Alice Springs Town Council

Alice Springs Landfill

Landfill Environment Management Plan (LEMP)

Commencement Date: 1 February 2011
Alice Springs Town Council

Alice Springs Landfill

Commencement Date: 1 February 2011

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Gavin Reeves

October 2010
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1 Introduction

1.1 Background

The Department of Natural Resources, Environment, The Arts and Sport (NRETAS) requires that waste management facilities submit for approval, review and maintain a Landfill Environment Management Plan (LEMP).

Operating a waste management facility in the Northern Territory is a prescribed activity of environmental significance which must be permitted by an environmental authorisation in the form of a Licence under the Waste Management and Pollution Control Act. The purpose of the LEMP for the Alice Springs Landfill (the site) is to set out environment protection objectives, procedures, management and monitoring throughout the sites operation, development and closure that will result in the site being operated in compliance with the Environment Protection Licence (the Licence) granted to the Alice Springs Town Council (Council).

Overall responsibility for the site ultimately rests with the Licensee. Landfill operations will be managed by the Council or a contractor engaged to operate the facility on behalf of the Council (the Operator). Section 3.2 defines the roles and responsibilities for the management and operation of the site.

To ensure that the environment protection measures of the LEMP are adhered to by the landfill Operator, the LEMP will form part of the tender documents for the operation of the landfill.

In summary, the following are addressed in this LEMP:

- Current site description and associated details;
- Framework for the Environment Management System;
- Management and/or monitoring of;
  - Groundwater;
  - Leachate production;
  - Surface water;
  - Landfill gas;
  - Asbestos;
  - Used tyres;
  - Dust, mud and slurry;
  - Noise, odour and litter;
  - Birds, vermin and weeds;
- Concept details for progressive closure and landscaping of the site, together with monitoring and management strategies;
- Database of site records and requirements for record keeping and reporting documentation to ensure the site is managed consistently with current licence conditions and NRETAS requirements; and
- Emergency response procedures to ensure that the integrity of the site as a waste management facility is maintained, while protecting the environment.
1.2 Management Authority

The management authority (Licensee) responsible for the landfill will be:

Alice Springs Town Council (ASTC)
PO Box 1071
Alice Springs NT 0871
Ph: (08) 8950 0500
Fax: (08) 8953 0558

1.3 Compliance with Reference Documents

In establishing this document the following regulatory requirements and guidelines have been considered:

- Northern Territory of Australia Waste Management and Pollution Control Act, (the Act);
- Department of Natural Resources, Environment, the Arts and Sport Environmental Protection Licence, Ref: EPL 11 (the Licence);
- The Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory, 2003 (the Guidelines)
- Landfill Environment Management Plan, (LEMP Guideline) NRETAS, document supplied to Council
- Northern Territory of Australia Workplace Health and Safety Act,
- Asbestos Management Guidelines (NT Department of Health and Families, 2008)

1.4 The LEMP

1.4.1 Use of the LEMP

It will be the responsibility of the Licensee to maintain this document in a useable form and to consolidate the documentation relevant to the operation of the site in a form that is accessible to site staff, contractors and NRETAS.

The current Licence requires that this LEMP is independently reviewed every three years after commencement of the Licence and the Licence holder shall provide a proposed scope of the review to the Chief Executive Officer no later than 28 days prior to the commencement of the review.

The Licensee shall provide the results of the review and any proposed amendments to the Chief Executive Officer within 28 days of the review being completed. The Licensee shall then update the LEMP with amendments approved by the Chief Executive Officer.

A copy of the most up to date version of this document shall remain on site at all times for easy reference for site manager and staff.

1.5 Objectives of the Landfill Environment Management Plan

This LEMP details actions and procedures to be carried out during the operation and post-closure phases of the landfill in order to mitigate adverse impacts on the environment where practicable.

