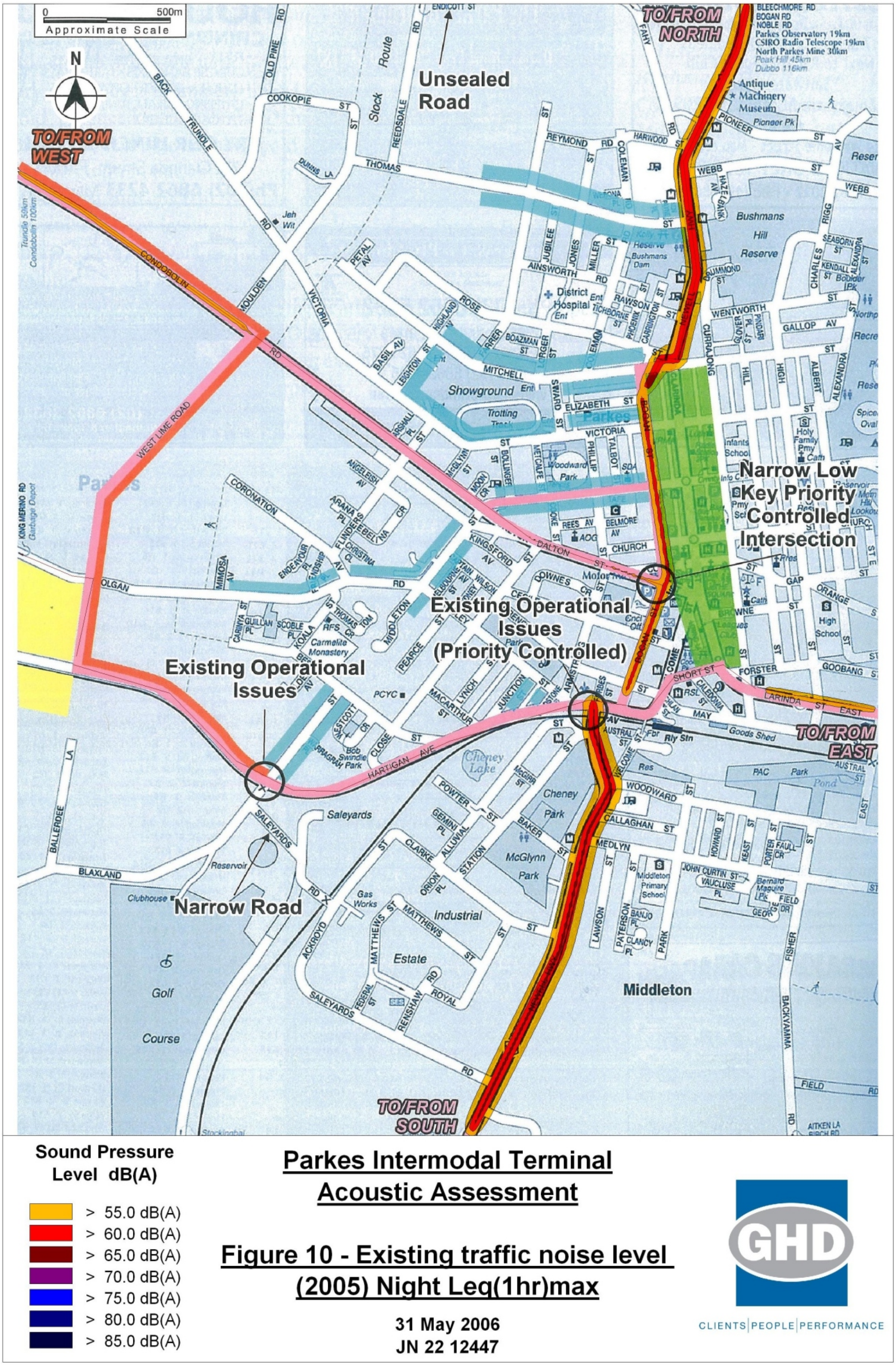
Source: Copyright Universal Publishers Pty Ltd

Legend

- Approved B Double Truck Routes
- Approved Road Train Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Industrial Uses
- CBD



Parkes Intermodal Terminal Acoustic Assessment

Figure 10 - Existing traffic noise level (2005) Night Leq(1hr)max

31 May 2006
JN 22 12447

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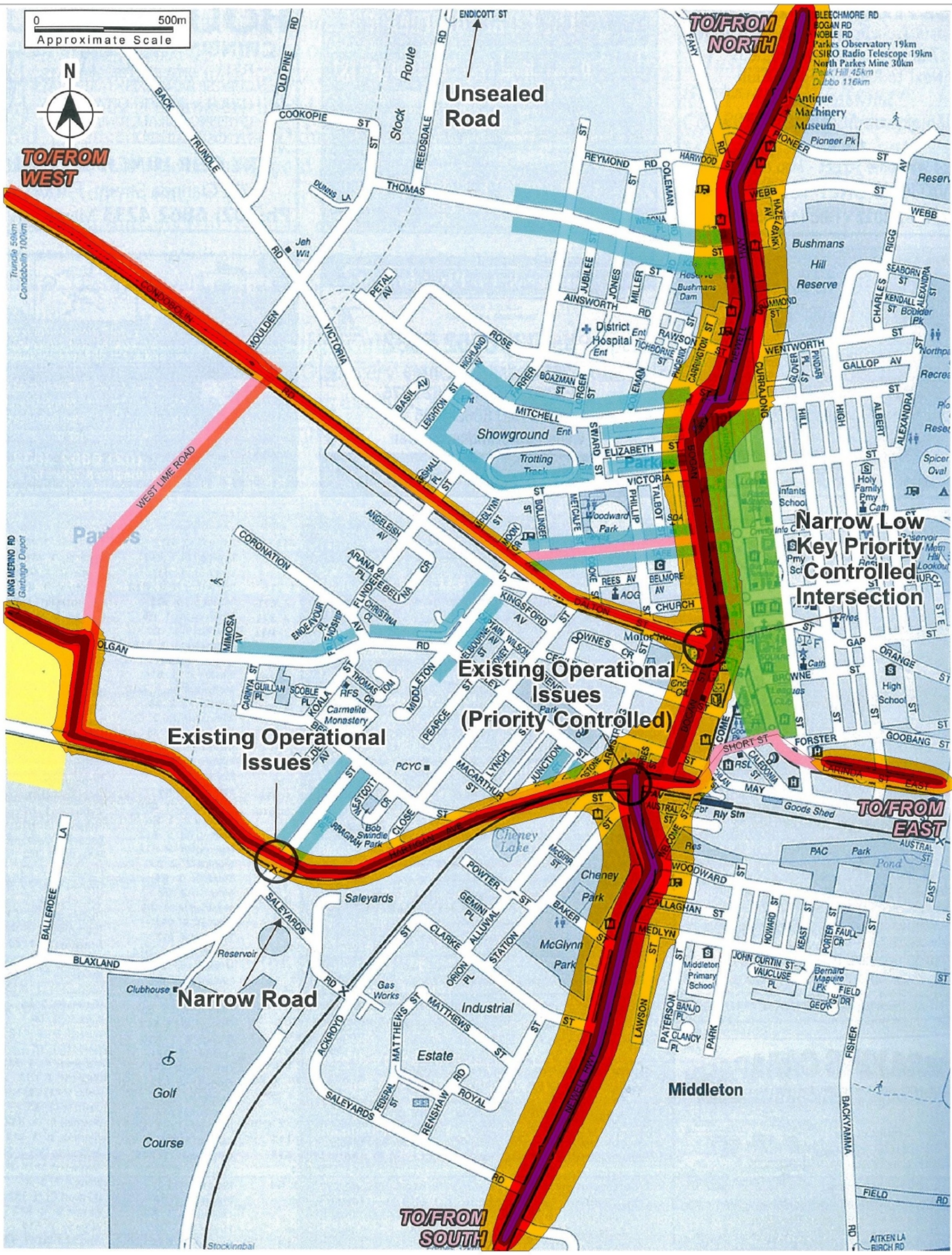
Legend

- Approved B Double Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Approved Road Train Truck Routes
- Industrial Uses
- CBD



Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 11 - Predicted traffic noise levels (2010) Day Leq(1hr)max

31 May 2006
JN 22 12447

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Legend

- Approved B Double Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Approved Road Train Truck Routes
- Industrial Uses
- CBD

Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 12 - Predicted traffic noise levels (2010) Night Leq(1hr)max

31 May 2006
JN 22 12447

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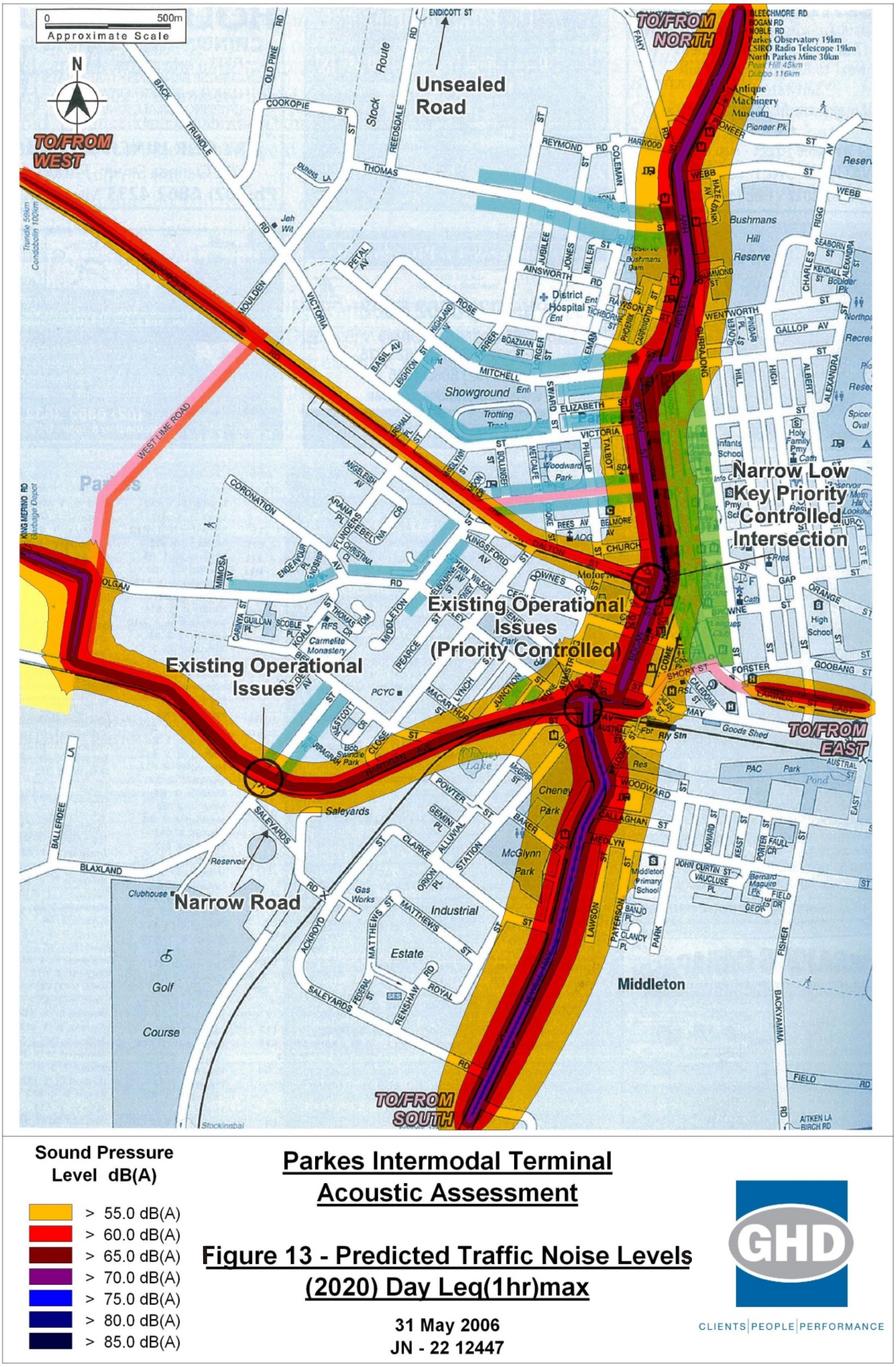
Legend

- Approved B Double Truck Routes
- Approved Road Train Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Industrial Uses
- CBD



Source: Copyright Universal Publishers Pty Ltd

Legend

- Approved B Double Truck Routes
- Approved Road Train Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Industrial Uses
- CBD

Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 14 - Predicted Traffic Noise Levels (2020) Night Leq(1hr)max

31 May 2006
JN - 22 12447

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Source: Copyright Universal Publishers Pty Ltd

Legend

- Approved B Double Truck Routes
- Approved Road Train Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Industrial Uses
- CBD

5.5 Rail Noise Assessment

The current NSW DEC recommended guideline for rail traffic noise is an $L_{eq(24hr)}$ of 55 dB(A) and an $L_{eq(max)}$ of 80. The existing rail traffic is 3 single stack trains per day from the west rail line. Rail traffic for the proposed terminal at the ultimate stage is 8 double stack trains in total per day distributed evenly from the North, South East and West rail lines (which over a 24 hour period equates to less than 1 train per hour). Calculations were performed using the Calculation of Rail Noise (CRN[7]) algorithm using the predicted increase in train movements.

Results indicated there will be no noticeable increase in the $L_{eq(24hr)}$ levels and that the predicted rail noise will remain below the NSW DEC recommended guidelines.

5.6 Sleep Disturbance Assessment

The INP states that the L1 level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) when measured outside the bedroom window.

The adjusted operational noise levels are provided in Table 5.9.

Table 5.9 Sleep Disturbance Noise Levels

	Scenario 1 dB(A)	**Scenario 2 dB(A)**	**Scenario 3 dB(A)**	**Scenario 4 dB(A)**
Parkes 1	24.5	24.5	29.2	24.5
Parkes 2	27.3	31.6	27.3	31.6
Parkes 3	30.2	33.0	30.2	33.0
Project Specific Noise Goals (Background Level)	**35**	**35**	**35**	**35**
Sleep Disturbance Level (Background +15 dB)	**50**	**50**	**50**	**50**

Noise modelling suggests that sleep disturbance criteria can be met at all three monitoring locations during operation of the intermodal terminal.

[7] The CRN algorithim is published by the UK Department of Transport, 1995.

6 Recommended Mitigation Measures

To minimise noise emissions during construction, the following management and mitigation measures are available to ameliorate likely noise impacts:

- All combustion engine plant, such as generators, compressors and welders should be checked to ensure they produce minimal noise with particular attention to residential grade exhaust silencers;
- Vehicles will be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes will be eliminated, where practicable;
- Where practical, all vehicular movements to and from the construction site must be made only during normal working hours;
- Where practical, machines should be operated at low speed or power and will be switched off when not being used rather than left idling for prolonged periods;
- Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made; and
- Where practical, impact wrenches should be used sparingly with hand tools or quiet hydraulic torque units preferred.

With regard to potential traffic noise, by keeping vehicles serviced, fitted with mufflers, eliminating exhaust brake usage and posted speed limits, noise due to trucking activity associated with the operation and construction of the terminal can be significantly mitigated.

As modelled results suggest, operational noise is not expected to exceed project specific noise goals, no engineered acoustic mitigation measures are required. However, best practice noise management as described, but not limited to the above, should be implemented to control operational noise.

7 Conclusion

GHD were commissioned by Terminals Australia, as part of an Environmental Impact Statement (EIS), to assess the acoustic impacts for the construction and operation of an Intermodal Terminal for the large-scale transport, warehousing, manufacturing and storage of freight located at Parkes, western NSW. The basis of the assessment was to ascertain whether the proposed facility would have an acoustic effect on the amenity of nearby sensitive noise receptors within close proximity of the site, during both construction and operation of the terminal.

Unattended noise monitoring was undertaken to determine the existing background and noise environment in the vicinity of the proposed facility. Detailed noise modelling was undertaken based on the predicted maximum sound power levels of primary noise sources for the facility. The noise model undertook a worst-case scenario with all plant items listed operating at their maximum sound power levels with wind directed at the nearest residences.

Results of the noise modelling suggest that noise emanating from the proposed Parkes intermodal terminal can potentially meet the DEC INP project specific noise goals at the three locations as outlined in the modelling.

Construction noise has the potential to exceed the project specific noise criteria in a worst-case scenario, however this can be mitigated through the utilisation of best management practices as outlined in this assessment.

Results of the noise modelling based on the increase in expected rail movements at the site suggest that 24hr L_{Aeq} levels in the vicinity of the intermodal terminal will remain below the NSW DEC 24hr recommended guidelines.

Predicted future traffic noise resulting from the haulage routes associated with the proposed terminal were modelled using provided information for future traffic counts. Based on the information provided and modelling under various day and evening scenarios, it is unlikely that traffic noise levels due to the predicted haulage routes associated with the proposed terminal will exceed the noise guidelines.

Therefore, based in the findings of this acoustic assessment, it is considered that operational, construction and traffic noise generated from the proposed Parkes intermodal terminal has the potential to meet the relevant noise guidelines at the three locations modelled in this report.

8 References

Australian Standards (AS 2436), 1981, *Guide to Noise Control on Construction, Maintenance and Demolition Sites*.

Austroads Research Report, "*Modelling, Measuring and Mitigating Road Traffic Noise*", 2005.

Manning, C.J 1981. *The Propagation of Noise from Petroleum: and Petrochemical Complexes to Neighbouring Communities.* CONCAWE Report No. 4/81.

NSW DEC, *Environmental Criteria for Road Traffic Noise*, May, 1999.

NSW DEC, *Environmental Criteria for Industrial Noise Policy (INP)*, January 2000.

NSW DEC, *Environmental Noise Control Manual*, June 1994.

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Document Status

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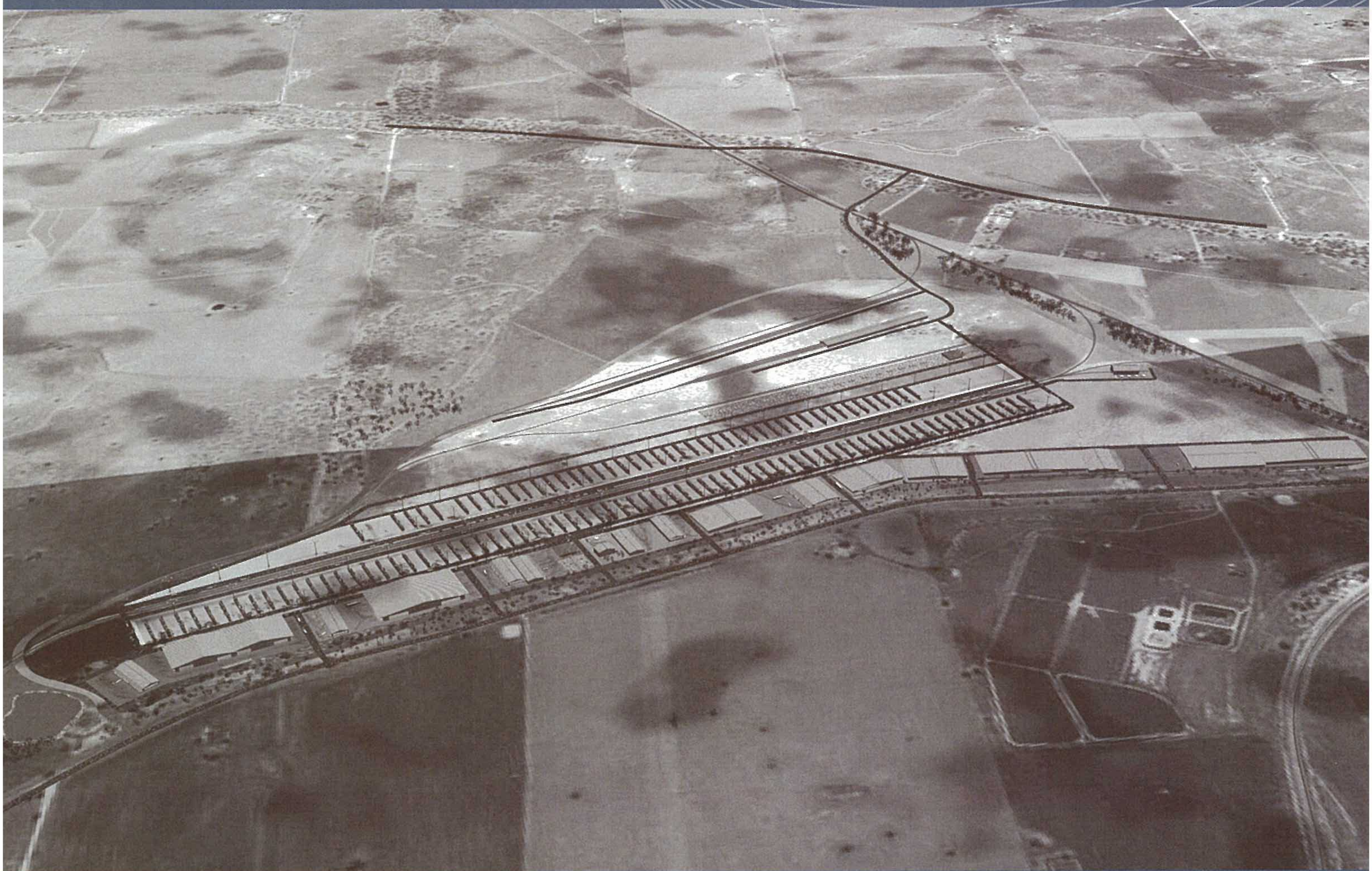
Parkes LOGISTICS AXIS

APPENDIX D

WATER MANAGEMENT ASSESSMENT



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Terminals Australia

Parkes Intermodal Freight Terminal

Water Management Report

January 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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A Concept Stormwater Management Plan

1. Introduction

1.1 The Proposal

The proposed site for the Intermodal facility is located approximately 5 kilometres west of the urban centre of Parkes. The site is located south of the State Route 90, north of Brolgan Road and west of the Parkes Narromine Railway. The primary access to the site will be via Brolgan Road.

Dominant features of the landscape include the Parkes-Narromine rail line, derelict dwellings, agricultural fields and associated dwelling/fences, Brolgan Road, the Sydney-Adelaide-Perth rail line and a predominant ridge on the western side of the site. The purpose of the Intermodal Terminal would be to provide a strategic location between the freight service user and a destination such as a port, whereby freight operators could take advantage of the road/rail transport modes. In addition, the freight operators utilise terminal facilities such as cold storage, refuelling facilities and long/short-term storage. The Intermodal Terminal would have the primary function of:

- Container stack and storage facilities, including storage capacity for empty containers;
- Warehousing and distribution facilities; and
- Associated rail and road infrastructure to support the Terminal.

The potential users of the Intermodal Terminal would include:

- Importers who are dependent on a single port of call shipping service; and importers wanting to use a single port, rather than multiple ports. Importers could build supply chains around Parkes warehouse and terminal;
- Major refrigerated facilities could be developed for cold storage;
- The Terminal could provide consolidation point for East Coast wool handling, packing and distribution for export;
- Terminal for rail fright moving to the East Coast freight corridors and for double stacking and reconfiguration of trains for West Coast services; and
- Bulk freight, including fuel and minerals could benefit from the facility.

1.2 Water Management Report Overview

The report describes and assesses the water management at the site including:

- Statutory and Authority requirements;
- The existing hydrological environment;
- Potential impacts of the proposal with respect to stormwater management;
- Mitigation of potential adverse impacts of the proposal on water management; and
- Proposals for ongoing maintenance of surface water management infrastructure at the site.

1.3 Statutory and Authority Requirements

An environmental assessment is to be prepared to address the potential impact of construction and operation of the proposal. This report provides the water management input to the environmental assessment. The DIPNR Director-General's Requirements (DGRs) has identified that water is a 'key assessment requirement' for the environmental assessment to be prepared under the new Environmental Planning and Assessment Act 1979, Part 3A requirements.

The focus of the DGRs and DEC's requirements is on undertaking a full water cycle assessment. This involves consideration of the integration of water supply/sources (including effluent reuse), sewerage/wastewater and stormwater, so that water is used optimally within a catchment resource or other defined boundary. In this way, an integrated system will often rely less on natural water sources as more benefit is made of water already being used through demand management, effluent reuse and stormwater use.

The Protection of the Environment Operations Act 1997 (POEO Act), administered by the Department of Environment and Conservation, is the primary legislative tool for regulating pollution control and waste disposal in NSW. The objectives of the POEO Act are:

- To protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development;
- To provide increased opportunities for public involvement and participation in environment protection;
- To ensure that the community has access to relevant and meaningful information about pollution;
- To reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote the following:
- Pollution prevention and cleaner production;
- The reduction to harmless levels of the discharge of substances likely to cause harm to the environment;
- The elimination of harmful wastes;
- The reduction in the use of materials and the re-use or recycling of materials;
- The making of progressive environmental improvements, including the reduction of pollution at source;
- The monitoring and reporting of environmental quality on a regular basis;
- To rationalise, simplify and strengthen the regulatory framework for environment protection;
- To improve the efficiency of administration of the environment protection legislation; and
- To assist in the achievement of the objectives of the Waste Avoidance and Resource Recovery Act 2001.

In order to ensure that potential impacts on the environment by surface water are managed in accordance with the objectives of the POEO Act, this report identifies mitigation measures that would need to be implemented during the construction and operational phases.

2. Existing Environment

2.1 Site Description

The proposed site is located to the west of the Parkes Township. The proposed site covers an area of approximately 365 hectares. Of this area, approximately 25 ha will be new hardstand, warehousing and internal roads for the initial stage, with an additional 32 ha for the ultimate and potential future stage development of the site. The catchment is predominantly cleared rural farming and grazing land.

The proposed terminal site will be predominantly container storage rail terminal & warehousing. For the purpose of this assessment it has been *assumed* that the facility will be a staged development. It has also been assumed that of the proposed warehousing a small percentage (say 10%) of the warehouse area will be office space for warehouse administration etc.

Based on this the site will be developed progressively in two stages:

- "Initial" stage – 4 ha warehouse area complete and operational by 2010, together with a 14 ha intermodal terminal container storage area, administrative buildings, maintenance and refuelling facilities, a containerised fuel storage facility and a heavy engineering facility;
- "Ultimate" stage – an additional 6 ha warehouse area complete and operational by 2020a and a further 10 ha of intermodal terminal container storage area; and
- "Potential" future" – additional 16 ha of warehousing.

2.2 Topography and Existing Drainage

The terrain of the land to be developed is predominantly open and flat to undulating, naturally draining southwest to Goobang Creek. Included on the site are hills up to 320 metres Australian Height Datum (AHD), with most of the site at approximately 300 metres AHD.

The Parkes Transport Hub LES describes the area as "Rural landscape, undulating agricultural country with timbered galleries along old stock routes, road reserves, ridges and waterways that are remnants of the original vegetation communities of the locality."

Stormwater runoff from the existing flows in a south-westerly direction and discharges into a number of small farm dams. These dams discharge into the Goobang Creek, west of Parkes.

2.3 Climate and Rainfall

The Parkes weather station (065026) records a mean annual rainfall of 585 mm. Referring to Figure 1, the mean monthly rainfall is generally constant throughout the year at approximately 50 mm. A slight increase in rainfall is observed in January. The number of rain days increases in the winter months compared with the summer months.

