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Parkes Intermodal Freight Terminal

Water Management Report

January 2006

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

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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.

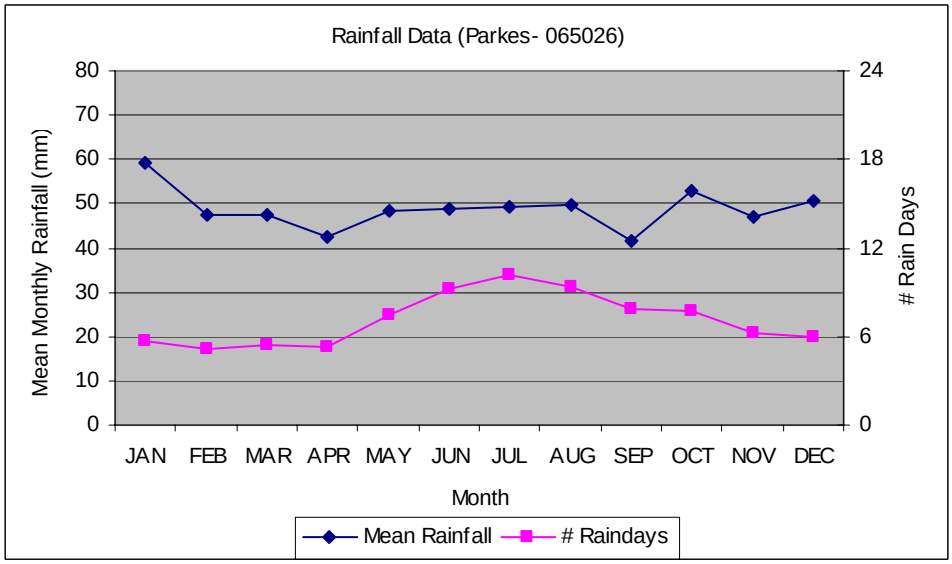

Figure 1 Seasonal Rainfall Distributions at Parkes

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

LEGEND

- UNDERGROUND STORMWATER RETICULATION SYSTEMS
- ABOVEGROUND STORMWATER RETICULATION SYSTEMS
- INITIAL STAGE STORMWATER INFRASTRUCTURE
- ULTIMATE STAGE STORMWATER INFRASTRUCTURE

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

98
DP750179

PROPOSED NORTHERN ACCESS ROAD

ABOVEGROUND STORMWATER RETICULATION SYSTEMS PIPED/CULVERT AT ROAD/RAIL CROSSINGS

UNDERGROUND STORMWATER RETICULATION SYSTEMS

PROPOSED MASTER SIDING

PROPOSED PROTECTED LEVEL CROSSING AT GRADE

SITE BOUNDARY

ABOVEGROUND STORMWATER RETICULATION SYSTEMS

4 x 500-800m WAGON STORAGE SIDINGS WITH OPTIONAL MIN. 900m EXTENSIONS (+-)

HEAVY ENGINEERING FACILITY
AREA = 2.5ha
2 x 600m SIDINGS

6
DP857631

UNDERGROUND STORMWATER RETICULATION SYSTEMS

CONTAINERISED FUEL STORAGE FACILITY
AREA = 3.5ha (700m x 50m)
2 x 800m SIDINGS

TRAIN REFUELLING & SANDING FACILITY AREA = 0.5ha.

EXISTING RAIL LINE

PROPOSED SIDING

ABOVEGROUND STORMWATER RETICULATION SYSTEMS

UNDERGROUND STORMWATER RETICULATION SYSTEMS

PROPOSED LANDSCAPING

18
DP658361

INTERMODAL TERMINAL CONTAINER STORAGE
ULTIMATE STAGE = 7ha

INTERMODAL TERMINAL SIDINGS
4 x 1800m AT ULTIMATE STAGE

GANTRY RAILS

STAGE 1 WAREHOUSING AREA = 2ha

STAGE 2 WAREHOUSING AREA = 3ha

POTENTIAL ADDITIONAL WAREHOUSING
AREA = 12ha

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

BROLGAN ROAD

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

WAREHOUSING

ROOF AREAS TO RAINWATER TANKS WHICH OVERFLOW TO UNDERGROUND SYSTEM

UNDERGROUND SYSTEM WITH SURCHARGE PITS (1:20 YR CAPACITY)

1:100 YR AS OVERLAND FLOW IN ROADWAYS

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

OVERFLOW PIPE FROM OSD#1 TO OSD#2

30.175 WIDE

COOPERS ROAD

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

PRELIMINARY

GHD CLIENTS | PEOPLE | PERFORMANCE

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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
CONCEPT STORMWATER DRAINAGE

Original Size: A0
Drawing No: 21-13701-R020D
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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
-	R Berg	S el Haddad		R Berg		24/01/06