The purpose of the environmental management process is to:
• produce a framework for control of design, construction, operational and post-closure impacts, including practicable and achievable performance requirements and a system of monitoring, reporting and implementing corrective action
• minimise adverse effects to the environment
• provide information for the landfill licence
• provide evidence of compliance with legislation, policies, guidelines and requirements of relevant authorities
• provide a guide for the landfill operator to meet various statutory requirements
• provide the community with assurance that management of the landfill will be conducted in an environmentally acceptable manner

1.5.1 Framework and Validity Period for LEMP

This LEMP has been prepared to address the management of the Alice Springs Landfill over the life of the site. Therefore this LEMP shall be reviewed by ASTC (i.e. the Licensee) at least once every three years and may involve consultation and negotiation with the landfill operator. Review and updating of the LEMP will be necessary due to the evolving nature of disposal activities and practices, and shall reflect the changes to the site, operations, technology and best practice since the previous review.

1.6 Landfill Management Approach

There is the potential for environmental impacts to be generated by the landfill. However, these potential impacts will be ameliorated by careful management, appropriate control measures and regular environmental monitoring.

Major issues concerning the landfill are:
• site management and operations, including monitoring of the characteristics of incoming waste and regular topographic surveys;
• waste to landfill diversion and reduction activities;
• erosion and stormwater management;
• leachate management;
• landfill gas management;
• nuisance avoidance, including noise, air emissions, dust and odour, visual amenity, litter control, weed control, pest control and fire control;
• post-closure management, maintenance and monitoring.

To control and manage the above issues, Alice Springs Town Council will ensure that environmental management measures, as listed in this report, will be implemented and continually reviewed.

1.7 Reporting of Environmental Incidents, Pollution or Potential Pollution

The Operator shall immediately notify Council of any circumstance giving rise to environmental harm or potential environmental harm. The Operator shall provide Council with the following information:
• the identity of the person giving notice;
• the time and date of the circumstance;
• the circumstance causing or threatening to cause environmental harm;
• the place where the circumstance occurred or is likely to occur;
• how the environmental harm occurred, is occurring, or may occur;
• the attempts made to prevent, reduce, control, rectify, or clean up the pollution or resultant environmental harm caused or threatening to be caused by the circumstance.
2 Site Overview

2.1 Site Location

The landfill is located on Commonage Road, Alice Springs. Lot 7902 is situated south-west of Heavitree Gap, north of the Alice Springs Waste Water Stabilisation Ponds and approximately 500 m west of the Todd River (see Figure 1).

2.2 Site Description

The Landfill site is located in the Ilparpa Valley, in the foothills of the Heavitree Range, to the south west of Heavitree Gap. The property comprises approximately 56.6 hectares bounded by the Heavitree Range to the north, Inarlenge (i.e. Alice Springs Town Camp more commonly known as Little Sisters) to the north-east and the waste water stabilisation ponds to the south.

The extent of the current landfilling footprint is approximately 28 hectares and has been used as a landfill since the sixties. Figure 2 shows the extent of the current landfilling footprint.

Based on anecdotal information, areas within the site boundary and to the west and north of the current landfilling footprint may have been used for waste disposal since the 1930s.

2.3 Land Title Details

The landfill is located on Lot 7902, Township of Alice Springs. Lot 7902 is covered by Crown Lease in Perpetuity (CLP) 1968 which was issued under the Northern Territory Crown Lands Act in December 2002 for the purposes of Municipal Waste Management Facility and Ancillary Uses. The Landfill Environment Management Plan for the site covers the whole of the allotment and is subject to reservations and provisions, conditions and covenants associated with CLP 1968.

2.4 Zoning and Land Use

According to the Northern Territory Planning Scheme for Alice Springs, the present zoning of the site is “community purpose”, this zoning allows primarily for “community services and facilities”.

From the Planning Scheme:

1. The primary purpose of Zone CP is to provide for community services and facilities, whether publicly or privately owned or operated, including facilities for civic and government administration.

2. Design is expected to incorporate landscaping that will enhance the visual appearance of the development. The development of residential accommodation is to only be in association with and ancillary to the primary use of the land.

2.5 Surrounding Land Use

The area immediately to the west of the site is undeveloped Crown Land under native title that is also zoned CP – “community purpose”.