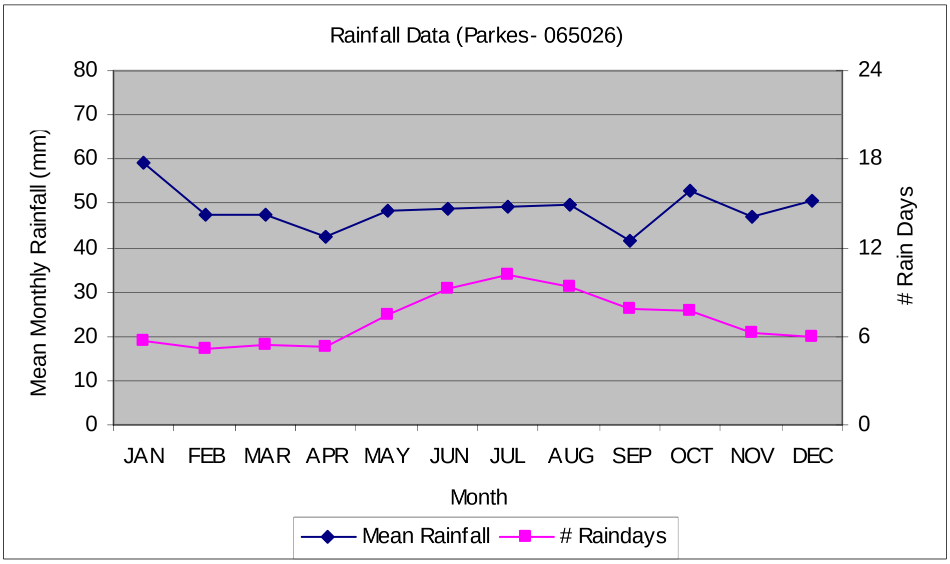


Figure 1 Seasonal Rainfall Distributions at Parkes

2.4 Groundwater

The Parkes Transport Hub Environmental Audit (Parkes Shire Council, 2003), documents:

- Groundwater across the site at depths greater than 40 m;
- Shallower groundwater resources (<8m depth) could be found in unconsolidadted material;
- Lack of data precludes assessment of freattic gradients;
- A general southerly flow direction; and
- recharge via infiltration of rainfall and slope runoff, overflows from Goobang Creek.

2.5 Salinity

The Parkes Transport Hub Environmental Audit (Parkes Shire Council, 2003), documents:

- No dryland salinity scalds found at the site; and
- Although dryland salinity is not a major issue at Parkes, the township does suffer from occurrences of urban salinity, foundation corrosion and pipe decay, potentially due to perched water tables, leakages and clayey soil profiles.

3. Potential Impacts of Development

3.1 General

Development results in increased impermeable surfaces, which affect the hydrological cycle. This 'hardening' of the surfaces results in reduced infiltration of rainfall to the soil and more rainfall becoming runoff. If not managed effectively, key impacts could include:

- Impacts to the water balance, in groundwater recharge;
- Stormwater pollution (by runoff and accidental spills entering the stormwater system);
- Increased stormwater peak flows and flood risk (on-site and local); and
- Construction phases impacts, such as erosion and sedimentation.

3.2 Water Balance Impacts

If adequate water management processes are not adopted, the increase in impervious area due to the proposed development could result in impacts to the water balance including:

- Reduced rainfall infiltration to the soil results in decreased groundwater recharge;
- Increased stormwater runoff volumes, which could impact downstream sensitive habitats in terms of flushing regimes (frequency, volume and rate), water quality, and wetting cycles;
- Development and infrastructure on the site could lead to increased recharge due to removal of vegetation, over-irrigation, and structural leakages;
- Site compaction, fill, landform reshaping and underground structures could impact groundwater flow; and
- Potential salinity impacts.

3.3 Stormwater Pollution

There are potentially a number of causes leading to pollution of stormwater discharging from the site. They include:

- Increased runoff volume during regular rainfall events would more readily entrain and mobilise pollutants (particularly first flush) and increase pollutant loads to the receiving environment;
- The type of development and associated activities may introduce differing pollutant profiles; for example, vehicular traffic could increase hydrocarbon introduction. The movement of vehicles, particularly during dry periods, could result in dust, and disturbed surfaces could provide a source of sediment, substantially contributing to the total suspended solids. In general, typical pollutants include litter, sediment, suspended solids, nutrients, hydrocarbons and toxicants;

- Accidental spills on unbunded areas of the site could discharge to the site stormwater system and the receiving environment. In addition this could lead to groundwater contamination;
- The generation of wind borne sediment/material by any of the operational activities could be deposited in to the stormwater system;
- Contamination from wastes streams from the site entering the drainage system and groundwater;
- Contamination from storage facilities (for example stockpiles, machinery storage and chemical), and covered/uncovered works areas which may include fuel, oil, grease, coolant, chemicals, solvents and/or cleaning agents; and
- During construction there is a significant risk of increased stormwater pollution. This is further discussed below.

3.4 Stormwater Peak Flows and Flood Risk

- On-site stormwater runoff peak flow rates and volumes would be increased due to the increased impermeable surfaces. During moderate rainfall events the resultant discharges can be highly erosive to stream beds banks and the receiving environment, thereby causing downstream degradation;
- Increased peaks would raise on-site and off-site flood risk if not adequately managed. This could raise the flood risk (to life and property), compromise downstream infrastructure capacity and impact downstream environments leading to increased erosion and sedimentation; and
- Flood risk at the site could also be impacted by local drainage channels that bisect or are located in close proximity to the site, and that convey runoff from larger upstream catchment areas either through or past the site. Increased local flood levels could impact directly on the site leading risk to life and property and associated damages.

3.5 Construction Phase Impacts

During the construction phase, clearing and earthmoving activities have the potential to impact on surface water quality in the vicinity of the site, especially during high rainfall events. The activities and aspects of the works that have potential to lead to erosion, sediment transport, siltation and contamination of natural waters include:

- Earthworks undertaken immediately prior to rainfall periods;
- Work areas that have not been stabilised, and clearing of land in advance of construction works;
- Stripping of topsoil, particularly in advance of construction works;
- Bulk earthworks and construction of pavements;
- Washing of construction machinery;
- Works within drainage paths, including depressions;

- Stockpiling of excavated materials;
- Storage and transfer of oils, fuels, fertilisers and chemicals; and
- Maintenance of plant and equipment.

4. Proposed Mitigation Measures

4.1 General

A number of measures will be implemented to effectively manage and mitigate the impacts identified:

- Water balance
  - Provision of stormwater retention strategies;
  - Rainwater harvesting;
  - Management and monitoring of onsite activities (irrigation) and infrastructure (leaks);
- Stormwater pollution (contaminated runoff and accidental spills entering the stormwater system)
  - Treatment of stormwater targeting pollutants;
  - Bunding;
  - First flush systems;
- Stormwater peak flows and flood risk (on-site and local)
  - Onsite detention strategies;
  - Flood planning levels;
  - Flood evacuation;
- Construction Phases Impacts;
  - Soil and Water Management planning for construction activities;
  - Implementation of erosion and sediment control strategies;
  - Ongoing monitoring and maintenance of erosion and sediment control strategies;

These strategies will be incorporated into the detailed design of the proposal and measures to monitor their effectiveness would need to be included in the construction and operation environmental management plans.

4.1.1 Water Balance

The impacts on the water balance at the site will be mitigated and managed by:

- Provision of stormwater retention strategies. These can be provided in the form of bio-retention swales and extended detention water bodies and wetlands. Strategies may need to be lined to prevent percolation to groundwater. Infiltration-based management on the site is generally not favoured due to potential groundwater contamination impacts and the risk of urban salinity;
- In general, water reuse on site is dependant upon the source water quality and finding a suitable use with effective yet minimal water treatment measures. There is an optimum storage volume that will maximise the water supply while minimising the number of overflows from the storage facility. Rainwater harvesting for re-use

will be sourced from roofed areas. Roof water would require adequate first flush treatments and can be directed to a single or a number of holding tanks for re-use as process water, toilet flushing or irrigation of landscaped areas. On-ground stormwater will be directed to onsite storage facilities and re-used as process water and for landscape irrigation, after suitable treatment; and

- Management and monitoring of onsite activities and infrastructure will be essential in managing the water balance, to prevent excess recharge, and potentially resulting in salinity impacts.

4.1.2 Stormwater Pollution

Stormwater quality and pollution will be effectively managed and mitigated by providing a number of strategies, which typically comprise both structural and procedural mitigation measures, which aim at "source control":

- Structural measures (for example first flush basins and drains) will have a direct, measurable effect on water quality while, procedural measures (for example improved housekeeping/maintenance) will play an important role in mitigation and will reduce the pollutant load on the structural mitigation measures. This will manage water quality and reduce the maintenance requirements for the structural measures. Key opportunities identified for the site include:
  - Opportunities for diverting "clean" stormwater, preventing contact with contaminated runoff;
  - Reduction in the sediment load by source controls, particularly from fuel storage or other high-risk contamination areas. This will be achieved through housekeeping, maintenance, treatment of surfaces, and diversion and treatment of stormwater runoff using first flush basins and other treatment strategies;
  - Prevention of stormwater runoff contact with contaminated areas through the construction of diversion drains and bunds as appropriate;
  - Separation of wastewater and stormwater streams across the site;
  - Separation of roof water from primarily the warehouse and storage buildings and surface stormwater runoff, if appropriate;
  - Provision of structural mitigation measures such as Gross Pollutant Traps and Oil and Water Separation Devices; and
  - Maximising vegetated overland flow paths for stormwater runoff, by using lined swales, buffer strips and bio-retention swales.
- All contamination areas, for example fuel storage and treatment areas must be bunded to contain overflows or accidental discharges. A plan would need to be developed to manage disposal of contaminated runoff from within the bunds, potentially for re-use or as a licensed discharge;
- All contaminated hardstand areas should be directed to first flush basins. This captured runoff should be re-used on site, or discharged to the stormwater system or the sewer if of suitable quality; and

- Site maintenance will be the key to managing stormwater pollution. This may require frequent sweeping and regular house keeping practices. Regular maintenance of stormwater infrastructure, particularly water quality strategies will be essential.

4.1.3 Stormwater Peak Flows And Flood Risk

On-site detention in the form of basins and storage areas will be used to effectively mitigate the increase in peak flows. In addition, stormwater quantity management wil be achieved by:

- A general site grading towards the west;
- Kerbs and gutters on internal roads collecting runoff and discharges, after treatment and reuse, via an internal stormwater pipe network and conveying these to a detention basin;
- Adopting flood planning levels, which ensure that floor areas are located above any flood levels on account of on-site and local flood peaks; and
- Providing a flood evacuation plan/strategy for the site.

4.1.4 Construction Phases Impacts

Construction Phase Impacts can be managed by implementation of a Construction Phase Soil and Water Management Plan detailing stormwater management strategies in accordance with Landcom Soil and Construction, Managing Urban Stormwater (Landcom, 2004). These would include amongst others:

- General site practices and responsibilities
- Material management practices;
- Stockpile practises;
- Topsoil practices; and
- Erosion control practices (earth sediment basins, straw bales, sediment fences, turbidity barriers, stabilised site accesses, diversions and catch drains).

4.2 Proposed Stormwater Management Strategy

4.2.1 General

Appendix A provides a concept Stormwater Management Plan for the site.

4.2.2 Designated Site Discharge Point

The designated site discharge point will be located at the south-western point of the site upstream of the culverts under Brolgan Road and downstream of the on-site basin, OSD 1.

4.2.3 Warehouses along Brolgan Rd and Intermodal Terminal Container Storage Area (Initial Stage)

The proposed warehouse developments along Brolgan Road and the Intermodal Container Storage Area will drain to the internal access road located between these two facilities.

- The internal access road will grade towards the west. A 1 in 20 year ARI sub-surface stormwater system will be provided along the access road, which will drain to the on-site basin, OSD 1. Surcharge pits will be provided and discharges in excess of the 20-year ARI event will be routed overland in the roadway;
- The Intermodal Terminal Container Storage Area will be provided with pits capable of capturing the 100-year ARI event, to prevent inundation of this hardstand area. These will connect to the sub-surface system along the internal access road;
- Each warehouse facility will be provided with internal stormwater management which will comprise:
  - A internal stormwater system of sub-surface pipes and pits;
  - Rainwater tanks from roof areas, which would overflow to internal sub-surface systems. Rainwater would be re-used for toilet flushing, vehicle washing and irrigation (with due consideration to increased salinity risk) ;
  - Bunding and first flush facilities, capturing the first 15 mm of rainfall on potentially contaminated hardstand areas. These would discharge to stormwater, sewer or licensed contractors depending on water quality and treatment achieved;
  - Inlet pit devices to capture sediment and litter;
  - GPT's and oil-water separation devices.
- Detention will be provided in the on-site basin, OSD 1.

4.2.4 Intermodal Terminal Container Storage Area (Ultimate stage) and Containerised Fuel Storage Area

These two areas will drain to the internal access road located between these two facilities.

- The internal access road will grade towards the west. A 1 in 20 year ARI sub-surface stormwater system will be provided along the access road, which will drain to a swale drain and the on-site basin, OSD 1. Surcharge pits will be provided and discharges in excess of the 20-year ARI event will be routed overland in the roadway;
- The Intermodal Terminal Container Storage Area will be provided with pits capable of capturing the 100-year ARI event, to prevent inundation of this hardstand area. These will connect to the sub-surface system along the internal access road;
- Containerised Fuel Storage Area will be provided with internal stormwater management which will comprise:
  - A internal stormwater system of sub-surface pipes and pits;

- Rainwater tanks from roof areas, which would overflow to internal sub-surface systems. Rainwater would be re-used for toilet flushing, vehicle washing and irrigation (with due consideration to increased salinity risk);
  - Bunding and first flush facilities, capturing the first 15 mm of rainfall on potentially contaminated hardstand areas. These would discharge to stormwater, sewer or licensed contractors depending on water quality and treatment achieved;
  - Inlet pit devices to capture sediment and litter;
  - GPT's and oil-water separation devices.
- Detention will be provided in the on-site basin, OSD 1

4.2.5 Heavy Engineering Facility

This facility shall be drained to a sub-surface stormwater system located in the access road, which discharges at the western end into a swale drain. The internal stormwater management of the Heavy Engineering Facility will comprise:

- A internal stormwater system of sub-surface pipes and pits;
- Rainwater tanks from roof areas, which would overflow to internal sub-surface systems. Rainwater would be re-used for toilet flushing, vehicle washing and irrigation (with due consideration to increased salinity risk);
- Bunding and first flush facilities, capturing the first 15 mm of rainfall on potentially contaminated hardstand areas. These would discharge to stormwater, sewer or licensed contractors depending on water quality and treatment achieved;
- Inlet pit devices to capture sediment and litter;
- GPT's and oil-water separation devices.

- Detention will be provided in the on-site basin, OSD 1.

4.2.6 Rail Tracks and Sidings

All rail tracks and sidings will drain to open channel 'cess' drains and sub-surface systems. These will generally drain in a south-westerly direction to OSD 1. "Lobster-pot" inlet pits will drain ballast areas and connect to sub-surface drainage in collecting runoff from the formation. All extreme events will be routed overland to OSD 1.

Culverts will be provided at track crossings over drainage lines.

4.2.7 On-Site Detention

Estimate of On-site Detention Requirements

Initial hydrology analysis was undertaken and documented in the Review and Assessment of Public Utility/Services Report for the site. These calculations determined the existing runoff from the site and were undertaken using the Rational Method in accordance with Australian Rainfall and Runoff. The results were accepted in this report and are shown in Table 1 below.

Table 1 Existing Site Discharges (Preliminary only)

ARI Period (years)	Design Discharge (m^3/ s)
10	6.1
20	9.0
50	14.8
100	21.0

It is noted that these figures are draft only and shall be finalised during the design process.

Discussions with Council (Review and Assessment of Public Utility/Services Report) highlighted the need for the post development drainage discharge to be limited to the pre-development drainage discharge. This is a standard condition for development within the Parkes Shire Council area and is further highlighted by the fact that the discharge point from the site shall be onto adjoining properties.

Based on this requirement and an assumed post development impervious area for the development the on-site detention storage requirement for the 100-year ARI event would be 230 m^3/ha.

Proposed On-site Detention Strategy

OSD 1 basin will be located on the northern side of Brolgan Road. The purpose of this basin is to control site discharge and to limit the peak flow of water in the stormwater drainage structure crossing beneath Brolgan Road. The proximity of the rail line and area reserved for future warehousing development may limit the size of this basin.

A second basin located in-line from OSD 1 and the drainage line leading to Goobang Creek, OSD 2, will be constructed on the southern side of Brolgan Road. The developer has an agreement with the existing Landowner to expand an existing dam in the southeast corner of this neighbouring lot. The purpose of this basin is to supplement site detention storage and to limit the peak flow of water in the stormwater drainage structure crossing beneath he Sydney-Adelaide-Perth rail line.

It is proposed that:

- Basin OSD 1 be maximised in order to contain and manage stormwater on-site in preference to off-site in OSD 2. It may be that OSD 2 is not required, however is the site discharge is of suitable quality OSD 2 could be used as a balancing storage for potential re-use;
- That the OSD basins be provided with pre-treatment in the form of GPT’s and inlet sediment traps;
- That the basins be provided with staged outlets (low level and flood) to manage discharges, offsetting potential evaporation losses and to emulate existing hydrological cycles; and

- Provide water quality treatment by including a wetland zone, a detention zone, together with and extended detention zone. The wetland zone could be located in the base of the basin.

Based on the development areas discussed in 2.1, the following on-site detention will be required:

- Initial stage (20 ha): 4600 m^3; and
- Ultimate and potential future stage (additional 32 ha): additional 7360 m^3.

These volumes should easily be accommodated in the locations of OSD 1 and OSD 2.

5. Monitoring Program

Monitoring should be undertaken to ensure that stormwater management measures are working effectively. Monitoring would rely primarily on visual inspections and sampling. Visual inspections should be undertaken of sediment basins, pits, diversion and catch drains and all other stormwater conveyance structures. A general indication of frequencies for inspections is provided in Table 2. An inspection log detailing the monitoring program should be kept.

Table 2 Monitoring Program

Sample location	Collection mechanism	Frequency first six months	Frequency normal operation
Sediment Basins	Visual Inspection	Every runoff event	First runoff event of any month
Inlet Pits	Visual Inspection	Every runoff event	First runoff event of any month
Trunk Drainage Channels	Visual Inspection	Every runoff event	First runoff event of any month
Overland Flow Paths	Visual Inspection	Every runoff event	First runoff event of any month
Trafficable Areas	Visual Inspection	Every month	
Bunded areas	Visual Inspection	Every runoff event	
Other works areas, potentially contaminating stormwater	Visual Inspection and system operation testing	Every month	

Notes:

- Runoff event must be sufficient;
- Inspect after 24 hour retention period (ie 24 hrs after runoff event);
- For every inspection, date, time and ambient weather conditions will be recorded.

6. Summary and Conclusion

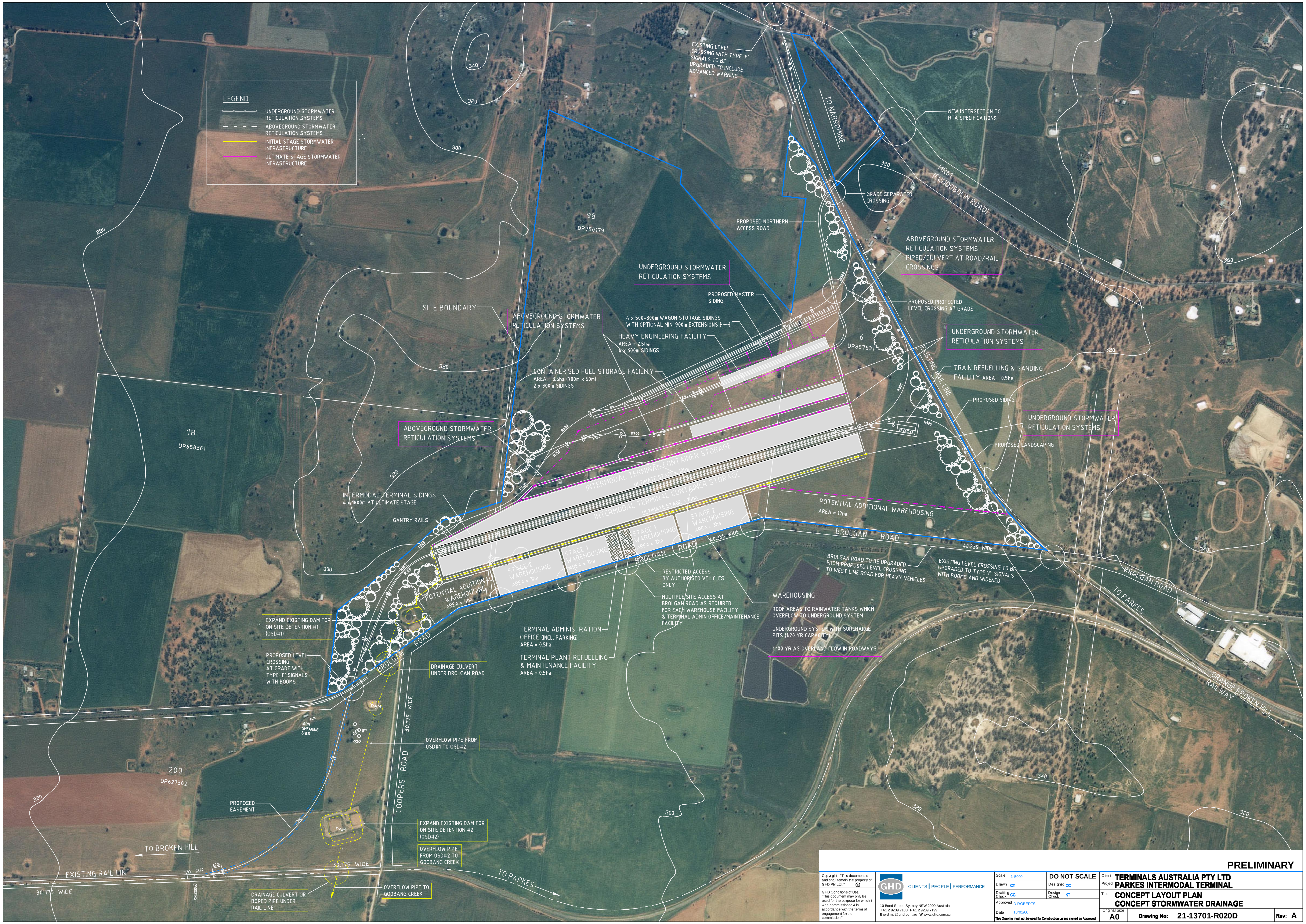
- The proposed site for the Intermodal facility is located approximately 5 kilometres west of the urban centre of Parkes. The site is located south of the State Route 90, north of Brolgan Road and west of the Parkes Narromine Railway.. This report describes and assesses the surface water management at the site;
- The proposed site covers an area of approximately 365 hectares. Of this area, approximately 25 hectares shall be new hardstand, warehousing and internal roads for the initial stage, with an additional 32 hectares for the ultimate and potential future stage development of the site;
- The Parkes weather station (065026) records a mean annual rainfall of 585 mm. The mean monthly rainfall is generally constant throughout the year at approximately 50 mm;
- The development results in increased impermeable surfaces, which affects the hydrological cycle. This 'hardening' of the surfaces results in reduced infiltration of rainfall to the soil and more rainfall becoming runoff. If not managed effectively, key impacts could include:
  - Impacts to the water balance (in particular groundwater recharge);
  - Stormwater pollution (by runoff and accidental spills entering the stormwater system);
  - Increased stormwater peak flows and flood risk (on-site and local); and
  - Construction phases impacts, such as erosion and sedimentation;
- A number of measures are proposed to manage and mitigate the impacts of the proposed development on surface runoff, groundwater and the water balance. These include, amongst others:
  - Provision of stormwater retention strategies and rainwater harvesting;
  - Management and monitoring of onsite activities (irrigation) and infrastructure (leaks);
  - Treatment of stormwater, targeting pollutants;
  - Bunding and first flush systems;
  - Onsite detention strategies;
  - Flood planning levels;
  - Flood evacuation; and
  - Soil and Water Management planning for construction activities;
- Hydrological simulations were undertaken to support this assessment. The results of the simulations showed that detention strategies can effectively mitigate the impacts of development on stormwater runoff peaks on and off-site; and
- Ongoing monitoring should be undertaken to ensure that stormwater management measures are working effectively.

7. References

- DNR&DE, 1998: Stormwater Quality Control Guidelines for Local Government, Department of Natural Resources and Department of Environment, February 1998;
- AR&R, 2000: The Institute of Engineers in Australia, Australian Rainfall and Runoff;
- Landcom, 2004: Soil and Construction, Managing Urban Stormwater (formally the “Blue Book”);
- EPA Website, Stormwater first flush pollution, http://www.epa.nsw.gov.au/mao/stormwater.htm;
- Parkes Shire Council, 2003: Parkes Transport Hub Environmental Audit, Terra Consulting, September 2003, part of Parkes Shire Council LES (July 2003);

Appendix A

Concept Stormwater Management Plan



PRELIMINARY

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Client **TERMINALS AUSTRALIA PTY LTD**
Project **PARKES INTERMODAL TERMINAL**
Title **CONCEPT LAYOUT PLAN**
CONCEPT STORMWATER DRAINAGE

Original Size	Drawing No:	Rev:
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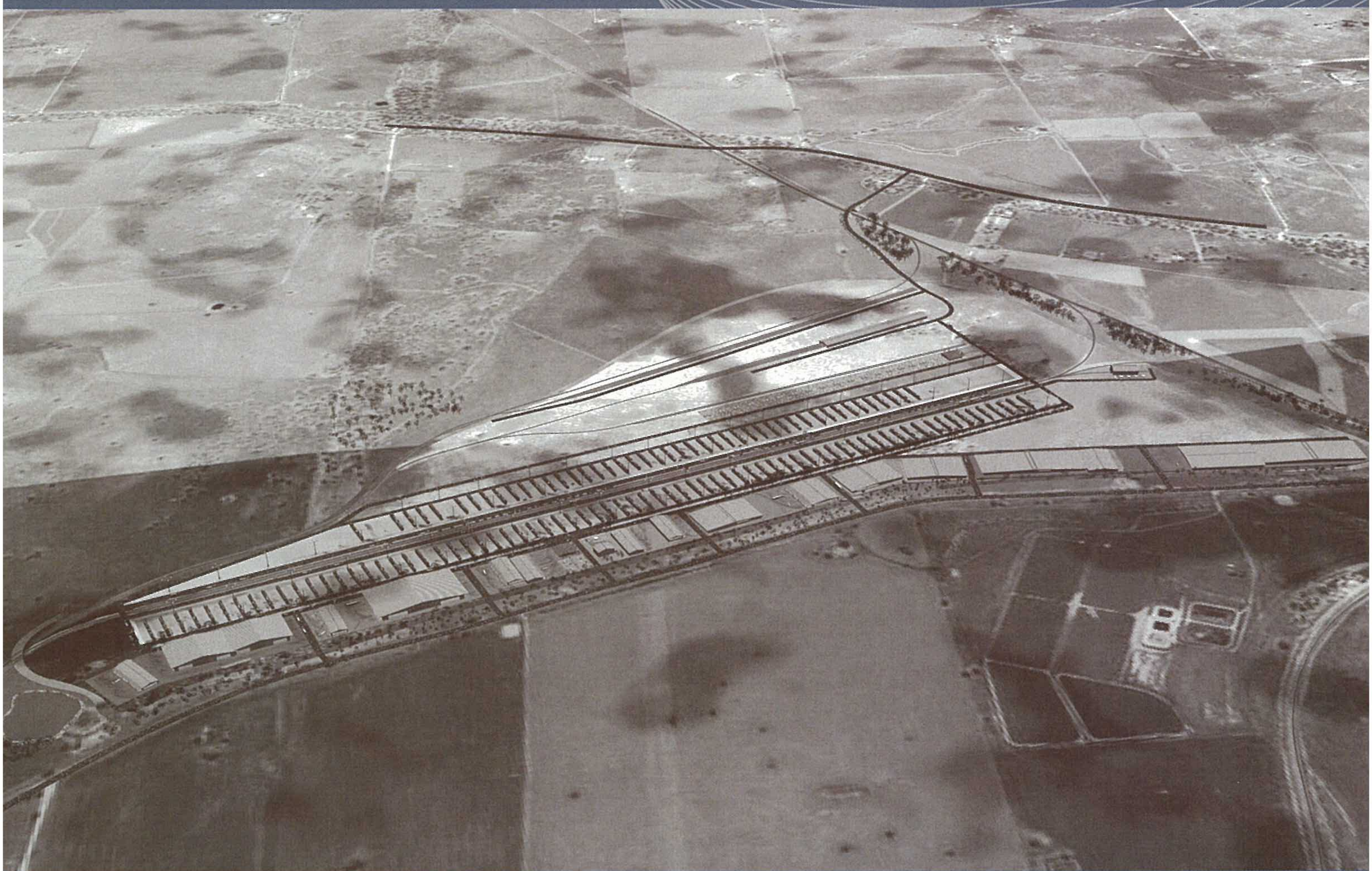
APPENDIX E

PRELIMINARY RISK SCREENING



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Terminals Australia Pty Ltd

Parkes Intermodal Terminal

Preliminary Risk Screening

January 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

Terminals Australia Pty Ltd has proposed to develop an Intermodal Terminal for the large-scale transport, warehousing, manufacturing and storage of freight. The Intermodal Terminal (hereafter referred to as 'the proposal') is to be located in western NSW at Parkes and would be part of the Multi Modal Freight Logistics Hub being perused by Parkes Shire Council.

