STORMWATER MANAGEMENT PLAN

The Stormwater Management Plan (SWMP) aims to provide a set of Best Practice site management procedures to control the severity and extent of soil erosion and pollutant transport during the earthworks and construction phase, as well as the operations phase. It will be prepared in accordance with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000), Parkes Shire Council Stormwater Drainage Design Guidelines (SDDG) and the NSW Managing Stormwater Guidelines- Soils & construction, Vol.1 (also known as the Blue Book).

1.1 CONSTRUCTION PHASE

The contractor will be required to prepare a SWMP prior to commencement of the construction activities to assure management of water quality and quantities for the temporary works. The Construction Contractor will be responsible for the implementation of the SWMP, including implementing the Water Quality Monitoring Program (WQMP) during the course of all construction activities.

1.1.1 IMPLEMENTATION STARTEGY

Permanent and long-term drains and bund walls to be topsoiled and vegetated with suitable vegetation as soon as possible. Cleanup of general site litter on a weekly basis, prior to anticipated heavy rainfall and after significant rainfall events (>25mm/24hours). Landscaping activities and revegetation to occur as soon as practical after completion of earthworks and construction activities within the immediate area and must achieve a minimum 70% coverage of all erodible surfaces.

Only appropriate herbicides and fertilisers to be used. The storage and handling of flammable and combustible liquids is managed in accordance with AS1940–1993. A detailed *Erosion and Sediment Control Plan (ESCP)* must be submitted to, and approved prior to site establishment and commencement of vegetation clearing or soil disturbance within each subdivision stage. Where appropriate, ESCPs must incorporate guidelines on the treatment, protection and stabilisation of exposed dispersive soils.

1.1.2 MONITORING

Erosion and sediment control (ESC) measures to be inspected daily by the site manager (or nominated representative) during periods of runoff-producing rainfall, and de-silted, repaired and amended as appropriate to maintain the WQOs.

- a) Daily site inspections, during periods of runoff-producing rainfall must include:
- all drainage, erosion and sediment control measures
- · occurrences of excessive sediment deposition (whether on-site or off-site)
- all site discharge points.
- b) Weekly site inspections must include:
- all drainage, erosion and sediment control measures
- · occurrences of excessive sediment deposition (whether on-site or off-site)
- occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements
- litter and waste receptors
- oil, fuel and chemical storage facilities.
- c) Site inspections immediately prior to anticipated runoff-producing rainfall must include:
- all drainage, erosion and sediment control measures
- all temporary (e.g. overnight) flow diversion and drainage works.
- d) Site inspections immediately following runoff-producing rainfall must include:
- · treatment and de-watering requirements of sediment basins
- · sediment deposition within sediment basins and the need for its removal
- · all drainage, erosion and sediment control measures
- occurrences of excessive sediment deposition (whether on-site or off-site);
- occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements;

- occurrences of excessive erosion, sedimentation, or mud generation around the site office, car park and material storage areas.
- e) In addition to the above, monthly site inspections must include:
- surface coverage of finished surfaces (both area and percentage cover);
- health of recently established vegetation;
- · proposed staging of future site clearing, earthworks and site/soil stabilisation.

Water quality monitoring must be carried out on any controlled discharge of water from a sediment basin, including water pH and suspended solids.

• Water quality monitoring at the nominated monitoring stations must be carried out monthly and following significant rainfall (>25mm in 72hrs).

The parameters to be tested for waters collected at monitoring stations must include: temperature, dissolved oxygen, pH, specific conductance, salinity, turbidity, suspended solids, and litter.

Note that additional water quality monitoring maybe required if the WQOs are not being met. ESCP reviews are to be carried out on a monthly basis to assess the implementation strategy. A checklist is to be completed which assesses the strategies listed above.

1.1.3 INCIDENTS AND FAILURE

Non-compliance with agreed performance criteria will be identified by:

- a) Visual inspections identifying:
- build-up of sediment off the site
- excessive sediment build-up on the site
- excessive erosion on the site
- · release of construction material from the site
- poor vegetation establishment
- poorly maintained, damaged or failed ESC devices.

b) Deteriorated water quality identified by the Environmental Consultant as being attributable to the construction activities.

1.1.4 CORRECTIVE ACTION

After any identification of incident or failure, the source/cause is to be immediately located and the following measures implemented:

- Build-up of sediment off the site the material must be collected and disposed of in a manner that will not cause ongoing environmental nuisance or harm; then on-site ESC measures amended, where appropriate, to reduce the risk of further sedimentation.
- Excessive sediment build-up on the site collect and dispose of material, then amend up-slope drainage and/or erosion control measures as appropriate to reduce further occurrence.
- Severe or excessive rill erosion investigate cause, control up-slope water movement, re-profile surface, cover dispersive soils with a minimum 100mm layer of non-dispersive soil, and stabilise with erosion control blankets and vegetation as necessary.
- Off-stream erosion fill rills, vegetate and install velocity control measures.
- In-stream erosion consult appropriate hydraulic/waterway consultant for advice.
- Release of construction material from the site collected and disposed of in a manner that will not cause ongoing environmental nuisance or harm; then inspect litter and waste receptors.
- Poor vegetation growth or soil coverage plant new vegetation and/or mulch as required. Newly planted and previously planted areas may require supplementary watering and replanting.
- Sediment fence failure replace and monitor more frequently. Regular failures may mean that the sediment fence location, alignment or installation may need to be amended.