Alice Springs Town Council
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20091467RA2RevA.doc Revision: A
Adjacent to the site on the southern side of Commonage Road and extending for the full extent of the site is the Waste Water Stabilisation Ponds which are managed by Power and Water Corporation. This site is zoned U - “utilities”. It is anticipated that this facility will be retained well into the future with potential for future expansion.

Inarlenge or Little Sisters Town Camp consisting of over a dozen dwellings exists to the north-east of the site, within 250 m of the site boundary and approximately 300 m from the nearest extent of landflling.

The area to the north of the site and including the Heavitree Range is undeveloped and zoned “conservation” therefore expected to remain undeveloped.

2.6 100 Year Flood Area

The possibility of flooding in the vicinity of the landfill in a 100 year flood event has been reviewed.

According to the latest Alice Springs flood map the site is above the flood level shown for a major flood, indicating the approximate 1 in 100 year flood boundary for the Todd River flood plain. Additionally, mapping indicates the site is also beyond the extent of the Probable Maximum Flood (PMF). The PMF is the largest possible flood that can occur and is said to have a flood risk of 1:10,000 to 1:10 million.

2.7 Topography

The Alice Springs landfill is located on undulating slopes at the edge of the valley bounded by the Heavitree Range to the north and an unnamed range to the south. The ranges protrude to a height of up to 350 m above the valley floor at grades of up to 50%. The southern boundary of the landfill is along Commonage Road and is situated on the northern edge of the relatively flat valley floor. The elevation of the southern boundary of the site is approximately 565 m AHD. The northern boundary traverses undulating terrain at the foot of the Heavitree Range with elevations between 580 m and 590 m AHD. Surface water drainage from the site would mostly flow towards Commonage Road, although some drainage would also flow east towards the Stuart Highway.

2.8 Geology

The landfill is situated at the northern end of the Amadeus Basin. The Amadeus Basin trends east-west, covering an area approximately 170,000 km², located predominantly in the southern part of the Northern Territory. Basin Margins are well defined to the north and south by igneous and metamorphic rocks of the Precambrian Arunta and Musgrave Blocks. To the east and west, the basin margin is obscured by a cover of younger rocks and sediments.

The regolith in the vicinity of the landfill has been mapped as slightly weathered saprock and alluvial sediments. The lithological units underlying the regolith are yet to be accurately defined. According to the Northern Territory Geological Survey, the underlying units include the Strangways Metamorphic Complex which consists of felsic and mafic gneiss, metavolcanics and metapelite. The northern, undulating portion of the site is underlain by the Bitter Springs formation which is comprised of dolomite and siltstone. This portion of the site mostly has only skeletal soil over the Bitter Springs formation which outcrops on the knolls and elevated parts of the site. The northern edge of the Quaternary alluvium which forms the Inner Farm Basin aquifer appears to be coincident with the southern boundary of the site on Commonage Road. Inspections of bore logs from Blatherskite Park reveals that the alluvium is up to 10 m thick. The Bitter Springs formation, which includes quartzite, sandstone, conglomerate, dolostone and limestone, underlies the alluvium north of the Charles River fault. South of the fault, the alluvium is underlain by the Alice Springs Granite formation. (Refer to drill logs Appendix C)

Drill logs for the existing monitoring wells indicate that limestone, siltstone, dolomite and calcite were intercepted during the drilling of MW1, MW2 and MW3. Whereas MW5A and MW6A intercepted gravels, silts, clays, and shale. It is unclear to what depth weathering is present, or in fact whether fresh rock was reached during drilling.
Therefore, according to the limited site information available to confirm regional geological mapping, geology beneath the site may include sedimentary units of the Bitter Springs Formation or metamorphic units of the Strangways Complex, or both, depending on the location of the contact between the two.

2.9 Hydrogeology

According to the 2006 Alice Springs Water Resource Strategy, there are no significant aquifers beneath the landfill site. The Inner Farm Basin is the closest aquifer to the landfill site.