Parkes is well situated to support a national intermodal hub. It is strategically located at the junction of the national road and rail corridors of the Newell Highway connecting Melbourne and Brisbane; the proposed inland (Melbourne-Brisbane) rail route; and the Main Western (Sydney-Perth) transcontinental railway linking the eastern seaboard to Adelaide and via Broken Hill to Perth. The proposed site would take advantage of the existing and any future upgrades to the national road and rail transport infrastructure.

GHD-Qest has been engaged to conduct a preliminary risk screening as part of the Environmental Assessment Report for the proposal. The preliminary risk screening will indicate weather the proposal is classified as "potentially hazardous" in nature. If the proposal is found to be potentially hazardous under *State Environmental Planning Policy No. 33* (SEPP 33) the proposal will require a Preliminary Hazard Analysis (PHA) if it is to gain development approval. Additionally, the statutory requirements for the proposal to comply with AS 1940 *The Storage and Handling of Flammable and Combustible Liquids*[1] will be presented herein.

This report was prepared with background information, terms of reference and assumptions supplied and agreed with by the customer. The report is not intended for use by any other individual or organisation and as such, GHD can not accept liability for use of the information contained in this report, except for the purpose for which it was intended at the time of writing.

1.1 Objectives and Scope

The objectives of a preliminary risk screening are:

» Indicate the class, quantity and location of all hazardous material present on-site;

» To determine the requirement for a PHA; that is, whether the hazardous material storage situations and quantities exceed the risk screening thresholds presented in the Department of Planning's (DoP's) *Applying SEPP 33 – Hazardous and Offensive Development Application Guide* (Applying SEPP 33)[2]; and

» To outline the statutory requirements for the proposal to comply with AS 1940[1] specifically in relation to separation distances, bunding requirements and fire fighting hardware for all hazardous material storage locations.

2. Statutory Requirements

The EP&A Act 1979, together with the *Environmental Planning and Assessment Regulation 2000* (the Regulation) forms the statutory framework for planning and environmental assessment in NSW. The Minister Planning, statutory authorities and local councils are responsible for implementation of the EP&A Act 1979.

The development application for the proposal shall be considered under the new Part 3A (in accordance with the Amendment Act). The potential implications for the environmental assessment process will need to be considered as the project progresses.

The proposal is considered to be a 'major project' and 'designated development' under the EP&A Act. These factors influence the decision making process as follows:

» Major project – the Minister for Planning is the consent authority for the proposal; and

» Designated development – an Environmental Assessment Report shall be submitted with the application for development consent.

The Environmental Assessment Report must include a preliminary risk screening completed in accordance with the DoP's *Applying SEPP 33*[2]. Should the preliminary risk screening indicate the proposal is "potentially hazardous" then a PHA must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (HIPAP 6)[3] and *Multi-Level Risk Assessment*[4].

3. Methodology

The methodology for the preliminary risk screening is as presented in the DoP's *Applying SEPP 33*[2]. The preliminary risk screening concentrates on the transportation and storage of specific dangerous goods classes that have the potential for significant off-site effects. The steps involved in a preliminary risk screening are as follows:

- Collate Information: The proponent should provide a full list of hazardous materials stored on-site, the method of storage, storage location, maximum inventory and shortest separation distance to site boundary. Additionally, the average number of weekly and annual road movements of hazardous material to and from the site, as well as the typical quantities in each load should be provided;
- Identify the Types of Hazard Presented by a Hazardous Material: This involves the identification of the hazardous material *class* (and subsidiary classes) for each hazardous material stored on-site. Classes and subsidiary classes are obtained from the Dangerous Goods Code (DGC) or material data safety sheets (MSDS) and illustrate the types of hazard to be considered;
- Group and Total by Class, Activity and Location: When several hazardous materials of the same class are stored in the same general site location but in differing storage forms, total the bulk quantity and then separately total the quantity stored in each form;
- Compare with Screening Threshold: Provided in the DoP's *Applying SEPP 33*[2] are various tables and figures indicating the screening threshold pertaining to each class of hazardous material. If a screening threshold is not exceeded it is assumed that the hazardous material is unlikely to pose a significant off-site risk; and,
- Transportation Issue Consideration: If a proposed development generates traffic movements (entering and leaving the site) of significant quantities of hazardous material, the development may be considered potentially hazardous. Provided in the DoP's *Applying SEPP 33*[2] are transportation screening thresholds relating to the various classes of hazardous materials. The thresholds are based on a minimum quantity per load (below which the vehicle movement should be ignored) and a vehicle movement frequency.

If any one screening threshold is exceeded then the proposed development is considered "potentially hazardous" under SEPP 33 and a preliminary hazard analysis (PHA) is required to be submitted with the development application. If any transport screening thresholds are exceeded then the proposal is considered potentially hazardous with respect to transport and a route evaluation study is required.

4. Facility Description

4.1 Location and Surrounding Land Users

Parkes is situated 365 km west of Sydney, 995 km from Brisbane, 1067 km from Adelaide and 306 km from Canberra on the western edge of the Great Dividing Range in central western NSW. The town centre of Parkes is the major urban centre in the Parkes Shire Local Government Area (LGA).

The site for the proposal is approximately 5 kilometres west of the urban centre of Parkes (Figure 1). The site is located south of the Main Road 61, north of the Brolgan Road and west of the Parkes - Naromine Railway. The primary vehicular access to the site is via Brolgan Road, however at the ultimate stage a northern access road is proposed from Main Road 61.

The site (Figure 2) is approximately 365 hectares in size - approximately 50% of which would be required for the proposal. Terminals Australia owns the majority of the site. The site comprises Lot 6 DP 857631, Lot 98 DP 750179, Lot 99 DP 750179, Lot 360 DP 750179 and Lot 1 DP 1082995. The proposal also incorporates part of Lot 200 DP 627302 – this lot is not owned by Terminals Australia but an agreement for use of the land has been reached with the owner by provision of an easement.

Figure 1: Site Location

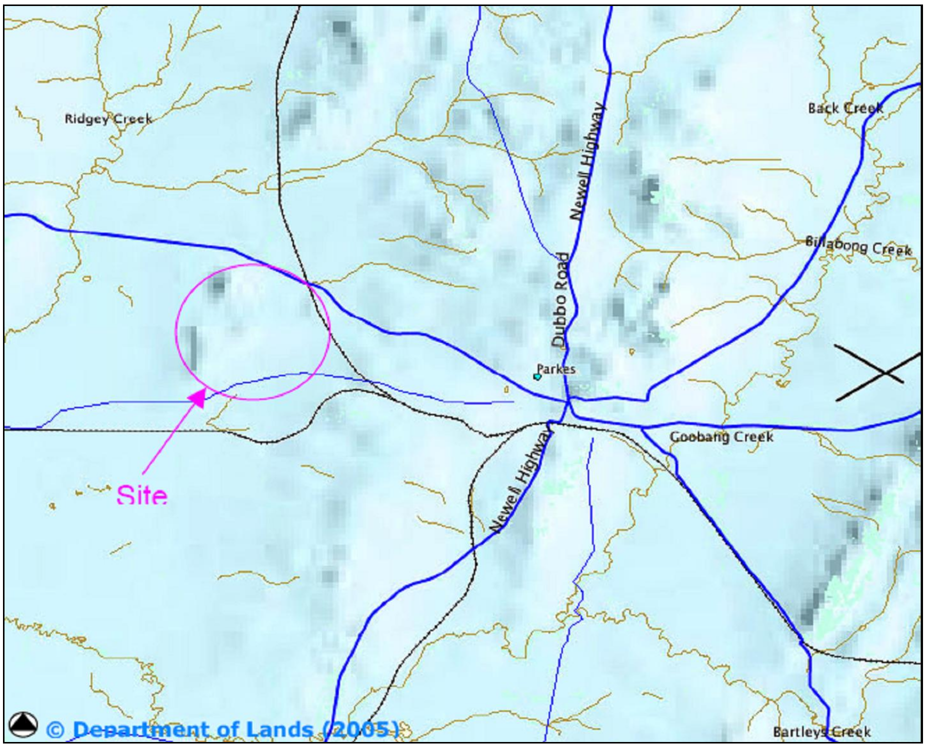
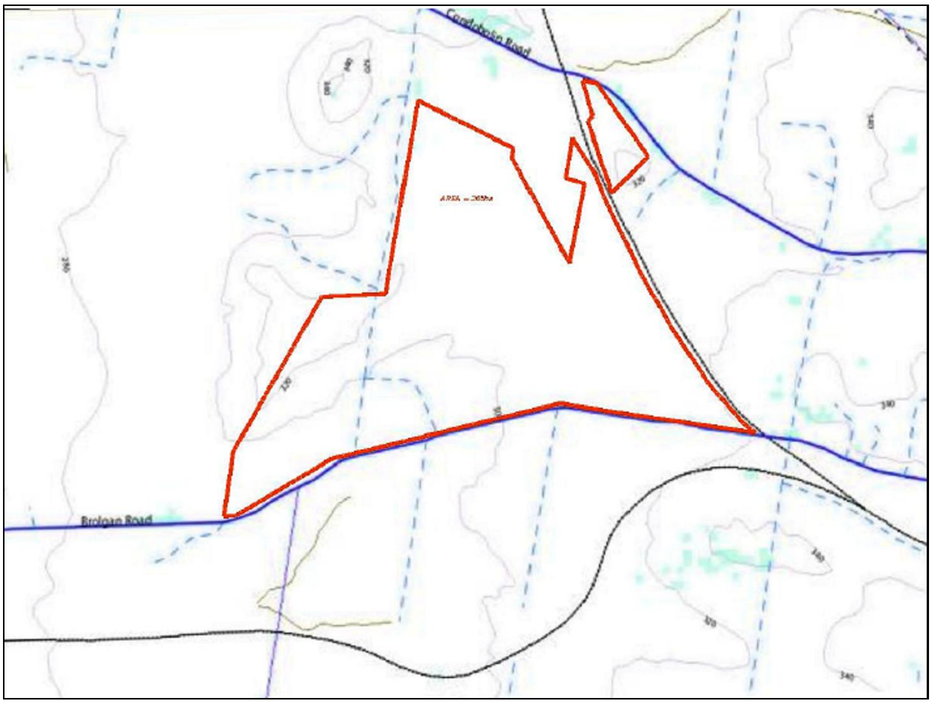


Figure 2: Site Boundary



The site is typical agricultural land of the area, and is currently being agisted to local farmers (Figure 3). Dominant features on the landscape are the Parkes-Narromine rail line, derelict dwellings, agricultural fields and associated dwellings/fences, Brolgan Road, the Sydney-Adelaide-Perth rail line, and a predominant ridge on the western side of the site. The Containerised Fuel Storage Facility is within the northern section of the site and is over 1.5 kilometres from the nearest existing dwelling. However,

Figure 3: Site Photos Showing Site Boundary, Parkes Narromine Railway and Surrounding Land Uses

council approval has been granted for a dwelling approximately 400m from the Containerised Fuel Storage Facility.

4.2 Site Layout and Operations Description

The proposal involves the construction of a national intermodal facility for the large-scale transport, warehousing and storage of freight. The intermodal terminal will be a 24-hour operation.

One of the purposes of the proposal is to provide a strategic location between the freight service user and the operator, such as a port, whereby the freight operators can take advantage of road/rail transport modes. Additionally, the freight operator can utilise terminal facilities such as cold storage, refuelling facilities and both short-term and long-term storage.

For rail operators, the proposal could also provide a facility to reconfigure, cross-load, maintain and service trains. Depending upon market forces, the site could also potentially provide rolling stock storage as well as maintenance facilities.

As the site selected for the proposal is a greenfield site, there are excellent operational advantages in regards to the flexibility of rail movements and access to either the east-west rail line or the proposed inland rail corridor. The size of the site means that a terminal operation could be established and be progressively developed without operational compromise or hindrance.

The key features of the proposal include:

- Warehousing;
- A heavy engineering facility;
- Rail terminal (incl. cold storage and operational depot);
- Rail wagon storage sidings;
- On-site refuelling facilities;
- A containerised fuel storage and distribution facility; and
- Administration offices, maintenance sheds and facilities for the above on-site functions.

A preliminary site layout plan at the ultimate stage is presented in Figure 4.

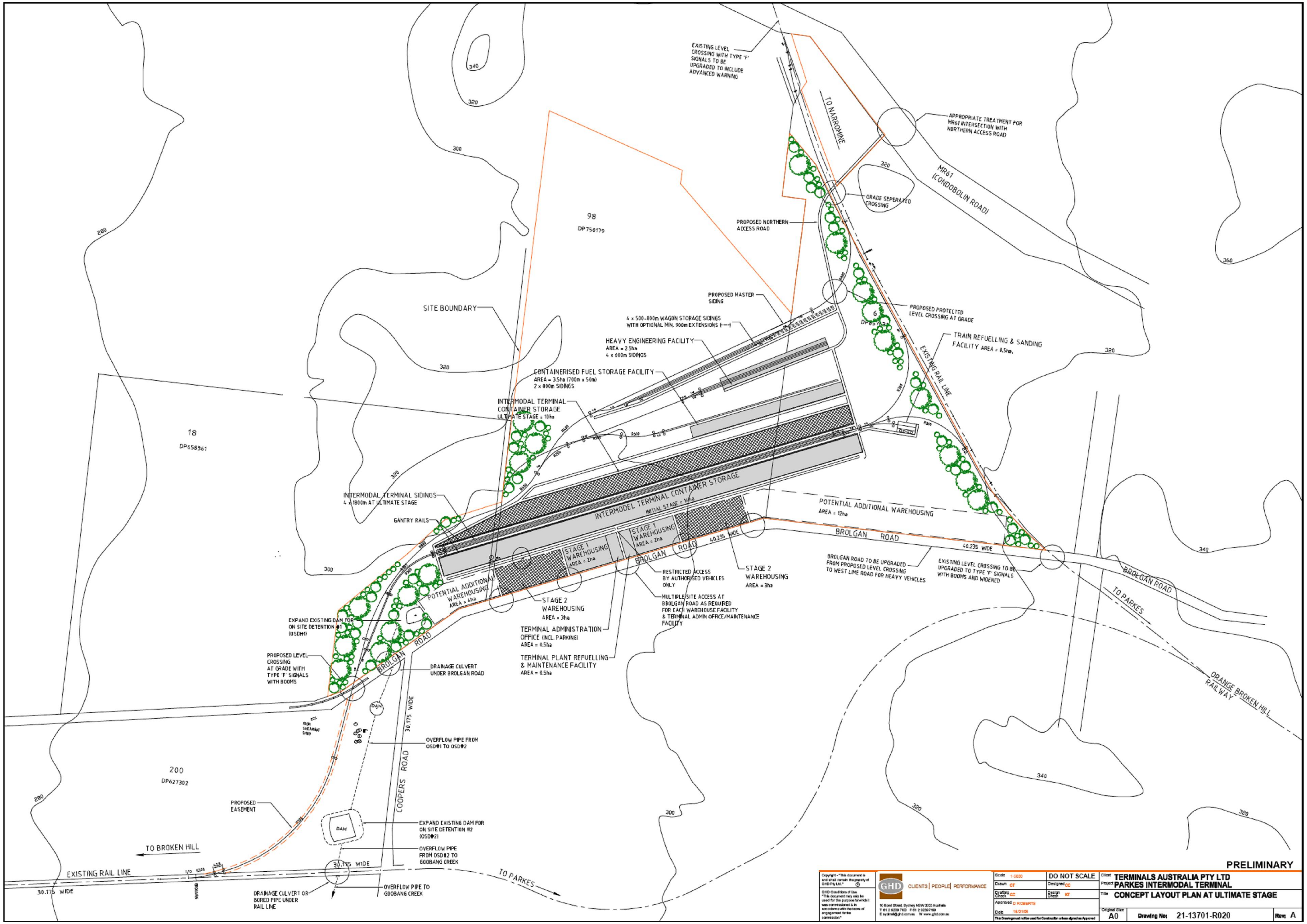
The container storage park on the southern side of the intermodal sidings is indicative in size only, however, highlights the area available for this function. It is adjacent to the rail sidings to minimise the distances for handling containers and it is planned that two lane, one way roadways would be constructed under the gantry crane for direct transhipment to/from road vehicles.

The warehousing and distribution area shown on the preliminary concept layout plan is indicative of the size of the area available. This gross area would include access roads and provision for other infrastructure for the servicing of the warehousing and distribution facilities.

The concept for the warehousing and distribution facilities on the southern side of the site (fronting Brolgan Road) is to provide ‘back door’ access to the intermodal sidings/container park and be within approximately 100m of these sidings.

It is envisaged that the heavy engineering/rollingstock maintenance facility, the rollingstock storage sidings, and the fuel storage and distribution facility would all branch off the master siding and not the intermodal terminal sidings. This clearly demarcates the intermodal terminal and minimises unauthorised road vehicles to/from the intermodal terminal and also minimises the rail movements within the intermodal terminal itself.

Figure 4: Preliminary Site Layout Plan at the ultimate stage



5. Preliminary Risk Screening

5.1 Dangerous Goods Storage Screening

The proposed inventories and locations of hazardous materials to be stored and utilised in the proposed development are listed in Table 5.1. The location ID (Loc-ID) relates to the site layout (Figure 5) and serves to illustrate different materials stored in the same general location. It must be noted however, that the inventories presented for hazardous material stored in the Containerised Fuel Storage Facility are indicative of a total hazardous material storage inventory of 1,000m^3 (which equates to approximately 1 million litres).

Table 5.1: Hazardous Material Description, Inventory and Location

Material	Inventory (m3)	Location	Loc-ID
Unleaded Petrol (ULP)	150	Containerised Fuel Storage Facility	A
Leaded Petrol (LP)	150	Containerised Fuel Storage Facility	A
Diesel	700	Containerised Fuel Storage Facility	A
Diesel	100	Train Refuelling Facility	B
Diesel	100	Terminal Plant Refuelling Facility	C

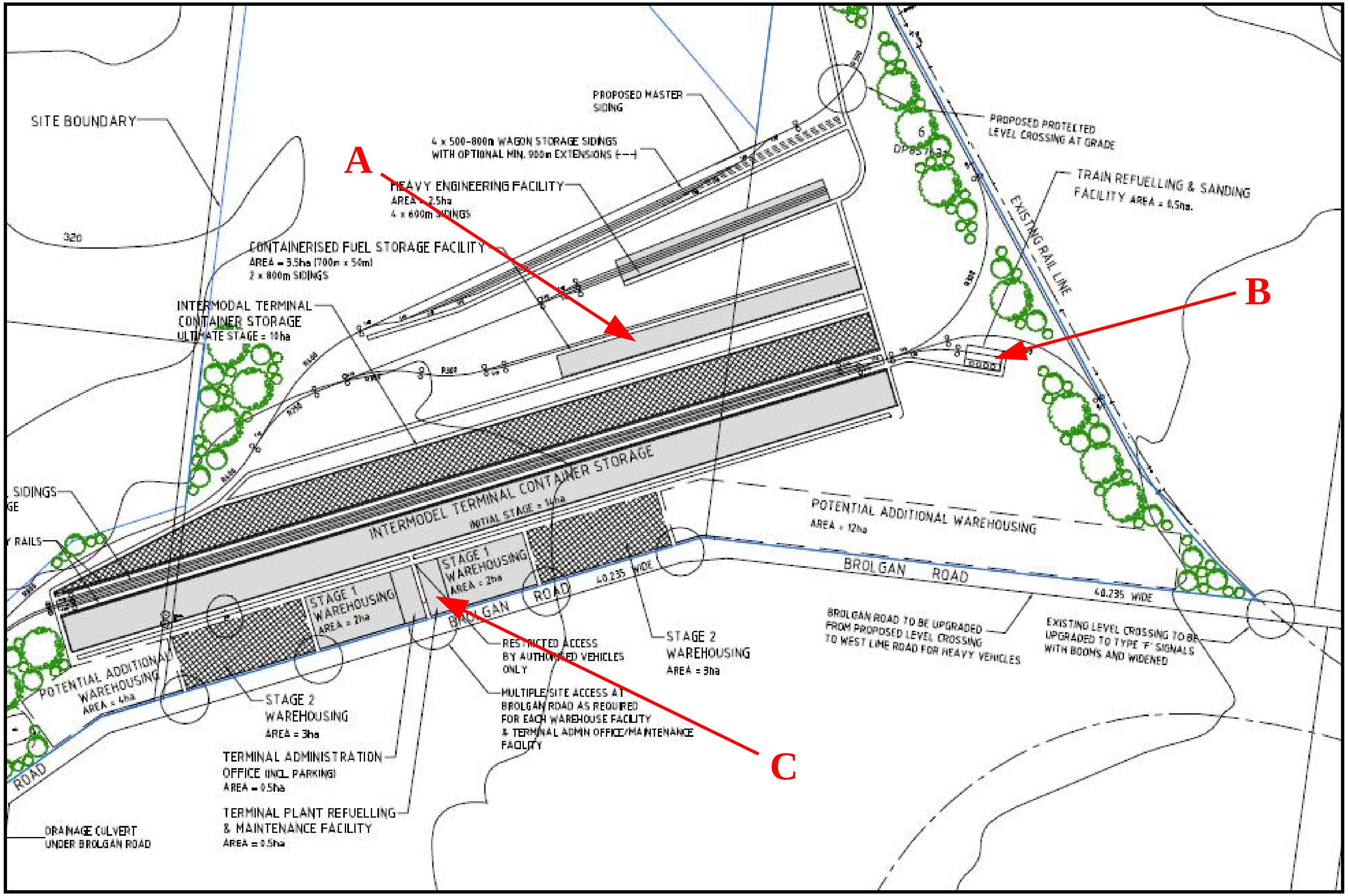
The hazardous material class relating to the materials listed above are presented below. A class 3PGII classification indicates the material is a flammable liquid with a flash point of less than 23^{o}C. A class C1 classification indicates a combustible material with a flash point of 150^{o}C or less.

Table 5.2: Hazardous Material Class (and Sub-Class)[5]

Material	Class/Sub-Class
Diesel	C1
ULP	3PGII
LP	3PGII

The containerised fuel centre (Loc-ID A) will be used to store both class C1 (diesel) and class 3PGII (ULP & LP) hazardous materials. Under SEPP 33 if a class C1 material is stored with other flammable materials then it should be considered a class 3PGIII hazardous material. Additionally, SEPP 33 advises that if more than one

Figure 5: Hazardous Material Storage Location ID



subsidiary class of a given class is stored in the same general area then the total (class) quantity should be considered to be of the more hazardous subsidiary class present.[2] Hence the total inventory of material stored at the containerised fuel centre was considered to be class 3PGII hazardous material. Table 1 of *Applying SEPP 33*[2] indicates that Figure 9 be used to determine if the storage situation at the containerised fuel centre is potentially hazardous in nature. Given the approximate separation distance of approximately 400m from the proposed containerised fuel facility to the site boundary, correlated with the approximate 1,000m^3 storage volume anticipated results in a screening value well below the specified storage screening threshold. Hence this storage facility (Loc-ID A) is considered unlikely to present a significant off-site risk.

Due to the classification of diesel as a class C1 material in the case of the diesel stored at Loc-ID B and Loc-ID C, as it is the only flammable material within the respective storage areas, as per the DoP's *Applying SEPP 33*[2] it is not considered to be potentially hazardous.

Based on the dangerous goods storage screening process conducted and illustrated above it is believed that none of the proposed hazardous material storage situations at the Parkes Intermodal Terminal exceed the storage screening threshold specified under SEPP 33. Hence, it is assumed that these storage situations are unlikely to pose a significant off-site risk.[2]

5.2 Dangerous Goods Transport Screening

It is proposed that the majority of the fuel stored in the Containerised Fuel Storage Facility will be diesel. With the classification of diesel as a class C1 material it is not subject to transportation screening thresholds under SEPP 33. It is envisaged that truck movements of ULP and LP will not exceed 750 movements per annum or maximum peak weekly movements of 45. ULP and LP are classified as class 3PGII hazardous materials and as such are subject to transport screening thresholds. The DoP's *Applying SEPP 33*[2] specifies the transport screening threshold for class 3PGII materials transported in quantities greater than 3 tonnes (which equates to approximately 3,000L[1]) as greater than 750 cumulative annual movements and not exceeding peak weekly movements of 45.

Therefore, it is concluded that the proposed total annual and peak weekly movements of class 3PGII hazardous materials will not exceed the transport screening thresholds specified under SEPP 33. Hence, the proposal is not considered to be potentially hazardous with respect to transportation.

5.3 Level of Risk Assessment

In accordance with SEPP 33, if any of the screening thresholds are exceeded then the proposed development should be considered potentially hazardous and a preliminary hazard analysis (PHA) is required to be submitted with the development application.

[1] Material with a specific gravity of 0.9.

Based on the above assessment, the proposed development does not exceed the storage threshold or transport threshold for Class 3PGII hazardous materials and hence is not considered as potentially hazardous. Therefore, a PHA is not required for the anticipated substance volumes for the Containerized Fuel Storage Facility or the permanent on-site fuel storage tanks proposed for the intermodal terminal.

6. Requirements for Compliance with AS 1940

The proposed Parkes Intermodal Terminal presents two separate and distinctly different hazardous material storage scenarios. The first is that of permanent on-site storage of combustible liquids in tanks with fuel being provided for site operations and train refuelling operations (Fig 5, Loc-ID B & C). The second scenario is transit storage of flammable and combustible liquids at the Containerised Fuel Storage Facility (Fig 5, Loc-ID A).

For the purposes of this investigation, a protected place is defined as per AS 1940 Clause 1.4.55 as;

- A dwelling, residential building, place of worship, public building, school or college, hospital, theatre, and any building or open area in which persons are accustomed to assemble whether it is within or outside the property boundary of the installation.[1]

6.1 Permanent On-site Storage Tanks

To ascertain whether the permanent on-site storage tanks comply with AS 1940, the permanent on-site storage tanks are defined as follows:

- A permanent on-site tank storing class C1 dangerous goods (diesel);
- Indicative dimensions of 2m height by 8.5m diameter, capable of storing approximately 100,000L; and,
- The tank is contained within a dedicated bund with no other flammable or combustible material stored within this bund.

6.1.1 Separation Distances

Separation distances for above ground tanks storing flammable or combustible material are specified in Section 5.7 of AS 1940. AS 1940 Clause 5.7.2 indicates that separation distances to security fences and on-site protected places are specified in AS 1940 Table 5.3 as.