If the release of excessive sediment and/or other materials off the site occurs, or water quality monitoring indicates levels are not within the WQOs, clean up deposition, and inspect all control measures.

If the release of excessive sediment and/or other materials off the site is identified during two consecutive site inspections, or water quality monitoring indicates levels not within the WQOs on two consecutive monthly tests, then review and revise the ESCP, or otherwise reduce the rate, extent and/or duration of soil exposure.

If monitored levels within any sediment basin does not conform to the release criteria for:

- suspended solids flocculate and retest;
- pH add acid if pH is too high, or add hydrated lime if pH is too low, and retest.

1.1.5 REPORTING

Reports will be submitted monthly during the construction at each stage. The reporting will include:

- · Construction Contractor site manager's report; and
- · Environmental Consultant's water quality monitoring report.

Reporting will identify performance of the implementation strategy, monitoring, identification of incidents and failure, and necessary/adopted corrective action.

1.2 OPERATIONS PHASE

The following are the proposed stormwater management practices for the operations phase.

1.2.1 CLEAN WATER MANAGEMENT

The site is in the catchment of Goobang Creek, which is a major tributary of Lachlan River. Clean water approaches the site from the north east, with a significant upstream catchment contributing to the flow. The flow from upstream will be maintained as clean water in its existing natural flow path. Some minor diversion drains may be required to direct flow around the intermodal site at the Phase 1 limit of works.

Some clean water will shed form the access roads around the southern side of the intermodal facility and into the existing clean water flow path. This is areas where the access road is crowned. In one way crossfall the water sheds onto the site and will be treated as dirty water.

MAIN ACCESS ROAD CULVERT

The main access road for the intermodal facility crosses an existing floodway, which forms the clean water flow path. Flooding analysis for a separate project has been completed in this area and it was found that Brolgan Road is inundated in a 10yr ARI storm. As access along Brolgan Road to the site will not be possible in any storm of 10% AEP or greater, it is recommended that the access road to the site would be designed to have the same immunity. The 10yr flow at the access road is found to be $20.2m^3/s$ from the upstream catchment, which will be the design flow for the proposed culvert. The dimensions of the no.10 proposed box culvert are $2.7m(W) \times 0.6m(H)$.

1.2.2 DIRTY WATER MANAGEMENT

The majority of the intermodal site catchment is being considered as dirty water. The design intent will be to facilitate flow of the dirty water to the low point at the south-western corner of the site. To allow this flow, drainage lines will be provided under the rail sidings for dirty water to flow from one side to the other.

At the outlet of pipes open channels will be provided to facilitate the flow of water from pipes to the south-western corner of the site and to reduce the potential erosion of material from the water flow. The Open channels will be designed to convey the maximum possible flow of dirty water in a 20yr ARI storm event. Conveyance of this flow would require a trapezoidal channel shape with 1m base width, 4:1 batters and a depth of 0.65m. This would provide 0.1m of freeboard in the channel. The channel will be lined with grass and some rock scour protection required where velocities exceed 2m/s.

Once the water reaches the south-western corner, 4×900 mm diameter culverts will be provided to allow the water to flow under the access road into the dirty water sediment basin.

HARDSTAND AREA

The hardstand area has a low point along the centreline for its entire length. The design will provide inlet pits along the lower centreline in the middle of the hardstand area with outlet pipes at each pit to the south east. This arrangement will minimise impact on the drainage infrastructure from vehicle loads, and prevents blocking and reduce the flow length and capacity required in the centre. 600mm x 600mm inlet pits will be provided to capture the flow with 525mm diameter pipes out letting to the southeast.

1.2.3 PERFORMANCE CRITERIA

A sediment control basin will be designed in accordance with the Blue Book, and captures 90th percentile 5-day storm event runoff. The runoff coefficient was estimated to be 0.64 based on the design rainfall and an assumed soil hydrologic group (Group D assumed being the highest runoff potential. Should the actual runoff potential be less, the basin will have additional capacity to what is required). The basin was found to require a storage volume of 3.4ML. The sediment basin is to attenuate the peak flows so the post-developed site outflows are maintained at their pre-developed levels. It also acts as a water quality improvement device to bring the site runoff quality to acceptable levels prior to offsite discharge.

Provisions will be made for recycling of the water collected in the basin for watering landscape areas and establishment of deeprooted vegetation stands to increase evapo-transpiration rates.

Water discharged from the site is to comply with the applicable legislative criteria to ensure that no detrimental impacts on water quality and the environment occur during the construction phase. The quality of discharge from the site to satisfy the applicable Water Quality Objectives (WQOs). It is expected that the sediment control release criteria would be

- An increase in suspended solids from upstream to downstream of site of less than 10%.
- Water pH released from a controlled sediment basin outflow must be within the range 6.5 to 8.5.
- · Suspended Solids released from controlled sediment basin outflows must be no greater than 50mg/L.
- Oils and Grease no visible films or odour.
- Litter no visible litter washed or blown from the site.

1.2.4 REGIONAL CONTEXT

The proposed SWMP aims at minimising any adverse impacts on the water quality and existing flooding conditions of the local catchment. The proposed drainage system will divert the external catchment flows, and collects site runoff in a proposed sediment basin. The sediment basin has a dual function, including attenuation of site peak flows so they can be discharged in a regulated manner, and collection of potential contaminants to ensure they will meet the water quality requirements prior to off-site discharge.

Through implementation of the SWMP, it is expected that the proposed development will have insignificant impacts on the upstream and downstream of the catchment.