The southern portion of the landfill is adjacent to the north-western margin of the Inner Farm Basin. This aquifer is composed of the Quaternary alluvial sediments, Tertiary sediments, and underlying Late Proterozoic Bitter Springs Formations (dolomite, limestone and siltstone), reaching an approximate depth of 40 m below ground level, and spanning an area of 0.8 km² and is situated to the east of the Todd River extending west under Blatherskite Park. Recharge of the Inner Farm Basin aquifer results from surface water infiltration (i.e. localised rainfall and occasional flow from the Todd River). The rate of such infiltration is dependent on the degree of fracturing of surrounding low-permeability rock. Groundwater within the aquifer is generally quite shallow and averages to a depth of approximately 6 m below ground level. The direction of groundwater flow within this aquifer is southward beneath the Todd River. It is estimated that groundwater discharges to the Outer Farm Basin at a rate of 310 ML per annum.

Groundwater Investigations

Groundwater investigations undertaken at the site in February 2009 revealed that the effluent treatment ponds to the south of the site significantly affect groundwater levels by creating a localised groundwater mound below the ponds altering natural groundwater gradients.

Analytical results for the parameters tested from groundwater samples were below the detection limits or complied with the NEPM guidelines (1999) with the exception of copper and zinc which exceed NEPM (1999) freshwater criteria in all wells except for MW6A.

Field conductivity measurements were collected from all six groundwater monitoring wells during purging. Field conductivity can be correlated to salinity of the groundwater. The field conductivity results attained on site would indicate that the groundwater well closest to the effluent ponds (MW4) contains groundwater with a salinity of 3,500 mg/L, and the furthest well (MW3) is indicating a salinity of approximately 600 mg/L.

As a guide, according to the Australian Drinking Water Guidelines (2004) drinking water of TDS 500-800 is fair quality. TDS higher than 1,000 mg/L is unacceptable for human consumption.

Groundwater monitoring and reporting did report contamination that could be directly attributed to the presence of the landfill.

2.10 Climate

Meteorological factors having the greatest impact on the operation of a waste management facility are rainfall, evaporation and wind.

Monsoonal influences provide rainfall in summer which exceeds precipitation rates in winter. Average monthly pan evaporation rates exceed monthly rainfall rates for all months of the year.
The climate at Alice Springs is typical of arid conditions, with summers of average temperatures around 35°C and maximum temperatures often exceeding 40°C. Winter months have average temperatures around 20°C with frosts not uncommon at night.

2.10.1 Rainfall

The mean monthly and decile 8 rainfall statistics and pan evaporation data shown in Table 2-1 below were retrieved from the Bureau of Meteorology (BOM) for station 15648- Alice Springs (Airport) at latitude 23˚ 47’ S and longitude 133˚ 53’ E.

The Alice Springs airport is located on the southern side of the MacDonnell Ranges and therefore would be expected to experience similar weather conditions to the landfill site.

Evapo-transpiration (ET) data for the same site is unavailable however the BOM do provide annual and monthly ET estimation mapping for the whole of Australia. Monthly ET data reported below has been estimated from this mapping. As detailed on the BOM ET webpage, ET is calculated based on the transfer and balance of energy in the environment; temperature, vapour pressure and solar global exposure are all used as inputs in the calculation.

The mean high monthly evaporation and estimated mean ET relative to the mean monthly rainfall is significant to a landfill sites potential to generate leachate. As demonstrated in the table below average evaporation exceeds rainfall in every month and estimated ET is exceeded by rainfall in only two months of the year on average by no more than 2.3 mm. Whilst climate may fluctuate and the water balance may be wetter than average from time to time, this clearly demonstrates dry climatic conditions experienced on average at the site will substantially limit this landfills potential to generate leachate.