- Separation distance to on-site protected places > 7.5m
- Separation distance to security fences > 7.5m

AS 1940 Clause 5.7.2 indicates that separation distances to protected places beyond the site boundary are specified in AS 1940 Table 5.4 as.

- Separation distances to protected places beyond the site boundary > 7.5m

6.1.2 Bunding Requirements

The bunding requirements for above ground tanks storing flammable or combustible material are specified in Section 5.8 of AS 1940. AS 1940 Clause 5.8.1 states:

- Provision shall be made to contain any leakage or spillage from the tank storage facility and to prevent it from contamination the surrounding soil or entering any watercourse or water drainage system.

The required capacity of the bund is specified by AS 1940 Clause 5.8.2 as:

- The net capacity of the bund shall be the volume of the largest tank plus the output of any firewater over a 20 min period (in this case this equates to approximately 100,600L).

6.1.3 Fire Protection Requirements

The required fire protection for this storage scenario is defined in AS 1940 section 11.12. AS 1940 Clause 11.12.4 specifies class C1 liquid stored as defined above require:

- A hose reel and foam making equipment capable of supplying 27L/min of foam solution at a minimum pressure of 220 kPa for 30 min: and,
- Two powder type fire extinguishers compliant with AS/NZS 1841.5.

6.2 Transit Storage Scenario

AS 1940 Clause 1.4.70 defines transit storage as 'the storage of flammable or combustible liquids for at least 12 hours and less than 5 days, where such liquids are intended for further transport to another location.'[1]

AS 1940 Clause 3.9.2 specifies that 'areas used for transit storage of flammable or combustible liquids shall be deemed to be separate areas if apart from each other and from any other storage areas, building or amenities by at least 15m.'[1]

AS 1940 Clause 3.9.3 states;

- The aggregate quantity of flammable and combustible liquids held in each transit storage area shall not exceed 200 tonnes (which equates to approximately 220,000L[2]);
- Freight or tank containers containing flammable or combustible liquids in a transit storage area shall not be stacked more than two containers high and two containers deep; and
- Where stacked two containers deep, be provided with access for inspection to both sides of each stack (minimum inspection width approximately 800mm).

6.2.1 Separation Distances

AS 1940 Clause 3.9.4 specifies transit storage areas shall be separated from protected places, on-site protected places and public streets by the distances given in AS 1940 Table 4.1 and shall be separated from site boundaries by the distances given

[2] Material with a specific gravity of 0.9.

in AS 1940 Table 4.2. Separation distances shall be measured from the edge of the transit storage area and be of the following minimum distances.

- Separation distance to accumulations of combustible material (i.e. timber, plastics etc.) > 5m;
- Separation distance to protected places, on-site protected places and public streets > 17m; and,
- Separation distance to site boundaries > 3m.

6.2.2 Bunding Requirements

AS 1940 Clause 3.9.3 specifies that each transit storage area shall be provided with spillage catchment facilities with a volume at least 100% the capacity of the largest tank or freight container. However, in order to facilitate the management of emergencies it is recommended that the catchment facilities be 10% greater than the capacity specified above. Hence, the catchment facilities should be 110% of the capacity of the largest tank.

6.2.3 Fire Protection Requirements

AS 1940 Clause 11.8.6 states that fire protection requirements for transit storage areas are as per the requirements of AS 1940 Table 11.3. AS 1940 Table 11.3 specifies that for transit storage areas storing between $10m^3$ and $100m^3$ of flammable liquid (which equates to between 10,000L and 100,000L) are required to have;

- Four powder-type extinguishers compliant with AS/NZS 1841.5;
- Two foam-type extinguishers compliant with AS/NZS 1841.4; and,
- A hose reel and foam making equipment capable of supplying 27L/min of foam solution at a minimum pressure of 220 kPa for 30 min and capable of reaching all parts of the storage areas.

7. References

1. *The Storage and Handling of Flammable and Combustible Liquids*, in *AS 1940*. 2004, Standards Australia.
2. *Applying SEPP 33 - Hazardous and Offensive Development Application Guidelines*, D.o. Planning, Editor. 1997, Crown.
3. *Hazardous Industry Planning Advisory Paper No. 6: Guidelines for Hazard Analysis*, D.o. Planning, Editor. 1997, Crown.
4. *Multi-Level Risk Assessment*, D.o. Planning, Editor. 1997, Crown.
5. Commission, N.R.T., *Australian Code for the Transport of Dangerous Goods by Road and Rail: Volume 2 - Technical Appendices*. 1998, Commonwealth of Australia.

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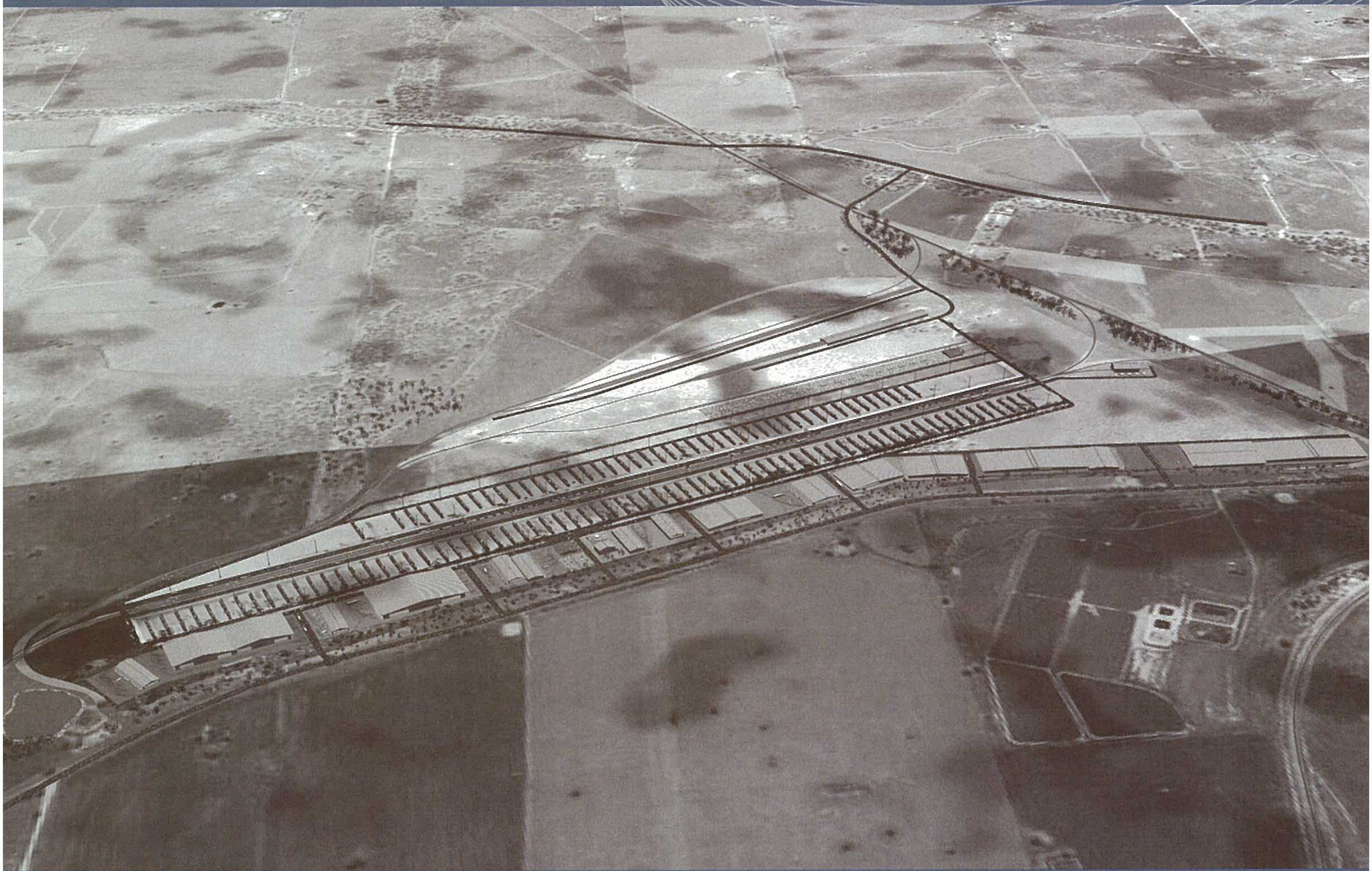
APPENDIX F

HERITAGE ASSESSMENT



BCS
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Parkes Intermodal Freight Terminal Heritage Assessment

FOR **GHD**

December 2005

BCS

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Parkes Intermodal Freight Terminal Heritage Assessment

FOR GHD

December 2005

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BCS

CONTENTS

BCS

1 INTRODUCTION

1.1 Background

Terminals Australia is proposing to develop a 365 Hectare Greenfield site west of Parkes, in western New South Wales as an Intermodal Freight Terminal, so as to provide a national road and rail intermodal hub.

b cubed sustainability Pty Ltd (*BCS*) has been engaged by GHD to undertake an indigenous and non-indigenous heritage assessment to assist in determining potential heritage impacts associated with the proposed facility.

1.2 This Report

This heritage assessment has been prepared to assess the potential impacts which may be incurred on the heritage significance of the subject site, as a result of works associated with the proposed Terminal.

This report includes an assessment and consideration of the subject site's potential Indigenous and Non-Indigenous heritage significance, and will inform the preparation of an Engineering Masterplan and Project Approval for the project made under Part 3A of the Environmental Planning and Assessment Act 1979. The Masterplan will outline the operational and functional requirements for the proposed Terminal, and describe the engineering infrastructure necessary to operate this facility.

1.3 Site Context and Location

Parkes Shire is located in the Central West Slopes and Plains region of New South Wales on the western edge of the Great Dividing Range. It is approximately 320 kilometres west of Sydney. It covers an area of 5919 square kilometres with the town of Parkes being the major urban centre, followed by Peak Hill (refer to Figure 1).

Figure 1 - Parkes Shire[1]

Parkes is strategically located at the junction of several national freight corridors, the main southern railway and a high capacity rail and road network which is experiencing a high rate of growth as a freight corridor.

The site of the proposed Intermodal Freight Terminal ("the subject site") is located approximately 5 kilometres west of Parkes township, at the junction of the Mainline to Broken Hill and the branch line to Narromine/Cobar (refer to Figure 2). The primary vehicular access to the site is via Brolgan Road.

[1] www.parkes.nsw.gov.au

The site is approximately 365 hectares in size (approximately 50% of which would be required for the proposal) and is part of the area referred to as the "Parkes Hub", which has been the subject of a Local Environmental Study prepared by Parkes Shire Council.

Figure 2 - Aerial Photograph - Site Location

1.4 Study Methodology and Limitations

In addition to a site inspection undertaken on 15 September 2005, this report has referred to a number of previously compiled documents relating to the studies previously undertaken on the "Parkes Hub". These include the *Parkes Transport Hub Local Environmental Study* prepared by Parkes Shire Council, the *Parkes Hub Archaeological Study* prepared by Jillian Comber and the *Aboriginal Archaeological Survey West of Parkes* prepared by John Robinson.

Given the comprehensive fieldwork relating to Indigenous Heritage undertaken as a part of the Parkes Hub studies, additional research on this element has been limited.

All relevant databases have been searched whilst compiling this report, including the Aboriginal Heritage Information Management System (AHIMS), the State Heritage Inventory and State Heritage Register, as well as the Parkes Local Environment Plan Heritage Schedule and the Parkes Shire Heritage Review.

Consultation has also taken place with representatives from relevant organisations, such as Parkes Shire Council, the Department of Environment and Conservation, the NSW Heritage Office and the Peak Hill Local Aboriginal Land Council. This process is summarised in Appendix 1.

1.5 Author Identification

This report has been prepared by Sophie Butler, Principal Heritage Consultant from *b cubed sustainability Pty Ltd.*

2 SITE DESCIPTION

The subject site is approximately 5 kilometres west of Parkes, and is generally bound to the south by Brolgan Road, to the east by the Parkes-Narromine Rail line, and to the west by rural agricultural lands (refer to Figure 3). The site comprises Lot 6 DP 857631, Lot 98 DP 750179, Lot 99 DP 750179, Lot 360 DP 750179 and Lot 1 DP 1082995. The proposal also incorporates part of Lot 200 DP 627302, which is not owned by the proponent (although an agreement for use of the land has been reached with the owner).

The subject site is characteristic of the rural landscape surrounding the township of Parkes and comprises broad undulating agricultural country, with remnant woodland vegetation lining the bounding road reserves and rail corridors.

This area has a long history of intense agricultural use. The majority of the site has been utilized for grazing and crop production since European Settlement in the 1830s-1840s[2]. Indeed, the greater part of the site has currently been sewn with wheat crops.

The key features on the site are the remains of a late Nineteenth Century farm complex, comprising the original farmhouse of pisé (rammed earth) construction, numerous timber outbuildings and another farmhouse, severely damaged by fire.

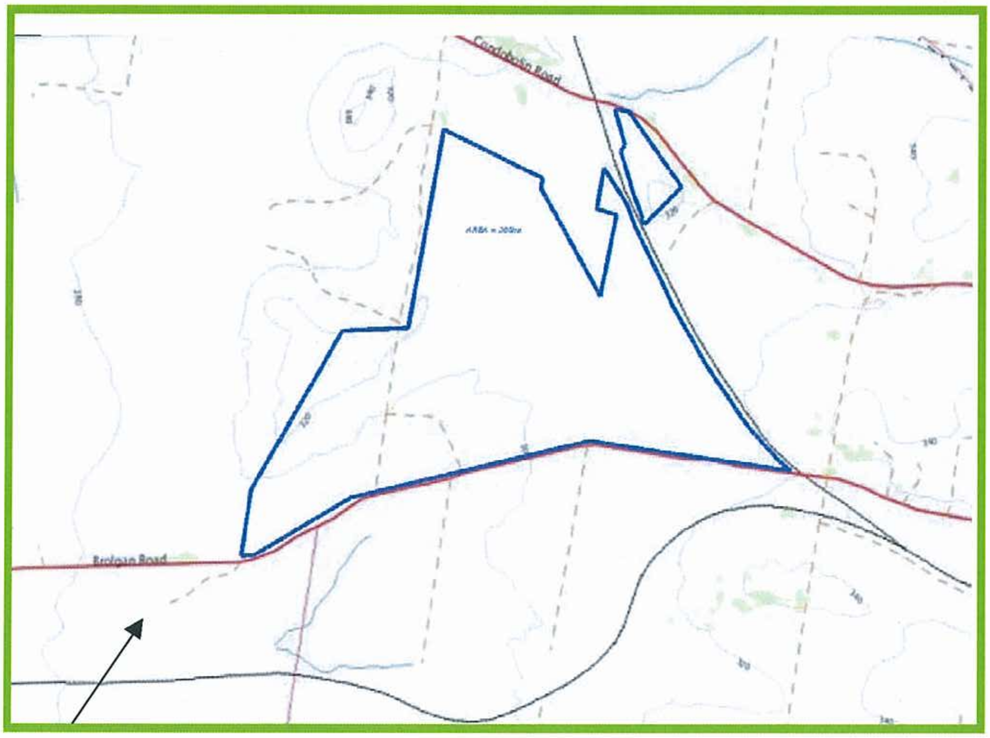

Figure 3 - Site Plan

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[2] *Parkes Hub Archaeological Survey* Jillian Comber (January 2004)

3 INDIGENOUS HERITAGE

3.1 Background

In NSW the principle laws which deal with Aboriginal heritage are:

- *National Parks and Wildlife Act 1974*
- *Heritage Act 1977*
- *Environmental Planning and Assessment Act 1979*

The National Parks and Wildlife Act provides the principle statutory protection for all Aboriginal objects and places in NSW.

3.2 The Subject Site

As discussed in Section 1.4, a number of surveys have been undertaken for the Parkes Hub area. These comprise the 2002 survey conducted by John Robinson, and the 2004 Survey conducted by Jillian Comber.

The area surveyed by these consultants is depicted in Figure 4.

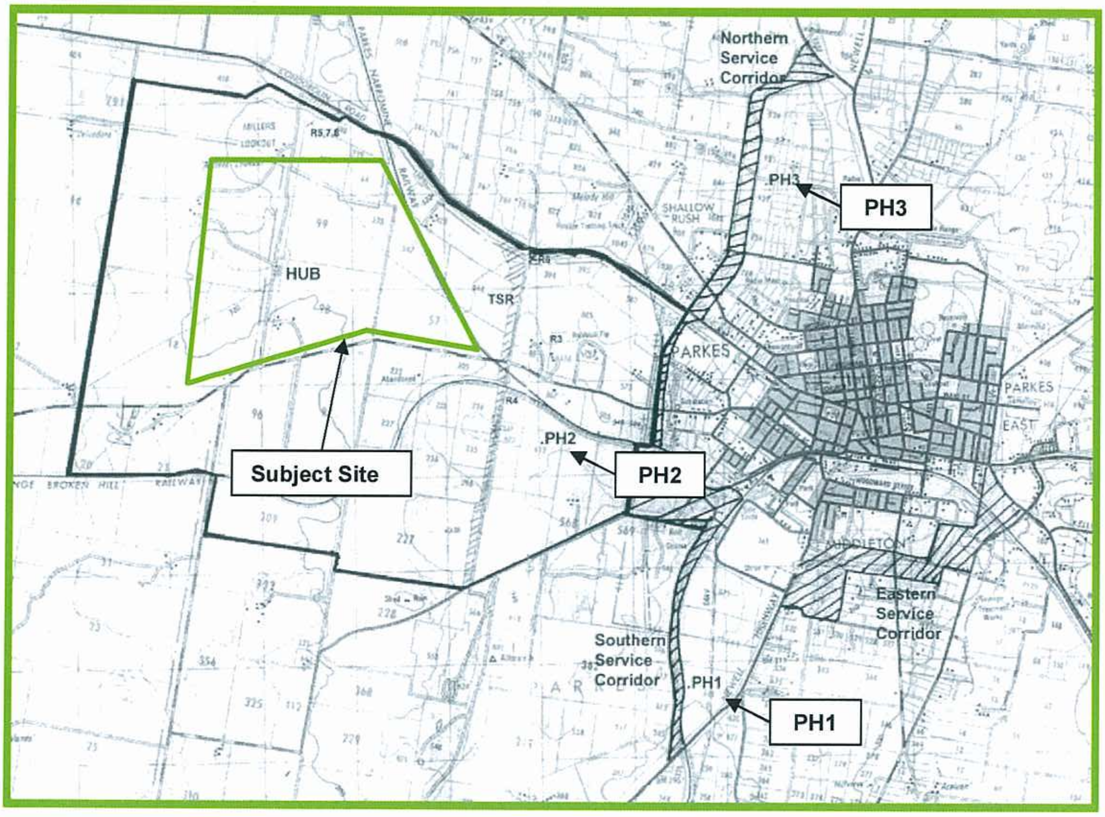


Figure 4 - Survey Areas

With regard to the context of the subject site, it is noted that there are no permanent water courses located within the area, and that it is a modified landscape, through intense agricultural activities over the past 150 years (refer to Figure 5). Both these factors reduce the likelihood of occurrences of Indigenous archaeological sites.

Figure 5 - Section of Subject Site viewed from Brolgan Road, looking north-east.

Having consideration for the above, it appears that the primary type of Indigenous archaeological evidence in the area is scar trees. In order to ensure the accuracy of survey results, with regard to scar trees, a number of criteria have been developed in previous studies, which can be applied to ascertain the authenticity of a scar tree, as an entho-historic artefact[3]:

1. That if a scar extends to ground level, the sides of the original scar must be relatively parallel (if not, may indicate scars resulting from fire, fungal attack or lightning strike);
2. That the scar is either approximately parallel sided or concave, and symmetrical;
3. That the scar should be reasonably regular in outline and regrowth;
4. That the ends of the scar should be "shaped", either squared off, or pointed;
5. That the scar contains adze or axe marks;

[3] Quoted in *Parkes Hub Archaeological Survey* Jillian Comber (January 2004) p11

6. That the tree must date to the time of Aboriginal bark exploitation within the region;
7. That the tree must be endemic to the region.

During field work undertaken by John Robinson in 2002, eight scar trees were recorded within the local area. However, in applying the above criteria, it was determined that only two of these trees qualified. A further one tree was identified during the 2004 survey undertaken by Jillian Comber.

The location of these three items is depicted in Figure 4, and as indicated on that plan, they are not within the site considered in this report.

A review of the AHIMS Database administered by the National Parks and Wildlife Division of the Department of Environment and Conservation also indicated that there are no Aboriginal objects or Aboriginal Places recorded in or near the subject site. The results from this search are included as Appendix 2.

It is also noted that consultation has been undertaken with the Peak Hill Local Aboriginal Lands Council, with regard to the previous work undertaken on the site, and confirmation of the findings of this report. The representatives from the Lands Council did not raise any concerns with regard to the subject site.

It can therefore be concluded that on the basis of previous studies and fieldwork undertaken as a part of this report, there are no Indigenous archaeological sites within the subject site. Consequently, no action is required with regard to the National Parks and Wildlife Act.

4 NON-INDIGENOUS HERITAGE

4.1 Background

The NSW Heritage Act 1977 is the primary legislative control for the protection of cultural heritage in NSW. Legal controls in the form of statutory lists provide formal recognition by local council or the State Government that a place has heritage significance help the community to look after those places for future generations. Items of significance to local areas can be listed on heritage schedules to a local council's Local Environment Plan (LEP). Items considered to be of significance to the state are listed on the State Heritage Register, which is administered by the NSW Heritage Office.

The registration of items on the SHR or the LEP creates certain legal requirements to ensure items of recognised heritage significance are conserved and managed appropriately. It is also noted that the NSW Heritage Act also provides protection to archaeological relics with heritage significance, which are not listed on any statutory registers.

4.2 The Subject Site

As discussed in Section 2 of this report, the subject site includes a number of non-Indigenous elements, worthy of consideration and impact assessment. It is noted, however, that the site does not include any places listed on any statutory or non-statutory heritage registers.

The primary feature of the site is the Nineteenth Century farm complex located on Lot 98 DP 750179. The complex and its location are depicted in Figure 6 and Figure 7.

Figure 6 - Farm Complex, viewed from Brolgan Road

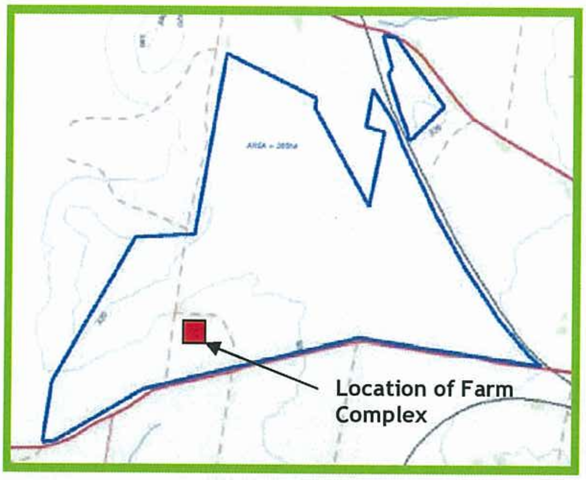


Figure 7 - Location of farm complex

Research into the history of the complex has drawn very little information. The earliest parish maps obtained indicate that the site was first occupied by the Massurit Family, by 1891 (refer to Figure 8). The Massurits were a large land holder in the area surrounding Parkes, and remain a prominent local family. It is likely that the Massurit family built the farm house and associated out buildings, which is known as "Innesvale", during the 1880s.

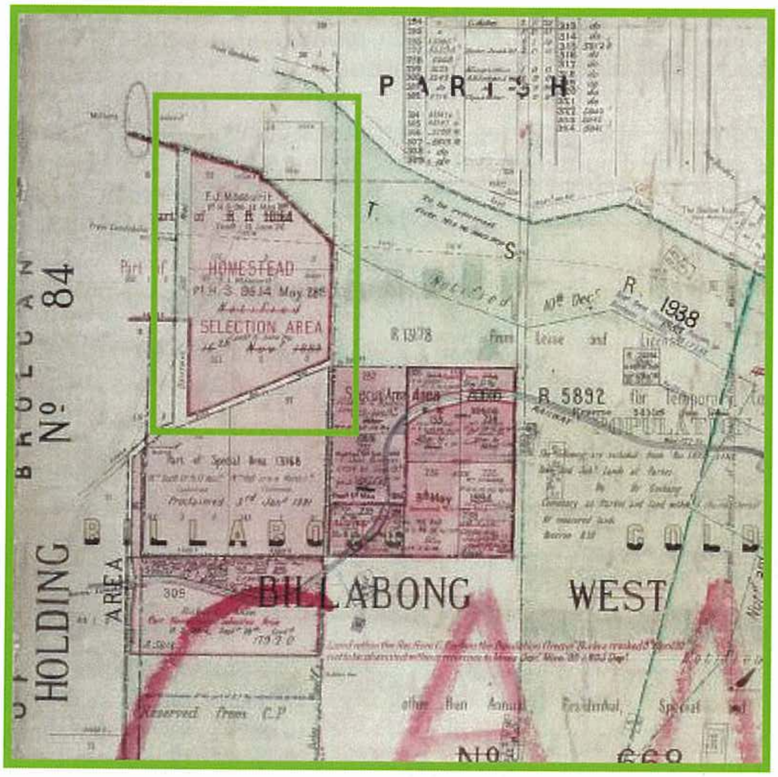


Figure 8 - 1891 Parkes Parish Map, depicting the subject site[4].

[4] Image ID 14835302, *Parish of Parkes, County of Ashburnham ed. 2* (1891), Department of Lands.

The complex includes a farm house of pisé construction (rammed earth), though this building is in extremely poor condition and is structurally unsound (refer to Figure 9 and Figure 10).

Figure 9 - Pisé farm house building

Figure 10 - Northern elevation

Originally designed with four main rooms and a central hallway, most of the exterior walls have partially or wholly collapsed.

The complex also includes numerous associated ancillary structures including sheds, tanks and other buildings (refer to Figure 11 and Figure 12). All of these structures are of a relatively standard vernacular type, utilising corrugated galvanised iron, and locally sourced materials such as Cypress Pine for structural components. They are all generally in a poor to very poor condition.

Figure 11 - Vehicle storage shed

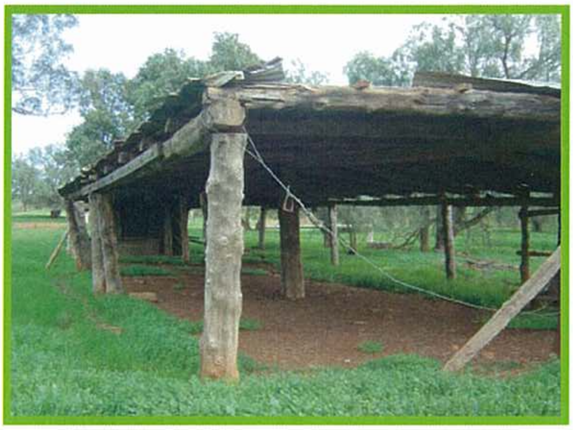


Figure 12 - Ancillary utilities building

The farm complex also has a number of remnant cultural plantings, including Pepper trees and Currajong trees.

By the mid-Twentieth Century the property was sold, and it appears that the pisé farm house was abandoned around that time. Another house was built approximately 200 metres to the east of the original farm complex (refer to Figure 13 and Figure 14) although this building is also in a highly dilapidated state, due to recently incurred fire damage.

Figure 13 - Second farm house

Figure 14 - Second farm house, southern elevation

4.3 Heritage Significance

To be considered as having heritage significance, these potential items must meet at least one of the following criteria for the assessment of heritage significance, as defined by the NSW Heritage Office:

a. *an item important in the course, or pattern, of Parkes' cultural or natural history*

b. *an item that has strong or special association with the life works of a person, or group of persons, of importance in Parkes' cultural or natural history*

c. *an item that is important in demonstrating aesthetic characteristics and/or high degree of creative or technical achievement in Parkes*

d. *an item has strong or special association with a particular community or cultural group in Parkes for social, cultural or spiritual reasons*

e. *an item that has potential to yield information that will contribute to an understanding of Parkes' cultural or natural history*

f. *an item possesses uncommon, rare or endangered aspects of Parkes' cultural or natural history*

g. *an item is important in demonstrating the principle characteristics of a class of Parkes' - cultural or natural places; or - cultural or natural environments.*

It is considered that the original farm complex may have significance under Criterion B (Historical Association), due to the site's association with the prominent Massurit Family, and under Criterion F (Rarity) due to the use of the pisé construction technique in the farm house building. However, due to the extremely poor condition of that building and the associated elements, the integrity of these elements has been greatly diminished, and therefore are not considered as having heritage significance at a local (or state) level.

As discussed, none of these potential items are included on any statutory or non-statutory heritage registers. They have also been excluded from the current review of the Parkes Heritage Study which is being finalised by Parkes Shire Council.

Therefore, on the basis of information obtained during the site visit and subsequent research, it is concluded that whilst the potential Non-Indigenous heritage items identified on the subject site reflect the former use of the part of the site, they do not meet the criteria required to be considered as having heritage significance. Furthermore, whilst the subject site is picturesque and is typical of the agricultural landscape in the Parkes Shire, it does not exhibit any particular or individual aspects to which heritage significance can be attributed.

4.4 Archaeological Assessment

It is noted that there is also the potential to uncover archaeological relics[5] in the area surrounding the subject site, during the proposed construction works; particularly during any excavation or disturbance of the existing ground level.

Whilst any relics uncovered on the site would assist in illustrating the type of occupation and activity which occurred there, it is considered that this information would not contribute any further to the understanding or significance of the site.

It is therefore concluded that the heritage significance of any potential archaeological relics is negligible.

As discussed in Section 4.1, there are certain statutory requirements associated with management of archaeological relics, particularly the requirement to lodge an application for a permit to excavate an area where there is potential to find archaeological relics. There are, however, also specific exceptions to this process, specified under Section 139(4) of the Heritage Act.

In the case of this project, it is considered that Exemption (a) is applicable. That is, an exception can be granted:

> *Where an archaeological assessment has been prepared in accordance with Guidelines published by Heritage Council of NSW which indicates that there is little likelihood of there being any relics in the land or that any relics in the land are unlikely to have State or local heritage significance*

Consultation with the Heritage Office has indicated that they will accept this report as the assessment documentation required with a notification under this exception.

---

[5] As defined by the NSW Heritage Act, *Relic* means any deposit, object or material evidence:

a) which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and

b) which is 50 or more years old.

5 PROPOSED WORKS

5.1 Background

The proposed Intermodal Freight Terminal involves the construction of an intermodal facility for the large-scale transport, warehousing, manufacturing and storage of freight. It is envisaged that this will become a nationally significant junction at which freight can be transferred between road and rail transport options.

The freight terminal will provide a strategic location on national freight routes, and will provide facilities such as cold storage, refuelling facilities and both short-term and long-term storage, which can be accessed by freight operators. For rail operators, the proposal could also provide a facility to reconfigure, cross-load, maintain and service trains. The site also has the potential to provide rolling stock storage as well as maintenance facilities.

The proposed project will enable access to either the east-west rail line or the proposed inland rail corridor.

5.2 Key Features

The proposal assessed in the preparation of this report is for a preliminary concept, and the following components are only indicative of what is proposed for the site. The preliminary concept plan is included as Appendix 3.

It is currently proposed to construct a number of rail sidings entering into the site off the Narromine/Cobar Branchline, as well as a "Y link" rail line, which will link the Narromine/Cobar Branchline with the Mainline to Broken Hill, on the western side of the subject site.

A container storage park is proposed for the southern side of the sidings, which will minimise the distances for handling containers. It is also planned that roadways would be constructed under the gantry crane for direct transhipment to/from road vehicles.

The warehousing and distribution area shown on the preliminary concept plan on the southern side of the site (fronting Brolgan Road), will include access roads and provision for other infrastructure for the servicing of the warehousing and distribution facilities. These facilities will provide 'back door' access to the sidings and container park.

It is envisaged that the heavy engineering/rollingstock maintenance facility, rollingstock storage sidings, and the fuel storage and distribution facility would all branch off the master siding.

It is envisaged that the terminal will be a 24 hour operation.

5.3 Summary

In summary, the proposed Intermodal Freight Terminal will comprise the following components:

Component	Elements
Indicative areas for major uses	• Rail Terminal (24 Ha) • (incl. Container Storage and operational depot but not rail lines) • Warehousing (28 Ha) • Engineering Facility (2.5 Ha) • Containerised Fuel Storage and Distribution Facility (3.5 Ha) • On-site refuelling facility (1 Ha)
Infrastructure	• Rail track (22,000 m) • Pavement for internal roads (120,000 m^2) • Pavement for upgrade to external roads (30,000 m^2) • 1 bridge over Parkes-Narromine railway to grade separate the northern access to the site
Development	• Warehousing Pavement (100,000 m^2) • Warehousing (40,000 m^2) • Heavy duty pavement for container storage (240,000 m^2) • Pavement of the engineering facility (25,000 m^2) • Warehousing for engineering facility (16,000 m^2) • Heavy duty pavement for fuel storage and distribution facility (25,000 m^2)

6 CONCLUSIONS AND RECOMMENDATIONS

As discussed in Sections 3 and 4, the research and field work undertaken during the preparation of this report have determined that there are no Non-Indigenous sites located within the subject area and that, based on previous research, it is very unlikely that Indigenous sites exist within the area. There is a Non-Indigenous site of interest within the subject site, in the form of the farm complex known as "Innesvale", though due to its highly dilapidated state, it is not considered to have any heritage significance.

As outlined in Section 4.4, there is also potential for archaeological relics to be uncovered within the "Innesvale" site during construction works, though it is considered that as these would not contribute any further to the understanding of the occupation of the site, or the activities which took place there, they are not considered to be of heritage significance. Therefore, their removal would not have an impact on the site's heritage significance.

It is also noted that the scale of the works is very large, and that it will dramatically change the landscape of the subject site and the surrounding area. However, as discussed in Section 4, the landscape features of the subject site do not have heritage significance. It is also noted that there are no recognised heritage sites in the adjoining area, upon which this proposal will have any impact.

Therefore, it is concluded that there will be negligible Indigenous or Non-Indigenous heritage impact resulting from the proposed works.

Despite there being a finding of nil heritage impacts on the subject site, a number of general recommendations are suggested:

1. *A photographic record of the Farm Complex and its key components (farm house, ancillary buildings, landscape elements etc) should be taken before and during the proposed works. Copies of these recordings should be forwarded to Parkes Shire Council Library's local studies section.*

   This is not required to be of archival standard, but will be a useful reference in future years.

2. *That an exception notification be lodged with the NSW Heritage Office seeking exception under Section 139(4a) of the NSW Heritage Act, and that acceptance of that notification be received prior to the commencement of construction taking place.*

   As discussed in Section 4.4 of this report, consultation with the NSW Heritage Office has concluded that the lodgement of this report as the supporting documentation for an Exception Notification under exception 139(4a) is acceptable.

7 REFERENCE LIST

1. Comber, J. *Parkes hub Archaeological Survey* (February 2004)
2. GHD *Terminals Australia: Parkes Intermodal Terminal Background Report* (August 2005)
3. Parish Map - Parish of Parkes, County of Ashburnham (1891) 148353 ed. 2
4. Parish Map - Parish of Parkes, County of Ashburnham (1900) 148354 ed. 3
5. Parish Map - Parish of Parkes, County of Ashburnham (1816) 115201/01 ed. 4
6. Parkes Shire Council *Parkes Local Environment Plan 1990*
7. Parkes Shire Council *Parkes Transport Hub: Local Environmental Study* (July 2003)
8. Robinson, J. *Aboriginal Archaeological Survey: West of Parkes* (March 2002)

8 APPENDIX 1

Schedule of Consultation Process

Organisation	Representative	Contact Type	Date	Outcome
Department of Environment and Conservation	Sharlene Freeburn, Administrator	Telephone/Fax/Letter	08.09.2005	Request made for a search of AHIMS of the subject site, reply received 08.09.2005 (see Appendix 2)
NSW Aboriginal Lands Council	-	Telephone call	05.09.2005	Contact details for Peak Hill Local Aboriginal Lands Council.
NSW Heritage Office	Adel Hislop, Aboriginal Heritage Officer	Telephone call	05.09.2005	Contact details for Aboriginal Community contacts in Parkes area.
	(Attention Vince Sicari, Principal Heritage Officer)	Letter	21.10.2005	Comments received 11.11.05, and incorporated where appropriate.
	Siobhan Lavelle, Archaeologist	Telephone call	13.12.2005	Confirmed that lodgement of this report in lieu of an "Archaeological Assessment" would be acceptable, when providing notification to the Heritage Office under Exception 139(4a).
Parkes Shire Council	Gillian Comber, Heritage Adviser	Telephone call	06.09.2005	Discussion regarding site and Draft Parkes Heritage Study. (She later advised that there where no potential items identified within the study area as a part of the

Organisation	Representative	Contact Type	Date	Outcome
				heritage study.)
	Steven Campbell, Director Planning and Environment	Telephone call	12.09.2005	Discussion regarding project and appropriate contacts within Council to discuss issues.
	Andrew Johns, Senior Strategic Planner	Meeting at Council	15.09.2005	Discussion regarding site and Council's Local Environment Plan.
	Deanna Carney, Local Studies Librarian	Telephone call	29.09.05	Discussion regarding records held in the library collection. *She did not get back with any further information.*
Peak Hill Aboriginal Lands Council	-	Telephone call (left message)	05.09.2005 08.09.2005 12.09.2005 14.09.2005 15.09.2005 10.10.2005	*No contact to date - calls not returned*
	-	Fax	21.10.2005	-
	Val Keed	Telephone Call	24.10.05	Received fax, wanted plan to confirm location. B3 to fax to her. She would get back if there were any concerns.
	Val Keed	Fax	24.10.05	No response received at time of writing.

9 APPENDIX 2

AHIMS
Aboriginal Heritage Information Management System

Department of
Environment
& Conservation

List of Sites (List - Short)

Parkes

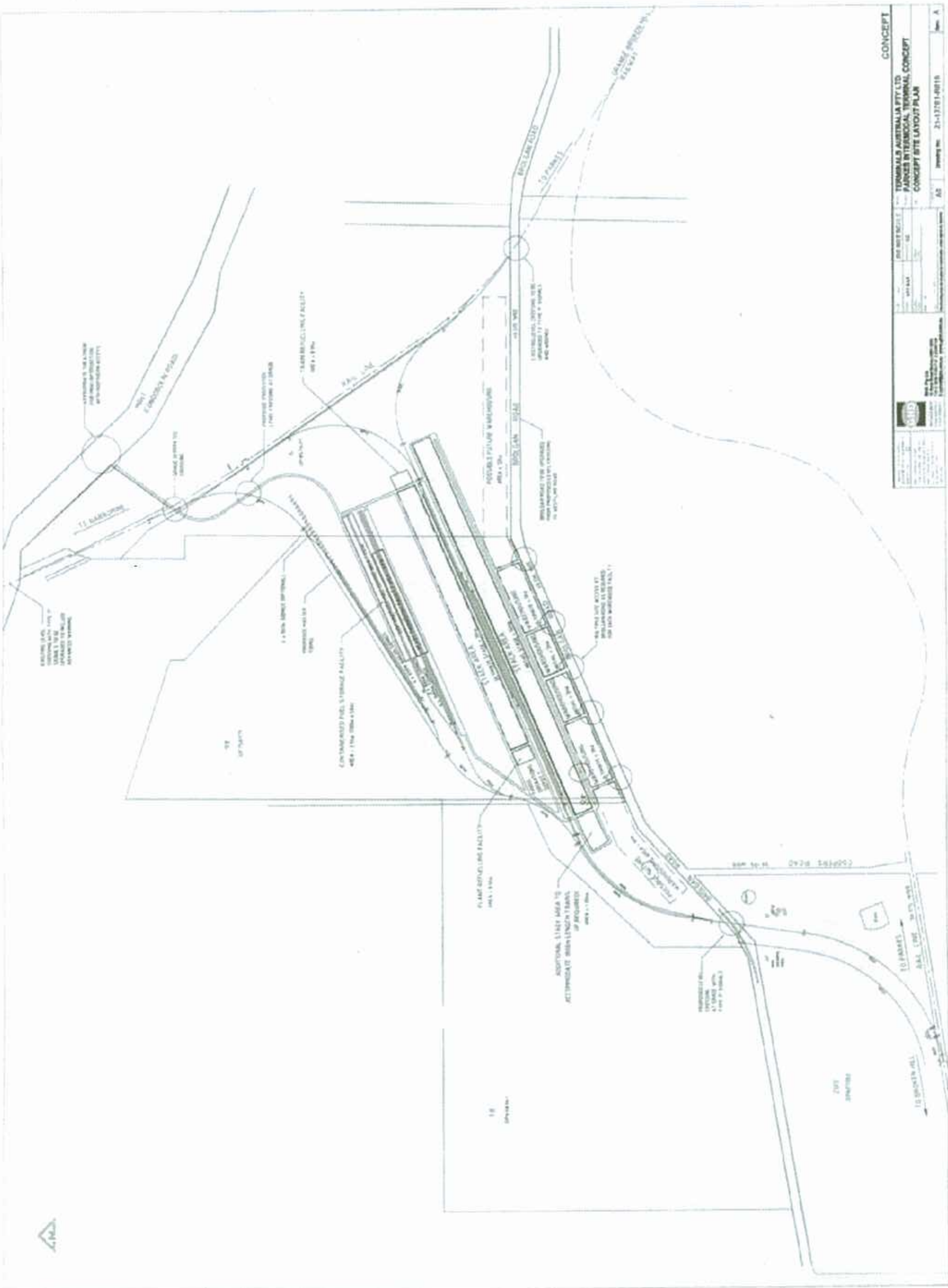
Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 55, Easting From = 600232, Easting to = 605079, Northing From = 6330832, Northing to = 6336808, Requestor like 6429%, Service ID = 13947, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)

No Site Recorded

Number of Sites : 0 Page 1 of 1 08/09/2005 14:55:13

10 APPENDIX 3



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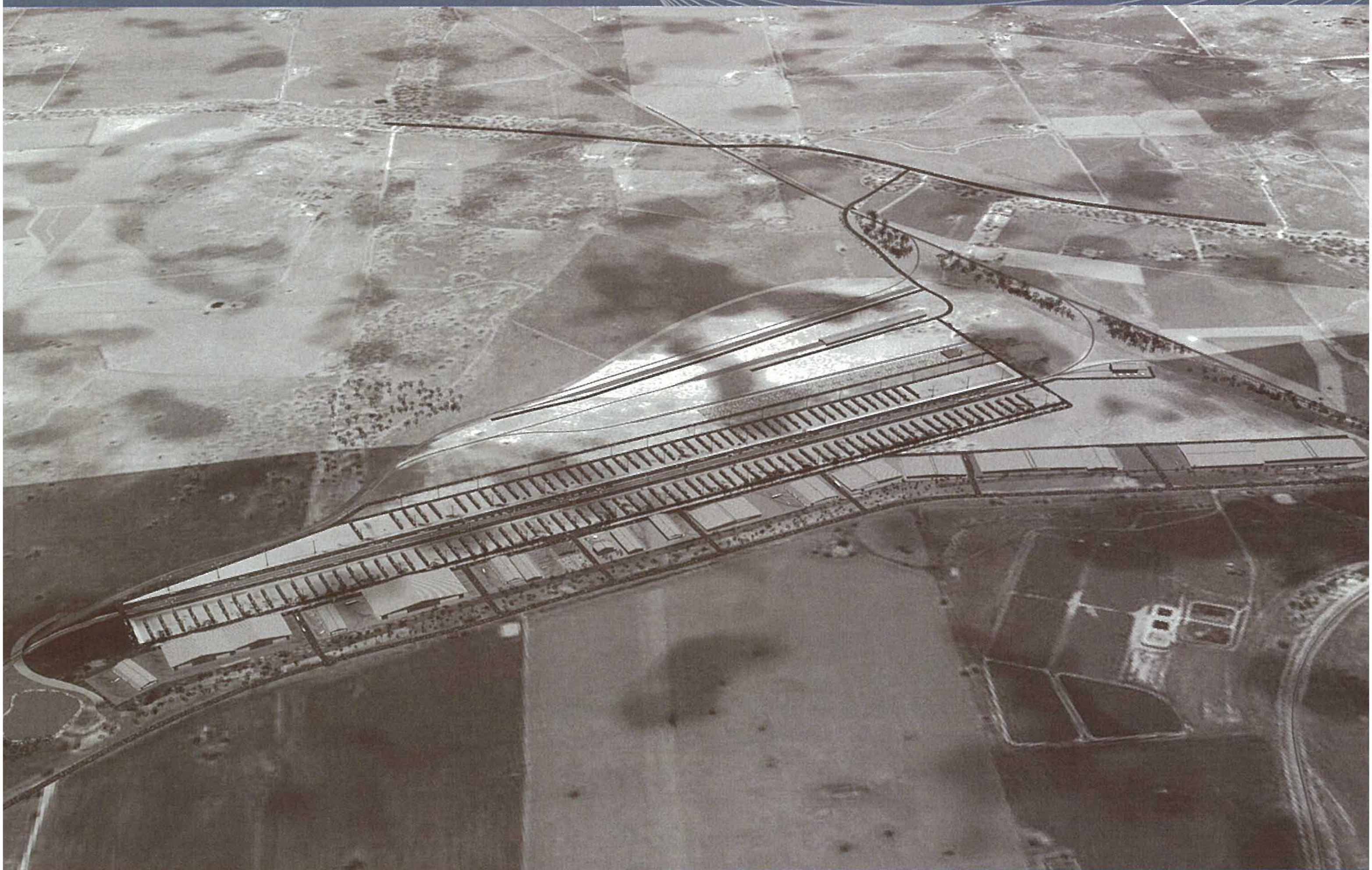
APPENDIX G

ECOLOGICAL AND BUSHFIRE ASSESSMENT



CLIENTS | PEOPLE | PERFORMANCE

Terminals Australia Pty Ltd

Parkes Intermodal Terminal DA & Masterplan

Ecological and Bushfire Assessment

January 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Appendices

1. Introduction

1.1 Purpose

GHD was commissioned to undertake a flora and fauna and bushfire risk assessment of a site proposed for location of an intermodal terminal at Parkes, Western NSW. Figure 1 illustrates the location of the site and Figure 2 the site boundary. Figure 3 shows the proposed layout. Key ecological issues that required consideration at the site included:

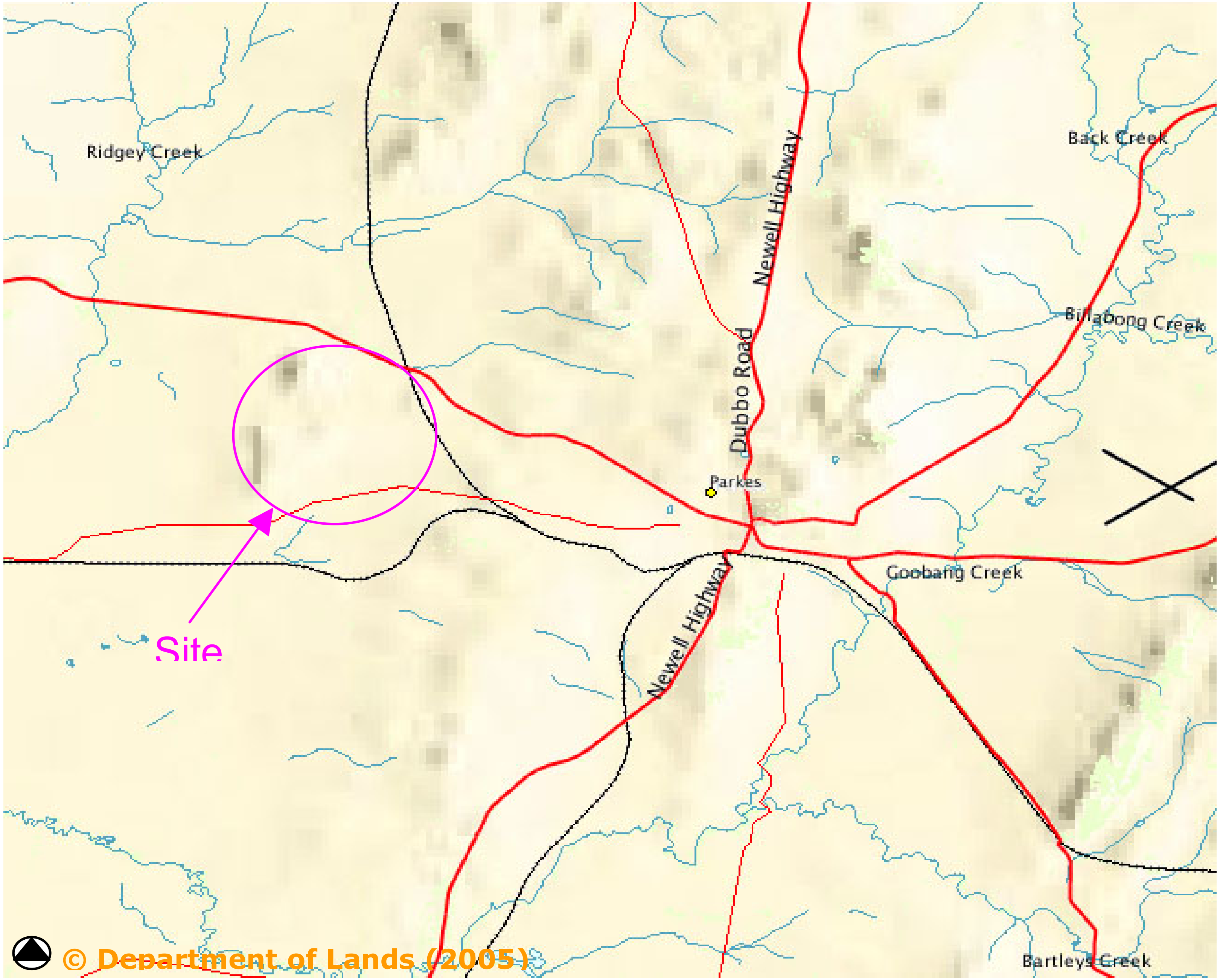
- The potential presence of any threatened species or their habitat listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act);
- The potential presence of any Matter of National Environmental Significance (NES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Potential corridor or vegetation management and conservation options; and
- Potential bushfire hazards.

1.2 Background

The site is located in Parkes, western NSW. It is bound to the north by Condoblin Road and grazing land, the east by the current existing railway, part of the south by Brolgan Road and grazing land lays to the east. Small parcels of land to the south west of Brolgan Road and north east of the current Parkes-Narromine railway were also incorporated as part of the site as shown in Figure 1. The majority of the site had been cleared in the past for cattle grazing and crops. The south eastern and central parts of the site had recently been sown for crops at the time of the site inspection and other areas were heavily grazed. Open woodland supporting a canopy of Yellow Box (*Eucalyptus melliodora*), White Box (*Eucalyptus albens*) and White Cypress Pine (*Callitris glaucophylla*) occurred in the north western corner of the site and also supported a heavily grazed understorey dominated by exotic species. The small parcel of land in the north east of the site supported White Box with a highly disturbed understorey and very little ground cover.

1.3 Soils and Topography

The site was predominantly flat, sloping up to a small ridge line in the north of the site. Soils were primarily sandy loam.