Table 2-1 Rainfall and Evaporation Data

<table>
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<tr>
<th>Month</th>
<th>Mean Monthly Rainfall (mm)</th>
<th>Decile 8 (mm)</th>
<th>Mean Daily Pan Evaporation (mm)</th>
<th>Estimated Evapo-transpiration (mm)</th>
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<td>January</td>
<td>38.0</td>
<td>71.2</td>
<td>403</td>
<td>45</td>
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<td>February</td>
<td>42.3</td>
<td>74.8</td>
<td>324.8</td>
<td>40</td>
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<tr>
<td>March</td>
<td>31.9</td>
<td>42.7</td>
<td>316.2</td>
<td>40</td>
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<td>April</td>
<td>16.8</td>
<td>25.6</td>
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<td>May</td>
<td>19.4</td>
<td>41.1</td>
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Source: Rainfall, Evaporation & Evapo-transpiration data sourced from the Bureau of Meteorology.

When comparing average rainfall and evaporation data for the site, a water deficit occurs in every month of the year (i.e. evaporation exceeds rainfall on average all year round).
2.10.2 Wind

The wind data from the BOM (wind roses) for Alice Springs Airport has been reviewed and detailed below to give an understanding of the wind conditions experienced at the site. Morning and afternoon conditions are reported based on data for 9 am and 3 pm wind readings respectively.

The site will experience some protection from winds from the north due to the local topography (Heavitree Range). Wind descriptions have been made using the Beaufort Wind Scale. It's important to note for landfill management that if wind speed is greater than 20 km/hr (moderate on the Beaufort Wind Scale), wind will raise dust and litter and move small branches therefore litter control is vital on the site.

- **Summer morning** winds tend to blow from the east to south east (approx 53%) and will generally be light to moderate (1 to 30 km/h) with only occasional fresh to strong winds (30 to 50 km/h). The remainder of the time winds are from north east to north and generally light. Calm conditions have been registered for 12% of the time on summer mornings.
- **Summer afternoon** winds tend to be from a south east to easterly direction. Light to moderate conditions prevail (1 to 30 km/h) but summer afternoons were also calm 6% of the time.
- **Autumn mornings** have light to moderate (1 to 30km/h) and some fresh (>30 km/h) winds from the east to south-easterly direction at approx 40% of the time. However calm wind conditions are common at 36%.
- **Autumn afternoons** have very similar conditions to summer afternoons in both speed and directions.
- **Winter mornings** have calm conditions 46% of the time. When calm conditions are not the case, wind has similar proportions from all directions but the east to south direction is most common with light to moderate winds (1 to 30km/h)
- **Winter afternoon** winds are not often calm (8%) compared to mornings, and prevail from the east and south-east direction (approx 50%) with light to moderate conditions (1 to 30km/h)
- **Spring morning** winds prevail from the east (approx 30%) with light to moderate conditions. Winds from the north, north-east and south-east have approximately equivalent prevalence with mostly light to moderate, and some fresh (>30km/h) conditions (approx. 5%).
- **Spring afternoon winds** prevail from south-east, east and southerly direction with light to moderate conditions. There are also considerable winds (approx. 12%) from the north-west direction with light to moderate and some fresh conditions.

2.11 Surface Water Management

The landfill is located in an area with an average annual rainfall of 280mm and an average pan evaporation of 3,106 mm (as measured at Alice Springs Airport). Significant runoff events generally occur as a result of thunderstorms or tropical storms.

Original surface water drainage patterns on the existing landfill area have been altered substantially. Apart from clearly defined landfill slopes, where stormwater erosion has occurred, no drainage patterns are obvious.

Surface water drainage outside the landfill area is generally in accordance with flow paths as they existed prior to commencement of landfilling activities.

It is expected that the catchment containing the landfill will drain towards the Todd River. Anecdotal evidence indicates that runoff from the catchment can also flood Blatherskite Park and Ilparpa swamp.
Surface water management for the developing site is discussed further in Section 8.

2.12 Services

The site is currently serviced by the following:

- Power;
- Water;
- Telecommunications; and
- Sewerage.