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Email: sydmail@ghd.com.au
Web Site: www.ghd.com.au

N

Figure 1: Site Location	VERSION: DRAFT
CLIENT: Terminals Australia	PROJECT NO: 21-13701
PROJECT: Parkes Intermodal Terminal	MAP NO: 21-13701-Z001
	DRAWN: CW — DATE: 22/12/05

Document (MXD): G:\Projects\21\13701\GIS\Map Documents\Z001.mxd

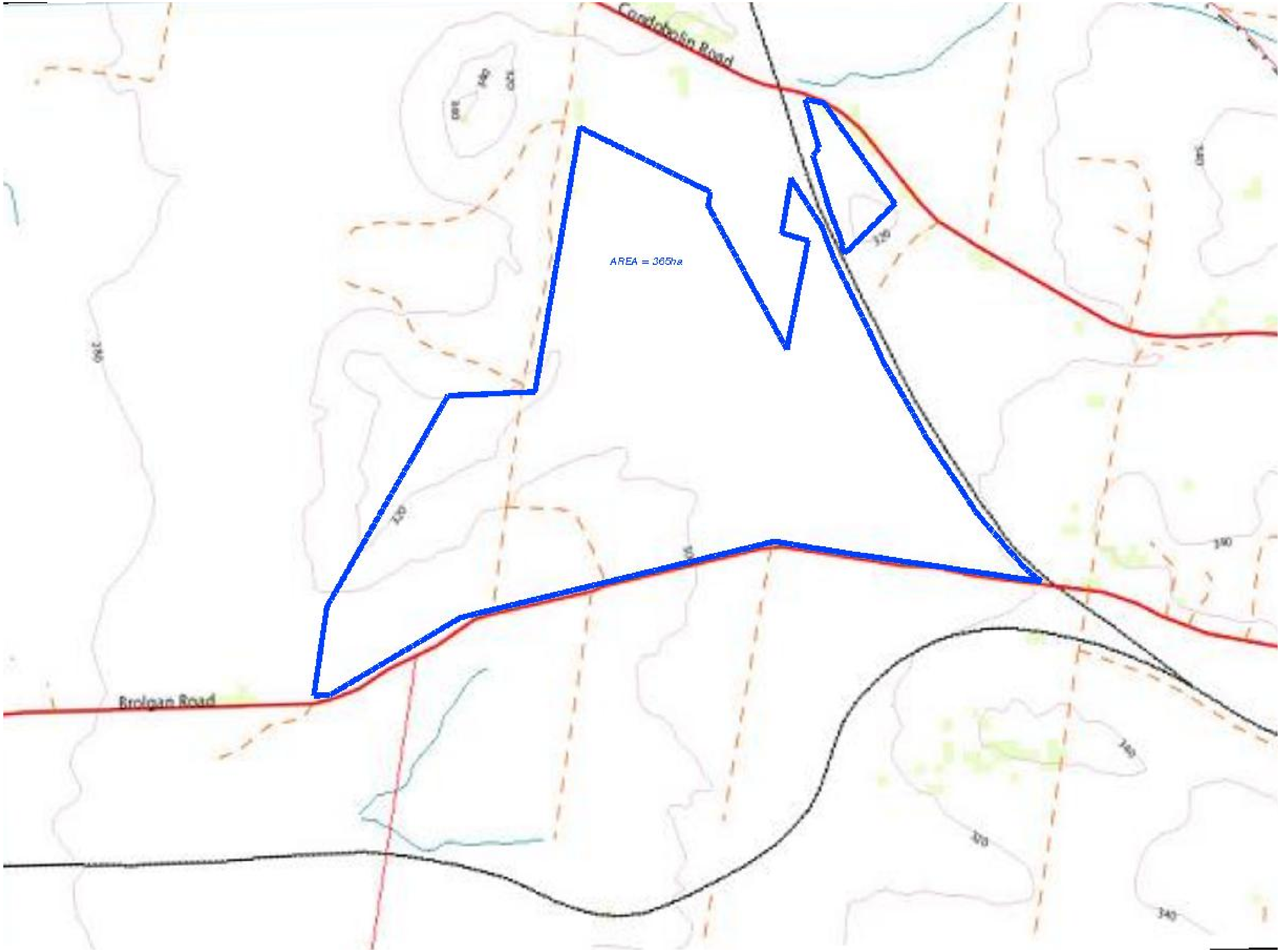

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Figure 2: Site Boundary		VERSION: DRAFT
CLIENT:	Terminals Australia	PROJECT NO: 21-13701
PROJECT:	Parkes Intermodal Terminal	MAP NO: 21-13701-Z002
		DRAWN: CW / DATE: 22/12/05

Document (MXD): G:\Projects\21\13701\GIS\Map Documents\Z002.mxd


EXISTING LEVEL CROSSING WITH TYPE 'F' SIGNALS TO BE UPGRADED TO INCLUDE ADVANCED WARNING
TO NARROMINE
NEW INTERSECTION TO RTA SPECIFICATIONS
MR61 (CONDOBOLIN ROAD)
GRADE SEPARATED CROSSING
PROPOSED NORTHERN ACCESS ROAD
98
DP750179
PROPOSED MASTER SIDING
PROPOSED PROTECTED LEVEL CROSSING AT GRADE
TRAIN REFUELLING & SANDING FACILITY AREA = 0.5ha.
6
DP857631
EXISTING RAIL LINE
PROPOSED SIDING
PROPOSED LANDSCAPING
SITE BOUNDARY
4 x 500-800m WAGON STORAGE SIDINGS WITH OPTIONAL MIN. 900m EXTENSIONS
HEAVY ENGINEERING FACILITY AREA = 2.5ha 4 x 600m SIDINGS
CONTAINERISED FUEL STORAGE FACILITY AREA = 3.5ha (700m x 50m) 2 x 800m SIDINGS
18
DP658361
INTERMODAL TERMINAL SIDINGS 4 x 1800m AT ULTIMATE STAGE
GANTRY RAILS
INTERMODAL TERMINAL CONTAINER STORAGE
INTERMODAL TERMINAL CONTAINER STORAGE
POTENTIAL ADDITIONAL WAREHOUSING AREA = 12ha
ULTIMATE WAREHOUSING
INITIAL WAREHOUSING
BROLGAN ROAD
40.235 WIDE
BROLGAN ROAD TO BE UPGRADED FROM PROPOSED LEVEL CROSSING TO WEST LIME ROAD FOR HEAVY VEHICLES
EXISTING LEVEL CROSSING TO BE UPGRADED TO TYPE 'F' SIGNALS WITH BOOMS AND WIDENED
TO PARKES
ORANGE BROKEN HILL RAILWAY
RESTRICTED ACCESS BY AUTHORISED VEHICLES ONLY
MULTIPLE SITE ACCESS AT BROLGAN ROAD AS REQUIRED FOR EACH WAREHOUSE FACILITY & TERMINAL ADMIN OFFICE/MAINTENANCE FACILITY
TERMINAL ADMINISTRATION OFFICE (INCL. PARKING) AREA = 0.5ha
TERMINAL PLANT REFUELLING & MAINTENANCE FACILITY AREA = 0.5ha
EXPAND EXISTING DAM FOR ON SITE DETENTION #1 (OSD#1)
PROPOSED LEVEL CROSSING AT GRADE WITH TYPE 'F' SIGNALS WITH BOOMS
DRAINAGE CULVERT UNDER BROLGAN ROAD
DAM
IRON SHEARING SHED
30.175 WIDE
COOPERS ROAD
OVERFLOW PIPE FROM OSD#1 TO OSD#2
200
DP627302
PROPOSED EASEMENT
EXPAND EXISTING DAM FOR ON SITE DETENTION #2 (OSD#2)
OVERFLOW PIPE FROM OSD#2 TO GOOBANG CREEK
TO BROKEN HILL
EXISTING RAIL LINE
30.175 WIDE
DRAINAGE CULVERT OR BORED PIPE UNDER RAIL LINE
OVERFLOW PIPE TO GOOBANG CREEK
NOTE:
STORMWATER DRAINAGE CONCEPT OMITTED FOR CLARITY.
REFER TO DRAWING No.21-13701-R020D REV A FOR DETAILS
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Design Check KT
Approved D ROBERTS
Date 18.01.06
This Drawing must not be used for Construction unless signed as Approved
Client TERMINALS AUSTRALIA PTY LTD
Project PARKES INTERMODAL TERMINAL
Title FIGURE 3 : PROPOSED CONCEPT LAYOUT PLAN AT ULTIMATE STAGE
Original Size A0
Drawing No: 21-13701-R020 (Fig.3)
Rev: A

2. Methodology

Given that the proposal was to be located on a site that was highly disturbed and support limited habitat for threatened flora and fauna, no detailed surveys were undertaken. A site inspection was conducted on July 8 2005 to assess the vegetation present at the site and the potential for the site to provide habitat for threatened flora and fauna species. Methodology used for the assessment is outlined below.

2.1 Literature Review

Available literature pertaining to the site and locality was reviewed prior to the site inspection to identify those species that may occur at the site or for which potential habitat was present. These findings were ground-verified during the site inspection. Literature reviewed included:

- Department of Environment and Conservation (DEC) Threatened Species Database Search for threatened species recorded within the locality (i.e. 10 km radius of the site);
- Department of Environment and Heritage (DEH) Protected Matters Search Tool for Matters of National Environmental Significance likely to occur in locality;
- Royal Botanic Gardens Threatened Flora Database Records; and
- Birds Australia Atlas of Threatened Species Records.

2.2 Site Inspection

A site inspection was undertaken to verify vegetation communities and fauna habitat at the site. No detailed flora and fauna surveys were undertaken. However, broad flora surveys were undertaken using the Random Meander technique.

A general fauna habitat assessment was conducted. Habitat assessments comprised an assessment of the nature and condition of habitats, specific resources and features of relevance for native fauna. In addition, indirect evidence of fauna (i.e. scats, feathers, fur, tracks, dens, nests, scratches, chew marks and owl wash) was recorded.

2.3 Limitations

Given that no detailed surveys were undertaken at the site and a half day site inspection was undertaken, limitations to this assessment exist. There is the potential for some species such as mobile species to occur at the site but to have not been recorded during the site inspection as they may periodically visit the site but were absent during the site inspection. Furthermore, the site inspection was undertaken outside the flowering season of many plants and therefore the potential for detection of cryptic species such as orchids was limited.

The drought conditions and heavy grazing at the site made flora species identification difficult as the ground cover in most areas not sown had been grazed down to ground level.

3. Results

3.1 Literature Review

Results of the literature review indicated that a number of threatened flora and fauna had been recorded within the locality or had the potential to occur within the locality. The results of the DEC, Royal Botanic Gardens and Birds Australia Database searches are shown in Figure 4 and Figure 5 and the results of the site inspection are detailed below.

3.2 Flora

Much of the site had been cleared and was currently used for crops or cattle grazing. The only vegetated areas at the site occurred in the north western corner and the small parcel of land in the north east. The north western corner supported vegetation largely characteristic of the endangered ecological community, White Box Yellow Box Blakely's Red Gum Woodland. It had an open woodland structure supporting a canopy of Yellow Box, White Box and White Cypress Pine. Although the understorey was disturbed and currently grazed by sheep, the canopy species are characteristic of this community. In areas not grazed by sheep along Brolgan Road native grass species such as Wallaby Grass (*Austrodanthonia bipartita*) occurred, suggesting that the site may have once supported intact White Box Yellow Box Blakely's Red Gum Woodland. This community was not present in any other areas of the site and would not be impacted by the proposal. The small parcel of land in the north east of the site supported White Box with a highly disturbed understorey and very little ground cover.

The majority of the soil across the remainder of the site had been sown with crops and therefore did not contain any native groundcover. However, native trees such as White Cypress were scattered across these areas. A row of Yellow Box also occurred along the western boundary and Yellow Box and White Box trees were scattered throughout the disturbed and sown areas.

3.2.1 Endangered Ecological Communities

The site supported a remnant of open woodland vegetation characteristic of the endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland. This community is listed under the NSW TSC Act. The community is also potentially characteristic of a disturbed remnant of the Commonwealth EPBC Act listed Grassy White Box Woodland. Although named differently under State and Commonwealth legislation, these communities have similar characteristics. White Box and Yellow Box were present at the site and are key diagnostic species for these communities. The understorey was largely absent and the ground cover appeared to support a mixture of native and exotic species. However, the drought conditions and heavy grazing made species identification difficult. This community would not be directly impacted by the proposal and indirect impacts would be mitigated. Therefore further consideration of this community was not deemed necessary.

3.2.2 Threatened Flora

A number of threatened flora species have been recorded within the locality (Figure 4 & Figure 5) and these are listed in Table 1 together with their conservation status and an assessment of the likelihood of them occurring at the site. Given that the site was highly disturbed and in most areas the soil had been sown with crops, it is unlikely that any of these species would occur.

Table 1 Threatened Flora Recorded within the Locality (DEC & RBG 2005)

Family	Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Likelihood of Occurring at Site
Fabaceae - faboideae	*Swainsona sericea*	Silky Swainson-pea	V		Potential habitat present in woodland.
Goodeniaceae	*Goodenia macbarronii*	MacBarron's Goodenia	V	V	Unlikely. No potential habitat.
Poaceae	*Austrostipa wakoolica*		E		Potential habitat present in woodland.
Rutaceae	*Philotheca ericifolia*		V	V	Unlikely. No potential habitat.

Note: E = Endangered, V = Vulnerable;

TSC Act = *Threatened Species Conservation Act 1995*; and

EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*.

3.3 Fauna

The site supports limited habitat for fauna as the majority had been cleared of vegetation and only scattered tree cover remained. However, the woodland area on the north western part of the site is likely to provide potential nesting and foraging habitat for a variety of bird species. No habitat for ground-dwelling or arboreal mammals was recorded at the site as the site did not support an understorey and the woodland area was sparse. However, the few hollow-bearing trees scattered across the site may provide habitat for some species of bats and birds. Two dams were present at the site and these have the potential to provide habitat for common frog species.

A small rocky area occurred south of the woodland along the western boundary of the site and may provide potential habitat for some reptiles such as skinks.

3.3.1 Threatened Fauna

A number of threatened fauna have been recorded within the locality (DEC 2005 & Birds Australia 2005, Figure 4 & Figure 5) and some have the potential to occur at the site. The woodland in the north western corner may provide foraging habitat for a number of threatened birds including the Grey Falcon (*Falco hypoleucos*) which has been recorded north of the site along Condobolin Road (Birds Australia 2005). Table 2 lists those species recorded within a 20 km radius of the site, their conservation status and outlines the likelihood that they could occur at the site. Given that the woodland at the site would not be removed as part of the proposal and some areas of pasture would also remain, it is considered unlikely that the removal of a small number of scattered trees have a significant impact on any of these species.

3.4 Corridors

The site does not form part of any recognisable fauna corridors throughout the locality. The site is isolated and disturbed, as is the majority of the vegetation around the site. Limited connectivity is evident in the north to vegetation along Condobolin Road. The woodland in the north western part of the site is likely to provide some connectivity in the form of stepping-stones for mobile species such as bats and birds throughout the locality. No corridors would be isolated or fragmented as a consequence of the proposal.

Table 2 Threatened Fauna Recorded within a 20 km radius of the Site (DEC 2005)

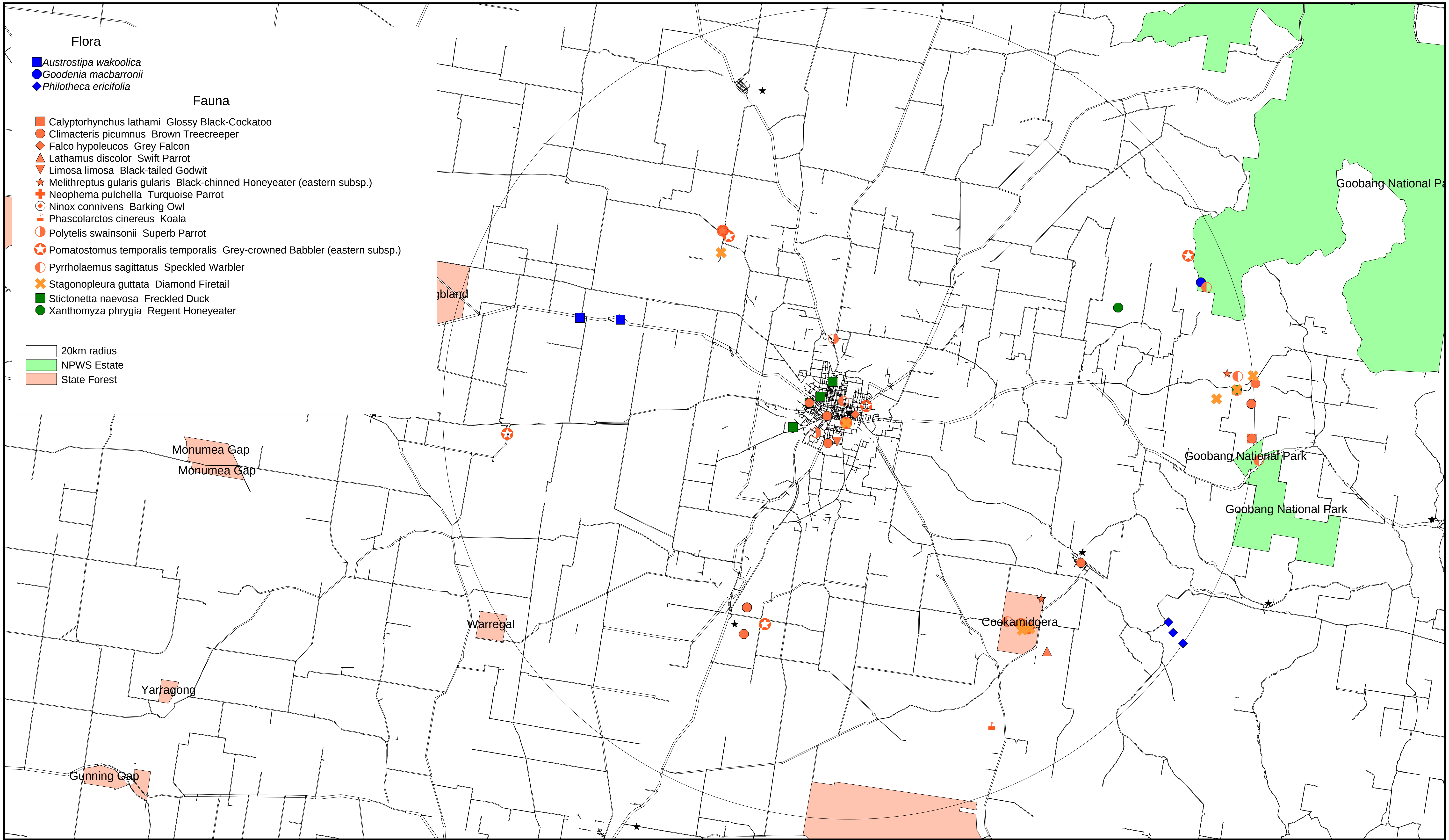
Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Likelihood of Occurring at Site
Birds				
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		Unlikely. No potential habitat.
Climacteris picumnus	Brown Treecreeper	V		Unlikely. No potential habitat.
Falco hypoleucos	Grey Falcon	V		Potential habitat present and has been recorded north of the site on Condobolin Road.
Hamirostra melanosternon	Black-breasted Buzzard			Potential foraging habitat present.
Lathamus discolor	Swift Parrot	E	E	Limited potential foraging habitat in the woodland supporting White Box.
Limosa limosa	Black-tailed Godwit	V		Unlikely. No potential habitat.
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subsp.)	V		Limited potential foraging habitat present.
Neophema pulchella	Turquoise Parrot	V		Potential foraging habitat present.
Ninox connivens	Barking Owl	V		Potential foraging habitat present.
Polytelis swainsonii	Superb Parrot	V	V	Potential foraging and limited nesting habitat present.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subsp.)	V		Potential habitat present in woodland.
Pyrrholaemus sagittatus	Speckled Warbler	V		Potential habitat present in woodland.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Likelihood of Occurring at Site
Stagonopleura guttata	Diamond Firetail	V		Potential habitat present.
Stictonetta naevosa	Freckled Duck	V		Unlikely. No potential habitat.
Xanthomyza phrygia	Regent Honeyeater	E	E	Potential foraging habitat present in form of Yellow Box.
Mammals				
Phascolarctos cinereus	Koala	V		Unlikely. No potential habitat.

Note: E = Endangered, V = Vulnerable;

TSC Act = *Threatened Species Conservation Act 1995*; and

EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*.



VERSION: 1/5/05

PROJECT NO:211370105

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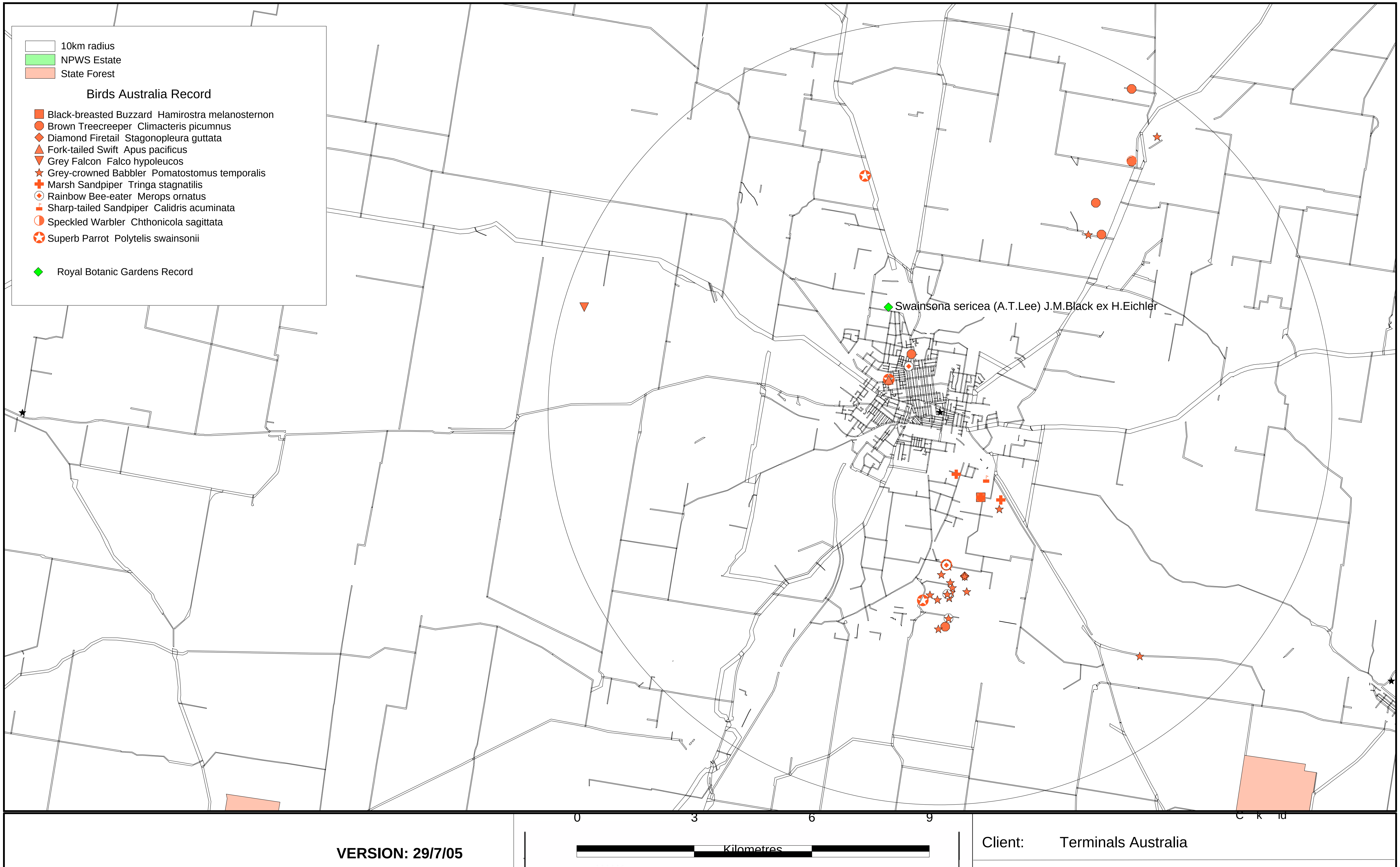
Project: **Parkes Intermodal Terminal Ecological Assessment**

Figure 4: DEC Threatened Species Recorded within the Locality (20km)



VERSION: 29/7/05

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Figure 5: Royal Botanic Gardens and Birds Australia Records (2005)

4. Impact Assessment

4.1 Assessment Under Part 3 of the EP&A Act

Pursuant to the NSW *Environment Planning and Assessment Act 1979* (EP&A Act) an assessment of the impacts of the proposed works on land that is critical habitat or is likely to significantly affect threatened species, populations or ecological communities, or their habitats, was undertaken. If the assessment concludes that a significant impact is likely on threatened species or endangered ecological communities then a Development Application must be accompanied by a Species Impact Statement (SIS).

In accordance with DEC *Draft Guidelines for Threatened Species Assessment* (July 2005), the assessment of potential impacts of the proposal on threatened species are set out in Annex A. Assessment of potential impacts for threatened species and endangered ecological communities has been undertaken for the following threatened species as these species have the potential to nest at the site due to the presence of a small number of mature and hollow-bearing trees and stags.

» Grey Falcon; and

» Superb Parrot.

There is also the potential for other mobile species to periodically use the site during foraging activities, but the impacts on these species are likely to be limited as removal of a small number of scattered trees and sown/pasture lands are proposed and therefore are not considered further.

4.2 Assessment Under the EPBC Act

The Superb Parrot is listed as vulnerable under the EPBC Act. However, in line with the findings of the assessment of potential impacts under Part 3A of the NSW EP&A Act, it is considered that the proposal would be unlikely to have a significant impact on this species. Therefore, a Referral to the Department of Environment and Heritage (DEH) is not required, as the proposal is unlikely to constitute a controlled action.

5. Ecological Recommendations

5.1 Ecological Recommendations

In order to prevent and mitigate potential indirect impacts of the proposal on the endangered ecological community and potential habitat for flora and fauna at the site the following management measures are recommended:

- Clear definition of development area boundary to prevent construction works breaching the site boundaries and potentially impacting adjacent vegetation;
- Installation of sediment detention basins, or similar, to prevent untreated runoff entering adjacent areas;
- Placement of stockpiles away from the woodland at the site; and
- Placement of soil that may contain seeds of exotic species away from the woodland where they could be spread during wind or rainfall events;
- Where possible avoid the removal of mature and hollow-bearing trees at the site;
- Removal of stock from the remaining woodland at the site to allow natural regeneration; and
- Initial and continual treatment of weeds within the woodland and potential rehabilitation.

6. Bushfire Risk Assessment

6.1 Bushfire Legislative Requirements

6.1.1 NSW Environmental Planning and Assessment Act 1979 and Rural Fire Services Act 1997

The proposal does not require referral to the NSW Rural Fire Service under section 79BA of the *Environmental Planning and Assessment Act 1979* (EP&A Act) nor section 100B of the *Rural Fires Act 1997* (RF Act) as neither residential nor rural residential development are proposed for the study area.

Under section 100B of the RF Act authorisation is required for the subdivision of bushfire prone land that could lawfully be used for residential or rural residential purposes or development of land for special fire protection purposes.

However in accordance with section 79C of the EP& A Act, the Department of Planning may choose to refer the application to the Rural Fire Service.

6.1.2 Planning For Bushfire Protection 2001

Whilst the proposed development is not required to comply with *Planning for Bushfire Protection* (PBP), it is recommended that the principles of this document be applied to the proposal where appropriate in order to reduce the threat at the site and on adjacent lands and property. Principles considered within the document include:

» setbacks and asset protection zones;

» siting and access;

» water supply; and

» vegetation management.

6.1.3 Special Protection Developments

There are several classes of development that are constrained by the presence of "high bushfire hazard," including developments such as aged care facilities, disabled people care facilities, schools and institutions for the mentally disabled. Specific fire-safety requirements are associated with such developments and these need to be considered by a consent authority when assessing development applications. State Environmental Planning Policies (eg. SEPP 5 Seniors Living, SEPP 9 Group Homes) have been introduced to allow councils to disallow such developments on land that has a "high bushfire hazard." Given that the site it proposed for industrial development these provisions would not apply.

6.2 Methodology

6.2.1 Site Inspection

During the site inspection the potential bushfire risks associated with the site were determined. The guidelines for bushfire risk assessment as set out in PBP were used to determine these potential bushfire risks.

6.2.2 Vegetation Communities

Vegetation typically provides the principle source of fuel for bushfires. As vegetation types vary in their ability to provide fuel, PBP provides a number of vegetation type descriptions, each of which is linked to particular hazard ratings. The vegetation of the site and surrounding areas was classed on the basis of an assessment of the vegetation structure based on PBP.

6.2.3 Slope

Slopes affect the speed and intensity of bushfires, with steep upslopes carrying a greater hazard than flatter slopes or downslopes. Land on the site was classified into slope classes (as per PBP) on the basis of angle over a distance of 140 m. The gradient considered to be the most likely to influence fire behaviour was used to calculate the bushfire risks.

6.3 Results

6.3.1 Vegetation Class

Vegetation groups are classified in accordance with the likely flammability of each vegetation type and are based on factors such as likely fuel loads, vegetation composition and presence of sclerophyllous species. Vegetation communities are assigned to three categories with Group 1 presenting the greatest fire hazard and Group 3 the least. Two vegetation classes were present at the site, Open Woodland (Group 3) and Grassland (Pasture) (Group 3).

6.3.2 Slope

The slope of the site was generally flat and was less than 5°. Given the vegetation classes at the site the slope is not considered a major factor influencing fire behaviour.

6.4 Bushfire Recommendations

Recommended fire management measures have been outlined below and include the provision of adequate Asset Protection Zones (APZs), site access and water sources.

6.4.1 Asset Protection Zones

Asset Protection Zones act as a buffer between the development and the hazard and are the principal protection mechanism. APZs reduce the vulnerability to fires through construction and maintenance of a protection areas (PlanningNSW 2001).

Vegetation types (eg. woodland or forest) present different levels of fire hazard. The level of fire hazard also varies with slope and aspect. Slope and aspect are unlikely to significantly affect fire behaviour at the site due to the vegetation type.

Based on the vegetation class present at the site an APZ of 20 m is recommended. Road and fire trails may form part of the APZ and therefore reduce the need for further vegetation clearance. Any vegetation within the APZ, which in this case is likely to be grasses, should be managed through regular mowing.

If a fire trail is incorporated into the APZ it will provide:

- easier access for firefighters allowing more efficient use of fire fighting resources;
- a safe retreat for fire fighters; and
- a clear control line from which to conduct back-burning operations if necessary.

The fire trail will need to have the following attributes.

- located within a minimum 6 m wide reserve (4 m wide trail and 1 m wide cleared area each side of the trail);
- constructed in accordance with design criteria outlined in Section 5.2.2 of PBP;
- be trafficable by firefighting vehicles under all weather conditions;
- appropriate drainage and erosion controls;
- not traverse any wetlands or other land potentially subject to periodic inundation;
- should link to Brolgan Road;
- be maintained in a serviceable and accessible condition at all times; and
- have passing bays at regular intervals of 200 m.

6.5 Site Access

Access to the site should be established and maintained and include a perimeter fire trail. This is a managed fire trail surrounding the buildings and incorporated within the 20 m APZ measured from the edge of the building. If Brolgan Road is within 20 m of the building and meets the bushfire standards, then construction of a perimeter access trail on this side of the building is not required.

The access trails should have the following attributes:

- a minimum trafficable width of 4 m with an additional 1m wide strip on each side of the road kept clear of bushes and long grass;
- the road should have a passing bay about every 200 m where possible, which should be 20 m long by 3 m wide, making a minimum trafficable width of 7 m at the passing bay;
- the capacity of the road should be sufficient to carry fully loaded firefighting vehicles (approximately 28 tonnes or 9 tonnes per axle);
- a minimum vertical clearance of 6 m to any overhanging obstructions, including tree branches;
- curves should have a minimum inner radius of 6 m and be minimal in number to allow for rapid access and escape;
- the minimum distance between inner and outer curves should be 6 m;
- roads should provide sufficient width to allow firefighting vehicle crews to work with firefighting equipment around the vehicle.

If possible two access roads to the site are recommended along paths that are unlikely to be cut by simultaneously by fire and therefore ensure there is at least one safe evacuation point.

6.6 Water Supply

Appropriate watering points should be provided along the perimeter trail from a series of fire hydrants. These hydrants should meet the requirements of Australian Standard 2419–*Fire Hydrant Installation* and be delivered by a ring main system.

7. References

Birds Australia 2005 **Atlas of Threatened Species Records**.

DEC 2005 **Draft Guidelines for Threatened Species Assessment**. Department of Environment and Conservation and Department of Primary Industries.

DEC 2005 **Threatened Species Database Search**. Department of Environment and Conservation, Hurstville.

DEH 2005 **Protected Matters Search Tool for Matters of National Environmental Significance.** Department of Environment and Heritage Online search http://www.deh.gov.au/erin/ert/epbc/index.html

Pizzey G & Knight F 2003 **The Field Guide to the Birds of Australia.** 7th Ed. Harper Collins Publishers, Australia.

PlanningNSW 2001 **Planning for Bushfire Protection.** Planning and Environmental Services, NSW Rural Fire Service and PlanningNSW.

Sydney Royal Botanic Gardens 2005 **Threatened Flora Database Records**.

Appendix A

Assessment of Significance Under Part 3 of the EP&A Act

Potential impacts of the proposal on the lifecycle of threatened species or populations

The Superb Parrot is a partially migratory species, endemic to the Murray-Darling Basin. It occurs mainly in the River Red Gum (*Eucalyptus camaldulensis*) and Black Box (*Eucalyptus largiflorens*) woodlands of the Riverina and northern Victoria. It migrates to over-winter along the Namoi and Castlereagh rivers in north-western New South Wales. The birds return from wintering sites to the South-west Slopes, Murrumbidgee Valley and Barmah-Millewa Forests have been identified as the major breeding areas. This species has been sighted in the Parkes area in White Box woodland.

Given that the Superb Parrot prefers large hollows for nesting and breeding, there is only limited potential for it to be nesting or breeding on site. Only a small number, if any, hollow-bearing trees would be removed for the proposal and some will remain at the site. Therefore it is unlikely that the proposal would have a detrimental impact on the lifecycle of this species.

The Grey Falcon is a sedentary species, breeding from August to November in refurbished nests of other raptor or corvid species, usually high in leafy eucalypts on watercourses or waterholes. Habitats include lightly treed inland plains, gibber deserts, sandridges, pastoral lands and timbered watercourses (Pizzey and Knight 1999).

Although there is potential for this species to nest and forage at the site, the most suitable areas of nesting habitat would not be disturbed and only a small number of scattered trees would be removed. Furthermore given that this species forages widely, it is considered unlikely that the proposal would significantly impact on the lifecycle for this species.

Potential Impacts of the proposal on habitat for threatened species, populations or ecological communities

The Superb Parrot nests in the hollows of large eucalypts, in River Red Gums and Black Box forests, foraging in adjacent mallee-spinifex, *Callitris* sp., farmlands, weedy clearings, vineyards, crops and stubble (Pizzey and Knight 1999). This species has also been observed nesting in Yellow Box and White Box hollows.

There is limited potential for the Superb Parrot to nest on the site, due to the minimal occurrence of suitable hollows. The species may nest in adjacent remnants and forage at the site. However it is unlikely that the development will significantly alter foraging or nesting habitat in the area.

The Grey Falcon inhabits lightly treed inland plains, gibber deserts, sandridges, pastoral lands and timbered watercourses. Nesting sites are primarily in previously occupied nests of other raptors (Pizzey and Knight 1999).

The main areas of potential habitat for the Grey Falcon would be conserved at the site and foraging habitat would also remain. The removal of only a small number of scattered trees and pasture areas is proposed. Therefore it is considered unlikely that the development would significantly alter prey-species habitat values in the area.

Known distribution of threatened species and endangered ecological communities at the site

Given the presence of Yellow Box and White Box in the same area, there may be potential for the presence of a small area of highly degraded White Box Yellow Box Blakely's Red Gum (*Eucalyptus albens – Eucalyptus melliodora – Eucalyptus blakelyi*) Endangered Ecological Community. The site assessment revealed a highly degraded understorey with no shrub layer and dominated by exotic herbs. However, this area would not be directly impacted by the proposal and potential indirect impacts would be mitigated.

The Superb Parrot and Grey Falcon have not been recorded on site, and given their broad distribution in the area, their presence would not indicate that the site is at the edge of their range.

Potential impacts of the proposal on current disturbance regimes

The site is currently highly disturbed, with a recently cropped and/or grazed understorey in all areas. Given that the site is currently cropping and grazing land, the proposal will not alter current management regimes.

Potential impacts on habitat connectivity

Given that the development involves the removal of scattered trees and cropped/pasture land, there is no potential impact on habitat connectivity in this instance.

Potential impacts on critical habitat

There are no areas identified as critical habitat present at the site.

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
	T. Haslehurst	A. Hunt	A. Hunt			

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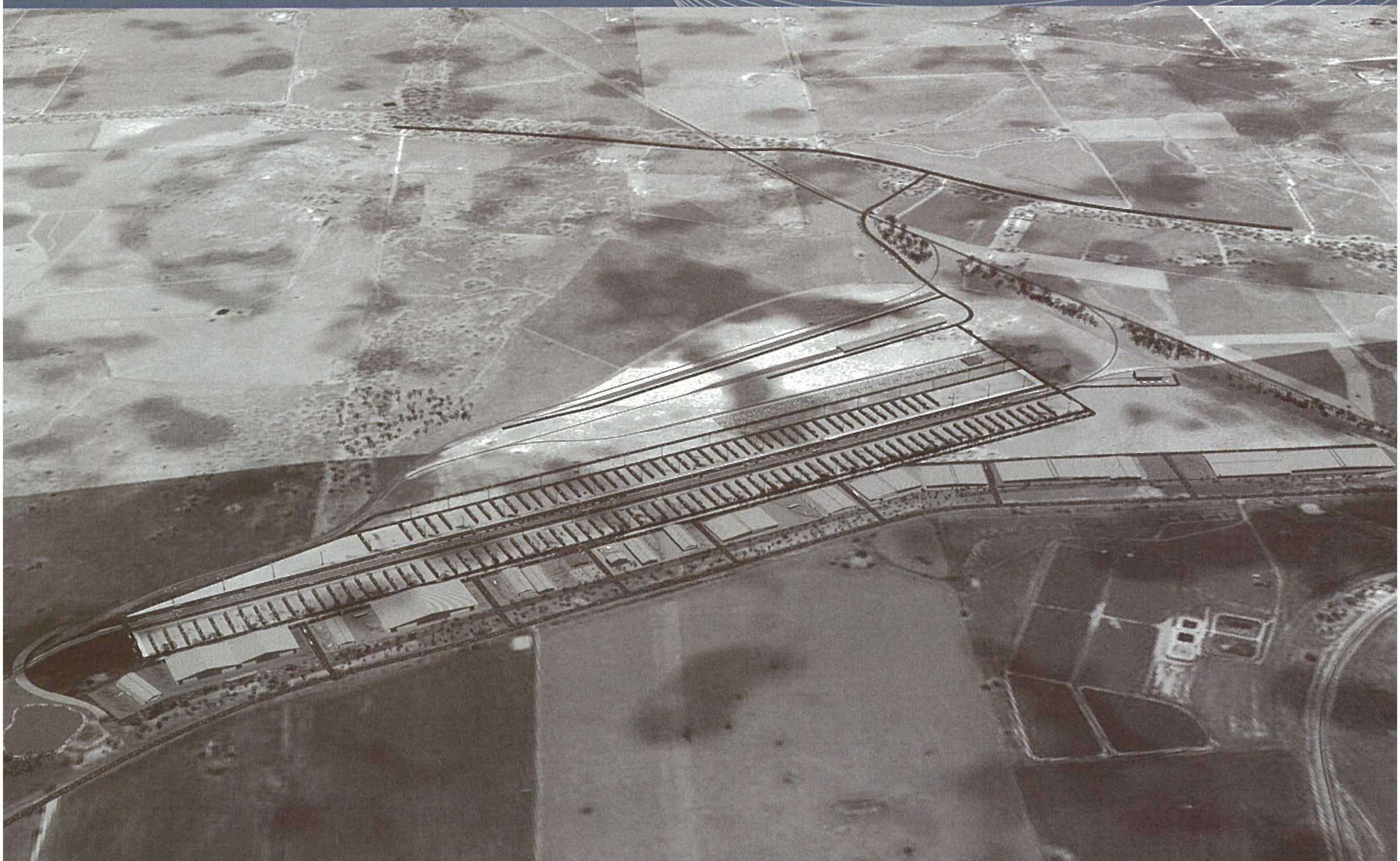
APPENDIX H

SUSTAINABILITY REPORT



Terminals Australia

Sustainability Report

January 2006

Contents

Table Index

Glossary

Alternative Waste Technology	Alternative Waste Technologies include mechanical separation systems that sort and separate waste from reusable and recyclable materials, biological processes, thermal technologies that incinerate or melt waste (also creates energy) and mechanical biological treatments
Ecological footprint:	The following definition comes from PBS (www.pbs.org/strangedays/glossary/E.html, 2005) "A calculation that estimates the area of Earth's productive land and water required to supply the resources that an individual or group demands, as well as to absorb the wastes that the individual or group produces".
Embodied energy	The following definition comes from the 'Your Home' Guide (Reardon, 2001). "Embodied energy is the energy consumed by all of the processes associated with the production of a building, from the acquisition of natural resources to product delivery. This includes the mining and manufacturing of materials and equipment, the transport of the materials and the administrative functions."
Embodied water	Embodied water like embodied energy is the water used by all processes associated with the production of the material or product, from acquisition of natural resources to product delivery, including the mining of materials, industrial processes and the transport of the material.
Life Cycle Assessment	the following definition comes from the 'Your Home' Guide (Reardon, 2001). "Life Cycle Assessment (LCA) is the method used to measure environmental impacts over the total life span of the materials. This includes extraction, manufacture, transportation, use or operation and eventual disposal or reuse. LCA can be applied to a whole product (house or unit) or to an individual element or process included in that product".
Stationary Energy:	The following definition comes from the National Greenhouse Gas Inventory 2003 Fact

	Sheet 1 (Commonwealth of Australia, 2005). "Stationary energy is energy generated from fuel combustion to provide energy in the following areas: Energy industries – electricity generation, petroleum refining, gas processing and solid fuel manufacturing. Manufacturing industries and construction – direct emissions from combustion of fuels to provide energy used in manufacturing such as steel, non-ferrous metals, pulp and paper and food processing. Other sectors – energy used by commercial institutions, residential sector as well as fuel use by agriculture, fisheries and forestry equipment and all remaining fuel combustion emissions of engine lubricating oil and military fuel use.
Thermal mass	The following definition comes from the Sustainable Development Guide for Nottinghamshire "Refers to the solid part of a building, such as block or brickwork, in which heat energy, from the sun or other sources, is absorbed, stored and then gradually given off".

Executive Summary

GHD was commissioned by Terminals Australia to prepare a report outlining the key environmental impacts and opportunities to incorporate environmental sustainability as part of the master plan. The proposal, which includes the development of a large scale transport, warehousing, manufacturing and storage of freight will have impacts on the environment.

This report provides an overview of the Building and Sustainability Index (BASIX) and the relevant targets established. BASIX applies to energy and water use in all new residential development. While addressing the relevant section of BASIX, this report goes further and also addresses the following sustainability opportunities and impacts:

» The energy use from the development including external lighting areas;

» Likely greenhouse impacts from the development including opportunities to offset greenhouse impacts;

» Surface water impacts which outlines the management issues of surface water runoff and the impacts of water use within the proposed development;

» Transport impacts

» Opportunities to improve sustainability through careful selection of materials;

» Waste generation impacts from the construction phase of the development and from the operation of the facilities; and

» Impacts on local biodiversity.

This report outlines key sustainability initiatives that if integrated into the development at the early planning stages can mitigate the impacts of the development. Examples of national and international 'best practice' have been incorporated to ensure the proposal achieves the highest sustainability outcomes and becomes a showcase for sustainability.

1. Background

Ecologically Sustainable Development (ESD) is a term used to describe developments that minimise their environmental and social impact, while maintaining economic viability. The definition of ESD developed by the Australian government states that ESD is 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends are maintained and the total quality of life, now and in the future, can be increased' (DEH, 1992).

The proposed development has the capacity to have considerable environmental impacts, in the local and the broader regional context. Incorporating sustainability into the design and operation of the facility can mitigate these impacts and reduce the ecological footprint of the development.

Environmental sustainability related to buildings and construction includes addressing issues such as energy use, water use, transport, waste generation, materials selection, indoor air quality, biodiversity and occupant satisfaction. This report will address some of these issues and suggest ways to incorporate sustainability into the development.

To maintain the environmental performance of the facility once operating, Terminals Australia should consider developing an Environmental Management System (EMS) in line with International Standard Organisation (ISO) 14001. The ISO 14001 is an environmental management standard and defines a set of requirements for environmental management systems. The purpose of an EMS is to assist organisations in protecting the environment, preventing pollution, and improving their overall environmental performance and efficiency. By implementing this standard, Terminals Australia can continue to monitor its environmental performance and to ensure the sustainability initiatives integrated into the development are carried through to the operation of the facility.

2. Project description

The purpose of the Intermodal Terminal would be to provide a strategic location between the freight service user and a destination such as a port, whereby freight operators could take advantage of the road/rail transport modes. In addition, the freight operators utilise terminal facilities such as cold storage, refuelling facilities and long/short-term storage. The Intermodal Terminal would have the primary function of:

» Container stack and storage facilities, including storage capacity for empty containers;

» Warehousing and distribution facilities; and

» Associated rail and road infrastructure to support the Terminal.

The potential users of the Intermodal Terminal would include:

» Importers who are dependent on a single port of call shipping service; and importers wanting to use a single port, rather than multiple ports. Importers could build supply chains around Parkes warehouse and terminal;

» Major refrigerated facilities could be developed for cold storage;

» The Terminal could provide consolidation point for East Coast wool handling, packing and distribution for export;

» Terminal for rail fright moving to the East Coast freight corridors and for double stacking and reconfiguration of trains for West Coast services; and

» Bulk freight, including fuel and minerals could benefit from the facility.

It is envisaged that the Parkes Intermodal Terminal will be developed in a progressive basis driven by market forces.

2.1 Location

The proposed site for the Intermodal facility is located approximately 5 kilometres west of the urban centre of Parkes. The site is located south of the State Route 90, north of Brolgan Road and west of the Parkes Narromine Railway. The primary access to the site will be via Brolgan Road.

Dominant features of the landscape include the Parkes-Narromine rail line, derelict dwellings, agricultural fields and associated dwelling/fences, Brolgan Road, the Sydney-Adelaide-Perth rail line and a predominant ridge on the western side of the site.

3. BASIX

The Building and Sustainability Index (BASIX) was developed by the Department of Planning and is a NSW Government initiative to ensure new homes use less potable water and produce fewer greenhouse gas emissions. BASIX has been designed to be flexible in the ways it assesses a development, by offering a range of options that will meet the energy and water reduction targets.

BASIX applies to residential developments and requires a BASIX certificate to be submitted with the development application as part of the development approvals process. The certificate is issued once a BASIX assessment has been satisfactorily completed, using the on-line tool. The applicant is responsible for completing the assessment. This ensures BASIX commitments are marked clearly on the plans prior to development application submission (www.basix.nsw.gov.au, 2005).

BASIX is a mandatory requirement that applies to all new residential developments including multi-unit dwellings. It does not apply to alteration and additions or to commercial or industrial developments. BASIX establishes targets for energy and water that need to be met prior to Council approval. The energy target is 25% reduction (on business as usual – i.e. an average development) except in the case of multi unit dwellings that are six storeys or more. In this case the energy target is 20% reduction. The water target ranges from 40% to 0% (on business as usual) depending on the location of the development. The water reduction target for Parkes is 30% (BASIX, 2005).

BASIX considers the location, size and design features of the proposal when determining the overall score. The score correlates to the percentage water or energy saved based on a 'typical' residential dwelling. For example, 28% of the energy used in a home is on water heating. If the proposal puts in place a solar hot water system, it can receive a score of 28 based on the energy saved compared to a typical house.

Although BASIX does not cover commercial or industrial type developments, the principles of BASIX can be applied to this development. These principles include issues relating to thermal comfort such as installing insulation, heating and cooling systems, ventilation, energy and water efficient appliances and alternative water and energy supplies. These will be covered in more detail in the energy and water sections.

3.1 Resources/websites

http://www.basix.nsw.gov.au/information/index.jsp BASIX

http://www.basix.nsw.gov.au/information/common/pdf/water_target/target_map.pdf Water targets

4. Minimising energy use

Energy can come from either renewable or non-renewable sources. Renewable energy sources include solar, wind and hydro power. These sources are naturally replenished and produce very little greenhouse gas emissions when operating. Non-renewable energy sources come from diminishing stocks of fossil fuels and are finite. They can produce large amounts of greenhouse gases.

4.1 Impacts of this development

Electricity use on this site is likely to be very significant. Electricity is required to power lighting in external areas, lighting in internal areas including the administration building, the terminal plant, the warehousing and distribution facilities and the container storage areas. The major electricity use will be the lighting of the external areas. It's important to note that this is a 24 hour operation and thus, the site will be lit daily for at least 10 hours. A study of the proposal estimates that 396,347 kWh of electricity will be used annually at an estimated cost of $27,750[1].

4.2 Implementation of 'best practice' to mitigate impacts

The impacts of energy use can be minimised through conservation and efficiency measures. These include harnessing renewable energy onsite, implementing energy efficiency measures in the selection of electrical appliances systems and the incorporation of energy efficiency measures in the design of the facilities.

4.2.1 Renewable energy

There are great opportunities for this development to be a showcase for sustainability by producing some of its energy requirements onsite. There are limited opportunities for wind turbines; therefore the most practical way of generating energy onsite will be through the use of photovoltaic panels. There are a number of photovoltaic manufacturers in Australia including British Petroleum (BP), Uni-Solar, Kyocera and Sharp.

Though the exact number of solar panels depends on installation, conditions and the efficiency of the panel, to generate 1% [2] of the site's energy needs, approximately 25 PV panels will need to be installed.

There are a number of rebate schemes to promote solar installations. The Commonwealth and NSW State government have rebate schemes that may offset the initial costs of utilising solar energy. These schemes include the Federal Renewable Remote Power Generation Program. The Federal government provides rebates of up to 50% of the capital costs to install solar panels to generate 'clean' energy that would otherwise come from diesel generators. The State government also provides additional funding, though this is restricted to systems that will generate more than 10 kW of energy.

1 Based on estimated energy costs per kWh. This does not factor in the cost of network charges or any additional market charges this site may incur. The actual price for this site will vary and it is important to investigate this further.

2 Data estimated using a 160 watt PV panel as a standard panel installed. The actually number of PV panels will vary depending on the brand and the efficiency. It is important to investigate these options further. The amount of energy converted also depends on environmental conditions and installation.

BP also operates an Enviro cash back scheme for those that install BP panels. This scheme provides the customer with a manufacturer cash back rebate and payments for the value of the emissions saved. This is known as the Renewable Energy Certificate (REC), in accordance with Federal government legislation.

These schemes have specific eligibility criteria, therefore it's important for Terminals Australia to consider this when developing its environmental plan.

Another opportunity is to install solar streetlights for some external lighting areas. The approximate cost of these systems will be approximately $5000 [3] per streetlight though this will be offset by savings made to reduce demand on utilities. This provides an important cost saving, particularly during peak daytime and summer time rate periods, which is when solar panels generate the most energy. Additionally, the costs of electricity are predicted to rise, reducing the payback period.

Carefully sizing the solar panel for the streetlight and matching it to the lamp size can reduce the net energy consumption of the lighting installation over a year to zero. As electricity tends to be more expensive during the day (when demand is highest), there may be additional financial benefits in this option.

4.2.2 Building design

The design of a building is very important in ensuring sustainability considerations such as energy are incorporated at an early stage. For the Parkes Intermodal Facility this includes the location of buildings and external lighting and the design of buildings to minimise energy requirements for lighting, heating, cooling and ventilation.

The proposal will need to incorporate the principles of passive design into the design of the administration, warehouse and maintenance buildings. Incorporating passive design will make buildings more comfortable for the employees and will save money from reduced lighting heating/ cooling and ventilation energy use. The principles of passive design need to address the orientation of a building (north facing windows will reduce lighting and heating energy requirements, though care needs to be taken to minimise overheating and glare), shading (by using plants and well designed eaves), insulation and allowing for cross ventilation (consider a convector stack that releases hot air, while drawing in cooler air).

Parkes experiences hot dry summers and very cold winters, therefore the design of the buildings will need to consider the local climate. Incorporating the appropriate thermal mass into the design and materials selected for the development will moderate the internal temperatures by averaging the day and night extremes in temperatures, increasing comfort and reducing energy costs. The thermal mass needs to absorb heat and re-radiate it and allow convection currents to pass over the mass and draw out heat. This can be achieved by having dense materials, such as concrete which has a high thermal mass. The materials used need to also have good conductivity (concrete or brick) and be dark, matt or textured (to absorb and re-radiate more energy). Things to consider are the locations of the thermal mass and the embodied energy of the materials.

3 Information gained by averaging the cost of solar streetlights from different suppliers. For more accurate estimates contact the chosen solar streetlight provider.

Other considerations include the materials used, such as windows and the window frame. To minimise energy use, double glazed windows should be used. The frames are also important. Aluminium frames reduce the insulation value of the window. For good results Fibre-Reinforced Polyester or uPVC frames should be used. Alternatively, Terminals Australia can use the Window Energy Rating Scheme to assist in selecting the appropriate windows and frames. This rating scheme is similar to the star rating scheme of electrical appliances.

Incorporating zoning of lighting and cooling requirements will impact on the energy use during the operation of a building. Different areas of a building have different heating, cooling, ventilation and lighting needs. Creating controlled zones ensures the appropriate amount of air, temperature and light is provided, reducing excess energy use on areas not requiring high lighting and air conditioning.

Designing and installing sensors can reduce energy use during the operation of the building. There are different sensor types including light lux level sensors (or photoelectric sensors) that adjust lighting in accordance with the amount of natural light entering the specific area, timers (to switch off lights at certain times), movement sensors (can be installed in meeting rooms or bathrooms) turn on lights when movement is detected, carbon dioxide sensors adjust ventilation rates to ensure enough fresh air is supplied and temperature sensors that adjust ventilation and heating and cooling systems as required.

Once operational, Terminals Australia can investigate participating in sustainability accreditation schemes such as NABRS (currently being developed by the Department of Utilities, Energy and Sustainability) or the Australian Greenhouse Rating Scheme (ABGR), which will establish industry standards in ‘best practice’.

4.2.3 Energy efficiency measures

As well as addressing the source of energy and the design of the facilities, Terminals Australia can reduce its energy use by considering the energy efficiency of lighting and office equipment.

External areas can be lit by energy efficient streetlights such as Light Emitting Diodes (LED). They use 30% less energy than normal streetlights and have a long life expectancy (100,000 – 200,000 hrs or 20 years). Other energy efficient lighting technologies include T5 lights. T5 lights are 45% more efficient than mercury vapour lamps.

It’s also important to consider lighting needs in internal areas. Internal lighting and the heating/ cooling and ventilation system (HVAC) are the two areas that use the most energy in office buildings. Energy efficiency measures that can be incorporated at the design stage to reduce energy needed for lighting include using energy efficient fluorescent tubes such as T5 or T8. Sulphur lights can also be used in commercial and industrial applications and are energy efficient. Better results can be achieved by combining energy efficient light fixtures and lights with reflectors.

Energy efficiency measures need to be incorporated into the HVAC system of the administration building. Some options for reducing energy use from air conditioning are to incorporate natural and passive ventilation in place of mechanical ventilation. If air conditioners are to be used they should have an energy rating of at least 4.5 stars.

Energy can be saved from heating requirements by investigating opportunities for cogeneration and geothermal applications. Cogeneration systems burn gas to produce electricity and use the waste heat locally, thus reducing energy needs for heating. Geothermal systems use the earth's ground temperature as a source of heating and cooling of a building. If heaters are to be used they need to have an energy rating of at least 4.5 Stars.

When purchasing equipment, Terminal Australia should consider the energy requirements during the life of the equipment and investigate more efficient options, if available. There are many opportunities to incorporate energy efficient equipment in the administration building. As well as the heating and cooling requirements that have been discussed, purchasing energy efficient office equipment such as printers, photocopiers and computers can further reduce energy requirements. For example, Liquid Crystalline Display (LCD) computer monitors use 77% less energy than Cathode Ray Tube computer monitors. Additionally, due to the reduction in the internal heat load of the monitor, this can have flow on impacts to cooling requirements (Department of Environment and Heritage, 2005). Ensure all office equipment is Energy Star enabled so that they switch to low energy mode when not in use. This simple action has the potential to save considerable energy.

A purchasing policy will need to be developed that includes selection criteria such as energy and water use, waste generation, recyclability of materials and recycled content of materials.

4.3 Resources/ websites

http://www.bp.com.au/solar/default.asp BP solar website

http://www.sunlightsolar.com.au/ solar streetlights

http://www.sunlightsolar.com.au/LED%20street%20lights.htm LED streetlights

http://www.designawards.com.au/ADA/03-04/Furniture%20and%20Lighting/134/134.htm T5 Streetlight

http://www.greenhouse.gov.au/lgmodules/wep/streetlighting/index.html Department of Heritage Streetlight toolkit

5. Minimising greenhouse impacts

Global warming is one of the most critical issues facing the world today. Australia's greenhouse gas emissions in 2003 were 550 million tonnes (Mt) making Australians the highest greenhouse gas producers per capita in the world. Australians produce 30% more greenhouse gas emissions per capita than Americans and more than double of those in other industrialised countries. Australia's total greenhouse emissions exceed those of major European countries including France and Italy (Clarke, 2005). Also, there has been a 34% rise in stationary energy use, which accounts for 49% of total CO_2 emissions. The transport sector accounts for 15% of total CO_2 emissions (AGO, 2004).

It is predicted that annual temperatures will rise by 0.4 to 2 degrees Celsius by 2030 and by 1 to 6 degrees Celsius by 2070 (AGO, 2004).

5.1 Impacts of this development

This development has the potential to produce significant levels of CO_2 emissions, the main greenhouse producing gas. CO_2 emissions will be produced during the construction and operation of the proposed development.

5.2 Implementation of 'best practice' to mitigate impacts

In addition to the energy efficiency measures (discussed in the minimising energy use section), this development can mitigate its greenhouse gas emissions by offsetting them. Greenhouse offsets from this site include purchasing accredited *GreenPower* from the electricity provider. The percentage of G*reenPower* purchased will need to be negotiated with the electricity retailer. The percentage purchased ensures investment in renewable energy sources to source that percentage to feed back into the grid.

Another way of offsetting greenhouse impacts is through tree planting. Trees absorb CO_2, hence reducing CO_2 levels in the atmosphere. This development can offset its greenhouse gas emissions, by planting locally indigenous trees on the site. This will improve biodiversity and reduce the greenhouse gas impacts of the development. A possibility is to investigate opportunities to make the operation of the development greenhouse neutral through tree planting, generating renewable energy onsite and purchasing *GreenPower*, thus setting the benchmark for 'best practice'.

5.3 Resources/ websites

http://www.greenhouse.gov.au Australian Greenhouse Office

6. Minimising surface water impacts

The continuing drought in NSW and the impacts of global warming is making water management a very important sustainability issue. Nationally, approximately 55% of water is used in industrial and urban applications. Globally, industrial developments consume 23% of total water consumed.

Parkes is located in an arid region and forms part of a catchment with two major river systems: the Bogan and Lachlan Rivers, which are major tributaries of the Murray Darling Basin system. The site is situated in an area with an annual average rainfall of 588 mm and an area that experiences climatic extremes with very hot summers and very cold winters. Therefore it's important to have water efficiency measures in place. Water saving initiatives include reducing water demand through efficiency measures, harvesting rainwater, onsite wastewater reuse, stormwater management and outdoor water use. Minimising water use saves money on water bills, reduces infrastructure operating costs, reduces energy bills and places less pressure on water utilities particularly during drought periods. This development can reduce its water needs by harvesting rainwater and implementing water efficiency measures.

6.1 Impacts of this development

Once constructed, the development will have over one million square meters of paved (impermeable) areas, which affect the hydrological cycle. This 'hardening' of the surface will result in reduced infiltration of rainfall to the soil and more rainfall becoming runoff. If not managed effectively, key impacts could include:

- Impacts to the water balance, in groundwater recharge. This has the potential 'knock-on' impact on local base flows effecting streams and groundwater;
- Stormwater pollution (by runoff and accidental spills entering the stormwater system). Also, the increased stormwater runoff volumes, could impact on downstream creeks in terms of flushing regimes (frequency, volume and rate), water quality, and wetting cycles;
- Construction phase impacts, such as erosion and sedimentation;
- Development and infrastructure on the site could lead to increased recharge due to removal of vegetation, over-irrigation, and structural leakages; and
- Site compaction, fill, landform reshaping and underground structures could impact groundwater flow.

There are potentially a number of causes leading to pollution of stormwater discharging from the site. They include:

- Increased runoff volume during regular rainfall events would more readily entrain and mobilise pollutants (particularly first flush) and increase pollutant loads to the receiving environment;
- The type of development and associated activities may introduce differing pollutant profiles; for example, vehicular traffic could increase hydrocarbon introduction. In general, typical pollutants include litter, sediment, suspended solids, nutrients, hydrocarbons and toxicants;
- Accidental spills on un-bunded areas of the site could discharge to the site stormwater system and the receiving environment. This could lead to groundwater contamination;

- The generation of wind borne sediment/material by any of the operational activities could be deposited to the stormwater system;
- Contamination from waste streams from the site entering the drainage system and groundwater;
- Contamination from storage facilities (for example machinery storage), and covered/uncovered works areas which may include fuel, oil, grease, coolant, solvents and/or cleaning agents; and
- During construction there is a significant risk of increased stormwater pollution. This is further discussed below.

Onsite stormwater runoff peak flow rates and volumes would increase due to the increased impermeable surfaces. During moderate rainfall events the resultant discharges can be highly erosive to stream beds/banks and the receiving environment, thereby causing downstream degradation. Increased peaks would raise onsite and offsite flood risk if not adequately managed. This could raise the flood risk (to life and property), compromise downstream infrastructure capacity and impact downstream environments leading to increased erosion and sedimentation. Flood risk at the site could also be impacted by local drainage channels that bisect or are located in close proximity to the site, and that convey runoff from larger upstream catchment areas either through or past the site.

During the construction phase, clearing and earthmoving activities have the potential to impact on surface water quality at or in the vicinity of the site, especially during high rainfall events. The activities and aspects of the works that have potential to lead to erosion, sediment transport, siltation and contamination of natural waters include:

- Earthworks undertaken immediately prior to rainfall periods;
- Work areas that have not been stabilised, and clearing of land in advance of construction works;
- Stripping of topsoil, particularly in advance of construction works;
- Bulk earthworks and construction of pavements;
- Washing of construction machinery;
- Works within drainage paths, including depressions; and
- Maintenance of plant and equipment.

6.2 Implementation of 'best practice' to mitigate impacts

6.2.1 Onsite water surface water management

A number of measures can be implemented to effectively manage and mitigate the above-mentioned impacts:

- *Water balance*
  - Provision of stormwater retention strategies and infiltration;
  - Rainwater harvesting;
  - Management and monitoring of onsite activities (irrigation) and infrastructure (leaks);
- *Stormwater pollution* (by runoff and accidental spills entering the stormwater system)
  - Treatment of stormwater targeting pollutants;

- Bunding;
- First flush systems;

» *Stormwater peak flows and flood risk (onsite and local)*

- Onsite detention strategies;
- Flood planning levels;
- Flood evacuation;

» *Construction phases Impacts*

- Soil and Water Management planning for construction activities;
- Implementation of erosion and sediment control strategies;
- Ongoing monitoring and maintenance of erosion and sediment control strategies;

These strategies would need to be incorporated into the detailed design of the proposal and measures to monitor their effectiveness would need to be included in the construction and operation environmental management plans.

Water Balance

The impacts on the water balance at the sites can be mitigated and managed by:

» Provision of stormwater retention strategies and infiltration-based management where site conditions permit. These can be provided in the form of dedicated infiltration areas, permeable pavers for roadways and paths, bio-retention swales and extended detention water bodies and wetlands. Infiltration strategies would need to maintain the movement of groundwater to such artificial wetlands; and

» Management and monitoring of onsite activities and infrastructure will also be essential in managing the water balance, to prevent over-recharge to the groundwater.

Stormwater quality and pollution

Stormwater quality and pollution can be effectively managed and mitigated by providing a number of strategies, which typically comprise both structural and procedural mitigation measures, and should aim at 'source control':

» Proposed structural measures (for example first flush basins and drains) are likely to have a direct, measurable effect on water quality while, procedural measures (for example improved housekeeping/maintenance) will play an important role in mitigation and will reduce the pollutant load on the structural mitigation measures. This will manage water quality and reduce the maintenance requirements for the structural measures. Key opportunities identified for the site include:

- Opportunities for diverting "clean" stormwater, preventing contact with contaminated runoff;
- Reduction in the sediment load by source controls from high risk contamination areas. This could be achieved through housekeeping, maintenance, treatment of surfaces and diversion and treatment of stormwater runoff using first flush basins and other treatment strategies;
- Separation of wastewater and stormwater streams across the site;
- Separation of roof water from primarily the office, warehouses and storage facilities and surface stormwater runoff, if appropriate;

- Provision of structural mitigation measures such as Gross Pollutant Traps and Oil and Water Separation Devices; and
- Maximising vegetated overland flow paths for stormwater runoff, by using swales, buffer strips and bio-retention swales.

» All contamination areas, for example fuel storage areas can be bunded to contain overflows or accidental discharges. A plan would need to be developed to manage disposal of contaminated runoff from within the bunds, potentially for reuse or as a licensed discharge;

» All hardstand areas can be directed to first flush basins. This captured runoff can be reused on site, or discharged to the stormwater system if of suitable quality; and

» Site maintenance will be the key to managing stormwater pollution. This may require frequent sweeping and regular house keeping practices. Regular maintenance of stormwater infrastructure, particularly water quality strategies will be essential.

Stormwater peak flows and flood risk

Onsite detention in the form of on-ground basins and storage areas, or in-ground tanks can be used to effectively mitigate the increase in peak flows. In addition, stormwater quantity management can be achieved by:

» A general site grading towards the discharge outlet point;

» Kerbs and gutters on internal roads collecting runoff and discharges, after treatment and reuse, via an internal stormwater pipe network and conveying these to a detention basin; and

» Adopting flood planning levels, which ensure that floor areas are located above any flood levels on account of on-site and local flood peaks; and

» Providing a flood evacuation plan/strategy for the site.

Construction phase impacts

Construction phase impacts can be managed by implementation of a ‘Construction Phase Soil and Water Management Plan’ detailing stormwater management strategies. These would include amongst others:

» General site practices and responsibilities

» Material management practices;

» Topsoil practices; and

» Erosion control practices (earth sediment basins, straw bales, sediment fences, turbidity barriers, stabilised site accesses, diversions and catch drains).

6.2.2 Water reuse

In general, water reuse onsite is dependant upon water quality and finding a suitable use with effective yet minimal water treatment measures. There is an optimum storage volume that will maximise the water supply while minimising the number of overflows from the storage facility. Rainwater harvesting for reuse can be sourced from roofed areas and from on-ground stormwater runoff. Roof water would require adequate first flush treatments and can be directed to a single or a number of holding tanks for re-use as process water, toilet flushing or irrigation of landscaped areas. On-ground stormwater can be directed to in-ground storage facilities and reused for landscape irrigation

Although the develop may not generate major quantities of grey water, implementation of a grey water reuse program should be investigated. Water reuse is when wastewater from the site is used again for another purpose within the site, rather than being discharged to the sewerage system (Sydney Water, 2005).

6.2.3 Water efficiency

Operational water use can be minimised through monitoring meters and sub-meters to identify water use and leaks. To reduce water loss through leaks, maintenance regimes need to be implemented to ensure water leaks are promptly reported and fixed. Where possible, water efficient appliances and equipment should be purchased. Although the operation of the development may not require a lot of water, it is important to ensure the development incorporates water efficiency measures. This includes incorporating initiatives such as having sensor operated taps and flow restrictors for taps.

Toilet flushing uses a lot of water. This can be minimised by installing 3 L/ 4.5 L dual flush toilets, sensor controlled urinals or installing waterless urinals. The water-free and odour-free urinals use an odour trap instead of a water flushing system. Waterless urinals save on the cost of installing and maintaining the urinals and also on the cost of water which would otherwise be needed for flushing (Specnet, 2005).

If shower facilities are included as part of the development, ensure the showerheads are AAA or AAAA rated. Water efficient showerheads can more than halve the water used during a shower and will also save money on energy bills.

Retaining and planting vegetation on the site, particularly deep rooted trees can lower the water table, bind the soil, filter nutrients and decrease runoff velocities, capture sediment and reduce the potential for dryland salinity in addition to managing stormwater runoff. Stormwater can further be managed by retaining stormwater onsite with impermeable paving, pebble paths, infiltration trenches, soak wells, swales and garden areas. Planting locally indigenous drought tolerant species not only improves the biodiversity of the site, but will also reduce water needed to water a water thirsty garden planted with exotic species.

Minimising water use through water efficiency measures in addition to rainwater harvesting and surface water runoff management will ensure this development minimises its water impacts on the environment, thus ensuring a sustainable development.

6.3 Resources/ website

http://www.tradelink.com.au/trade/content/?action=getfile&id=14 Waterless urinal

7. Minimising transport impacts

The transport sector is the second highest greenhouse gas producing sector in Australia, accounting for approximately 15% of total CO_2 emissions. Greenhouse gas emissions from the transport sector are expected to rise by 42% between 1990 and 2010. Approximately 88% of these emissions come from road travel including cars, trucks and buses (AGO, 2005).

7.1 Impacts of this development

It is estimated there will be 48 trains and 1,792 trucks will move through the proposed development per week (GHD Pty Ltd, 2005). As well as the impacts on air quality, the vehicle movements will generate CO_2 emissions. Although Terminals Australia cannot fully control the transport impacts of the development, there are opportunities to promote greenhouse issues. A business as usual assessment of the site can be conducted. This assessment needs to compare the greenhouse gas emissions of hauling freight using trucks only and compare it to the greenhouse gas emissions from using rail and trucks. It's estimated that rail freight uses one third of the fuel used by road transport per tonne of freight hauled. Rail is twice as energy efficient as road transport even when considering the fuel used for rail haulage, road pickup and delivery from the rail terminus, manufacture of transport equipment and the construction of roads and railway lines (GHD Pty Ltd, 2005). The CO_2 savings can be documented to promote the sustainability of the proposal in reducing transport impacts.

7.2 Implementation if 'best practice' to mitigate impacts

The proposal can promote government initiatives such as the Alternative Fuels Conversion Programme. This program is designed to assist operators and manufacturers of heavy commercial vehicles and buses (>3.5 t GVM) to convert to Natural Gas or Liquefied Petroleum Gas (LPG). The programme provides grants of up to 50% of the cost of converting existng vehicles from diesel to LPG or to purchase new LPG vehicles (AGO, 2005).

Terminals Australia can take a leadership role in offsetting a proportion of the greenhouse gas emissions from the vehicles that pass through the proposed development by investing in tree planting initiatives such as *GreenFleet*. *GreenFleet* currently operates in most Australian states and territories including NSW. This program plants a locally indigenous species mix in areas of environmental concern. To date *GreenFleet* have planted over 2 million trees nationally. *GreenFleet* charge 40 dollars to plant 17 trees. This is based on the number of trees required to offset the CO_2 emissions from the average car per year (4.3 tonnes). Should this option be pursued, Terminals Australia will need to negotiate and coordinate a suitable fee for offsetting greenhouse gas emissions from trucks.

As well as the vehicles that pass through the proposed development, this proposal is a trip generator (for anyone who comes to the site, including staff, clients, customers, visitors, couriers etc). It is assumed that most staff will be from Parkes, therefore there are great opportunities to minimise their transport impacts. Although these impacts may be insignificant compared to the transport impacts of the truck and train movements, opportunities exist to implement programs to reduce traffic to the site. This can be achieved by providing a shuttle bus service from Parkes to the site, particularly during the construction phase when it is estimated that 600 workers will be involved in the proposal.

The proposal is also within easy riding distance from the Parkes urban centre (5 km), thus it is possible that some employees may want to ride a bicycle to the site. To facilitate this, lockers, showers and bike racks are needed at the site. A 'tuck shop' and some food preparation facilities in the administration building will reduce the need to travel to the Parkes to purchase food, coffee and drinks, further reducing traffic from the site impacts.

7.3 Resources/ websites

http://www.greenfleet.com.au/ Greenfleet

http://www.greenhouse.gov.au/transport/afcp/pubs/type-guidelines.pdf Alternative Fuels Conversion Program

http://www.greenhouse.gov.au/transport/index.html AGO Sustainable Transport

8. Materials selection

8.1 Impacts of this development

The materials selected for the construction of the development can have health and environmental impacts that extend beyond their specific use on site. The impacts of materials include the embodied energy and water of the material and the potential to impact on toxicity in manufacture. The impacts of materials can occur at all stages of the lifecycle from extraction and processing, to use, maintenance and disposal. As well as considering the cost and suitability of materials in the proposal, Terminals Australia should also consider issues such as lifecycle analysis and the embodied energy of materials. Table 1 outlines the embodied energy of different building materials.

Table 2 Embodied Energy of Building Materials

Material	Per embodied energy MJ/KG
Plastics (general)	90
PVC	80
Acrylic paint	61.5
Plasterboard	4.4
Fibre cement	4.8
Cement	5.6
Insitu concrete	1.9
Precast tilt-up concrete	1.9
Clay bricks	2.5
Concrete blocks	1.5
AAC	3.6
Glass	12.7
Aluminium	170
Galvanised steel	38

Source: 'Your Home' Guide (Reardon, 2001)

8.2 Implementing 'best practice' to mitigate impacts

Undertaking a full lifecycle analysis of materials can be a complex process, however there are some simple ways to reduce the embodied energy of materials, including designing for long life of buildings. Designing buildings and facilities at the site to be flexible in use allows for adaptability. Materials that require low maintenance reduce the additional energy input during their life. One very simple way of reducing the embodied energy of materials is to use reused materials, or to use materials with recycled content. 'Reusing materials can save about 95% of the embodied energy that would otherwise be wasted' (Reardon, 2001). Terminals Australia can investigate opportunities to use recycled concrete in some areas. This should be done in accordance with the *Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage,* developed by ResourceNSW (now the Department of Environment and Conservation), the Construction and Demolition (C&D) branch of the Waste Management Association of Australia and the Institute of Public Works Engineering Australia.

Other considerations when selecting materials include sourcing materials from local suppliers (to reduce transport costs and greenhouse gas emissions), selecting materials with low toxic emissions and selecting materials that are highly reusable and recyclable under current technologies. This ensures materials can be easily recovered at the end of the facilities' life. The toxicity of materials to the environment is an important issue and can be addressed by specifying materials that are not listed on the National Pollutant Inventory.

Websites such as '*Ecospecifier'* provide details on over 1000 environmentally preferable products, materials and resources. This can be a very useful resource when considering and selecting materials during the design phase of the development.

The materials selected can also have an impact on Indoor Air Quality (IAQ). Occupants of buildings with poor IAQ can suffer from headaches, fatigue, coughing, sneezing, dizziness and eyes, nose, throat and skin irritation. Studies have shown that poor indoor air quality can have a negative impact on workplace productivity, therefore it is important to address indoor air quality impacts when selecting materials. Avoiding or minimising the following can achieve this:

» Materials that emit volatile organic compounds (VOCs). VOCs are chemical substances that at room temperature become volatile or air borne. Most paints, paint strippers, wood preservatives, aerosol sprays, glues, cleansers and disinfectants and stored fuels and automotive products give off VOCs.

» Formaldehyde is a common VOC, which is released from some manufactured wood products such as plywood, wall paneling, particleboard, fibreboard and furniture made with these products. Formaldehyde is also released from combustion sources, tobacco smoke, treated textiles, and some glues.

» Carbon monoxide and nitrogen oxide sources include automobile exhaust from attached garages, and tobacco smoke.

» Xylene and Toluene are solvents in paints, glues and carpets as well as polyurethane.

8.3 Resources/ websites

http://www.resource.nsw.gov.au/data/18-6%20Green%20Spec%202003.pdf Greenspec

www.npi.gov.au/ National Pollutant Inventory

http://www.ecospecifier.org/ Ecospecifier

http://www.deh.gov.au/atmosphere/airquality/indoorair/index.html DEH

9. Waste minimisation

Australians on average generate approximately one tonne of waste per person per year, 40% of which is construction and demolition (C&D) waste. In NSW over 4 million tonnes of waste are disposed at landfill per year, of which approximately 20% is C&D waste and 40% is commercial and industrial (C&I) waste.

To address waste management the NSW *Waste Avoidance and Resource Recovery Strategy* establishes targets for 2014 and key outcome areas. They are to avoid and prevent waste, increase the capture and use of recoverable and renewable materials, reduce toxicity in materials and to reduce littering and illegal dumping. Specific targets to increase resource recovery for the different waste sectors are to increase C&D waste recovery from 60% to 76% and to increase C&I waste recovery from 28 % to 63% (Resource NSW, 2003).

Recovering building waste will continue to be a major sustainability issue. The World Watch Institute predicts that by 2030 most of our building materials will come from recovered resources. This is one of the reasons to apply the waste hierarchy of: Avoidance, Resource Recovery and Disposal to all stages of the development.

9.1 Impacts of this development

There is great potential for this development to generate large volumes of waste, during both the construction and operational phases. The location of the proposed development is a greenfield site that will require significant amounts of excavation. As Table 2 shows, soil and rubble makes up a large proportion of the C&D waste stream, hence it is important to minimise the amount of soil and rubble leaving the site during the construction phase.

Table 3 NSW construction and demolition waste generation rates

Material	Disposed to Landfill (tonnes/year)	Proportion of total C&D waste
Soil/Rubble	360,000	36%
Other (eg. Metal, packaging)	220,000	22%
Concrete based	160,000	16%
Clay based	160,000	16%
Timber	100,000	10%
Total	1,000,000	100%

Source: Wright,2000 Independent Public Assessment – Landfill Capacity and Demand. State Government of NSW, Office of Minister of Urban Affairs and Planning.

The development is also likely to generate high quantities of concrete and metals such as steel. These materials are highly reusable and recyclable and efforts should be made to plan for the likely quantities of materials generated during construction of the proposal.

9.2 Implementation of 'best practice' to mitigate impacts

9.2.1 Construction waste

Currently, Parkes does not have a waste management facility to recover and recycle waste, therefore it is very important to avoid creating waste through design and to ensure the buildings are constructed to allow for future disassembly. The design of the facilities should incorporate the following principles:

» Minimise cut and fill. If this cannot be avoided, reuse excavated material onsite;

» Include waste management clauses in contracts to ensure contractors are aware of the waste management targets and objectives of the development and their obligations;

» If possible, design for standard sizes, this avoids unnecessary offcuts and waste generation;

» Use pre-fabricated components. Usually, pre-fabricated components are delivered to site where they are assembled, saving money and reducing onsite waste;

» Specify for materials that are easily reusable and recyclable, avoiding potential future waste;

» Design for disassembly to ensure the buildings are able to be easily taken apart, thus facilitating future resource recovery;

» Look at ways of using materials that have recycled content;

» Avoid specifying and ordering potentially harmful substances and materials; and

» Arrange supplier take-back for excess or damaged material and for excess packaging.

9.2.2 Operational waste

Waste management onsite also extends to waste generated during the operation of the building. Although, currently the Parkes area has no recycling facilities, the development should be designed so as to maximise opportunities for future waste recovery through reuse and recycling. Table 3 outlines waste likely to be generated from the operation of the proposed development that can be reused and recycled.

Table 4 Reusable and recyclable waste likely to be generated from proposal

Paper/cardboard
Food organics
Oil
Batteries
Packaging waste including plastic strapping
Containers (aluminium cans, plastic bottles, glass, cartridges)
Metal
Wood products and off-cuts including timber pallets and sawdust

Although no current waste management facilities exist in Parkes, future recovery of waste should be facilitated through the design of the proposal to allow for storage room/ areas and manoeuvrability of waste containers such as bins or skips. It is also possible that waste may be transported in fright containers via rail from the site to other locations with proper waste recovery facilities. This makes the storage areas designed in the development important. Incorporating and implementing the following guidelines in the design and operation of the development will ensure maximum recovery of waste:

- Calculate the type and the volumes of waste expected to be generated by the operation of the proposed development. This should include waste generated from the office, landscaped areas, refuelling facilities and warehousing and distribution activities. These should be based on industry standards;
- Ensure the proposal has been designed with storage areas. The waste storage areas should have sufficient room to store the required containers to accommodate the estimated quantity of waste and recyclables generated and to allow for manoeuvrability;
- Waste storage areas need to be undercover and drained to sewer;
- Terminals Australia needs to select appropriate waste handling equipment and the design has to allow adequate space for onsite separation, storage and manoeuvring of waste prior to collection and transport;
- There should be adequate space for the storage of containers of at least three waste streams – recovered waste (for reuse or recycling), residual waste (for disposal or Alternative Waste Technology) and hazardous waste (wastes that are toxic, corrosive, flammable, explosive or reactive);
- Design a separate storage area for liquid wastes (oils etc) that is bunded and drains to grease trap. Liquid wastes from grease traps must only be removed by a licenced contractor approved by the relevant water authority or NSW DEC;
- Provide adequate space for bulky items;
- Provide a separate storage and collection area for hazardous/ special wastes;
- The waste storage areas and wash down areas should have smooth, impervious floors, be graded to a silt trap and connected to the sewer;
- Prevent wastewater (from cleaning the waste storage area (s) and bins) from entering the stormwater system;
- Comply with WorkCover NSW requirements for the storage of dangerous goods;
- Ensure there is adequate drainage;
- Provide details of provision made to prevent waste water, liquids, solid waste and debris from entering stormwater drains;
- The proposed development must comply with the Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Waste (DEC) http://www.epa.nsw.gov.au/resources/waste_guide.pdf;
- Ensure the waste storage areas do not compromise fire safety objectives by having adequate fire protection measures in accordance with Australian Standards;

» This site will be used for goods receival and export. Therefore the waste storage areas should be designed to be separated from the goods receiver dock, particularly if more than 10 m^3 of uncompacted recyclable materials and waste is likely to be generated per day. Use compaction units where appropriate;

» Though the site is located away from the town centre and not close to residents, there may still be a need for security measures of waste storage areas, particularly if hazardous wastes will be stored onsite. Terminals Australia needs to ensure the design the storage area is secure by providing security access measures. This will prevent entry to the waste storage areas, scavenging, vandalism and illegal dumping. Some measures can include fences, lockable gates, natural barriers such as ditches and embankments and surveillance systems; and

» In future a private waste contractor may be used to manage the site waste. Terminals Australia needs to provide access for servicing and for the collection of waste by a private contractor where desirable and/or necessary;

» Provide a proper transport route to the main or communal storage area;

» If a private contractor is employed, access to the storage areas by collection trucks should implement measures for road design to have adequate strength, clearance and geometric design for truck movements on access driveways and internal roads;

9.3 Resources/website

http://www.resource.nsw.gov.au/cd2.html Department of Environment and Conservation, C&D case studies

http://www.resource.nsw.gov.au/strategy.htm#download Waste Avoidance and Resource Recovery Strategy

10. Ecology and biodiversity

10.1 Impacts of this development

The proposed site is on land that has previously been cleared for agricultural use. There are two main vegetation communities open grassland and open woodland communities. There have been no threatened species found at the site and the site is not listed as a threatened ecological community, therefore the proposal is unlikely to have a significant impact on local biodiversity. Despite this, there are opportunities to potentially improve the biodiversity of the site. Areas that have been restricted from grazing are of a higher ecological value than the rest of the site therefore it's important to maintain this by fencing this area (GHD Pty Ltd, 2005).

10.2 Implementation of 'best practice' to mitigate impacts

Tree planting of locally indigenous plant species can create a habitat for some wildlife, buffer some of the noise generated from the site and improve the local air quality. Additionally trees planted can act as a greenhouse sink, offsetting some of the greenhouse gas emissions generated from the site.

Parkes Shire Council has a list of locally indigenous plants. Terminals Australia can work with Parkes Shire Council and the community to undertake tree planting of the area and to investigate the possibility of linking this to remnant vegetation. This can create a wildlife and plant corridor, increasing habitat, facilitating movement of wildlife and improvement in the local biodiversity.

To minimise site impacts effective sediment and erosion controls should be in place onsite and sediment contaminated water should be prevented from leaving the site.

Social considerations also form an important part of sustainability. Part of the re-vegetated area can provide employees of the facilities with shaded outdoor seating areas and small parklands, creating a pleasant area to eat lunch or simply to relax.

10.3 Resources/websites

http://www.basix.nsw.gov.au/pdf/indigenous_species/4.pdf List of indigenous and low water plants

11. References

Australian Greenhouse Office (AGO) in Department of Environment and Heritage (2004). *Stationary Energy Sector Greenhouse Gas Projections 2004*, Canberra, ISBN 1 920840 26 5

http://www.greenhouse.gov.au/transport/index.html AGO website, downloaded information 5 October 2005 12:30 pm

Clarke, M (2005). *Green Buildings and Performance*, Presentation at the 2005 Green Building Conference, 30 June 2005

Department of Environment and Conservation (2005). *Model Waste Minimisation and Management Development Control Plan*

Department of Environment and Heritage (2005). *ESD Design Guide For Australian Government Buildings,* commonwealth of Australia: Canberra

GHD Pty Ltd "*Parks Intermodal Terminal Background Report*", August 2005

Reardon, C (2001). *Your Home*, NSW Edition, ISBN 1 876536 81 0

Specnet (2005) http://www.spec-net.com.au/press/0505/watersave.htm , downloaded information 10 October 2005 12:30 pm

Sydney Water (2005) http://www.sydneywater.com.au/SavingWater/InYourBusiness/ReusingAndRecyclingWater.cfm downloaded 10 October 2005

Sustainable Developer Guide for Nottinghamshire http://www.sdg-nottinghamshire.org.uk/index.htm downloaded information 24 October 2005 10:30 am

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
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1	Elham Monavari	A Ginns	A.G.	J Ardas	J. Ardas	07/10/05
2	Elham Monavari	D Gamble A Ginns	A.G.	J Ardas	J. Ardas	25/01/06

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
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	K Smallwood	A Ginns		J Ardas		16/02/06