2.13 Waste Disposal and Licence Conditions

The site is licensed to conduct activities prescribed by Schedule 2, Part 2, Items 1 and 3 of the Waste Management and Pollution Control Act 1998, as follows:

- Operating premises for the disposal of waste by burial that service, or are designed to service, the waste disposal requirements of more than 1,000 persons.
- Operating premises, other than a sewerage treatment plant, associated with collecting, transporting, storing, re-cycling, treating or disposing of a Listed Waste on a commercial or fee for service basis.
- The site is also licensed to accept the following Listed Wastes:
  - Asbestos;
  - Acidic Solutions;
  - Basic Solutions;
  - Containers that are contaminated with residues of listed waste;
  - Lead, lead compounds;
  - Soil contaminated with a listed waste;
  - Surface active agents (surfactants) that contain principally organic constituents and that may contain metals and inorganic materials;
  - Tyres (shredded);
  - Waste mixtures, or waste emulsions, of oil and water of hydrocarbon and water.

Of these Listed Wastes that are able to be accepted, only asbestos and shredded tyres are allowed to be buried under the site’s licence conditions. All other Listed Wastes that are allowed to be accepted under the licence conditions can only be collected from residential sources and stored above ground on site, prior to eventual transport off site.
3 Environmental Management System

The environmental management framework for the Alice Springs Town Council Landfill is based on the principles of:

- ISO 14001 – Environmental management systems, Specifications with guidance for use; and
- ISO 14004 – Environmental management systems, General guidelines on principles, systems and supporting techniques.

3.1 Legislative Requirements, Standards and Codes of Practice

The purpose of the Environmental Management System (EMS) is to provide policy direction, management structure, improvement programs and operational procedures to ensure that environmental aspects and impacts of the landfill site are managed and minimised.

The environmental management initiatives that relate directly to the Licence or existing documentation such as the LEMP form part of the EMS.

The objectives of the EMS are summarised as follows:

- to provide a framework to facilitate operation of the site in an environmentally sustainable manner; and
- to provide a mechanism to measure operational performance and to implement a program for continual improvement.

3.2 Management Structure and Responsibilities

Overall responsibility for the site ultimately rests with the Licensee. Landfill operations will be managed by the Council or a contractor engaged to operate the facility on behalf of the Council (the Operator).

The specific responsibilities associated with the various procedures and monitoring programs are detailed further in Table 3-1.
Table 3-1  ASTC Landfill Management Structure and Responsibilities

<table>
<thead>
<tr>
<th>Project Stage</th>
<th>ASTC</th>
<th>Environmental / other Consultant</th>
<th>Contractors</th>
<th>Landfill Operator</th>
<th>NRETAS</th>
</tr>
</thead>
</table>
| Licence maintenance/ issues   | Preparation and submission of licence application  
                                  Public consultation activities 
                                  Liaise with NRETAS            | Preparation of LEMP and associated documentation  
                                  Liaison with authorities on technical issues  
                                  Review and update LEMP as required  | Operate site in accordance with Licence  |                   | Review of LEMP and associated documentation  
                                  Administer Licence  
                                  Respond to Licence and general enquiries  
                                  Approvals for Licence and LEMP etc  
                                  Intervention in the event of a breach to the Waste Mgt and Pollution Control Act |
| Environmental management      | Arrage for env. monitoring to be undertaken in accordance with LEMP  
                                  Forward env. monitoring reporting to NRETAS | Undertake monitoring as requested by ASTC  
                                  Advice to ASTC as required |                   | Operate site in accordance with env. obligations of LEMP and contractual arrangements |
| Construction projects (eg new facilities, capping works etc) | Seek development approvals for proposed construction projects  
                                  Seek tenders for project works  
                                  Administer any construction project | Design and documentation for projects  
                                  Inspection and/or supervision as required  
                                  Advice to ASTC as |                   | Undertake construction project in accordance with obligations of contractual arrangements |

Alice Springs Town Council  
Alice Springs Landfill Commencement Date: 1 February 2011  
2009146TRA2RevA.doc Revision: A  
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<table>
<thead>
<tr>
<th>Project Stage</th>
<th>ASTC</th>
<th>Environmental / other Consultant</th>
<th>Contractors</th>
<th>Landfill Operator</th>
<th>NRETAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Operation</td>
<td>• Provision of annual reports to the NRETAS&lt;br&gt;• Administer landfill operation contract</td>
<td>• Advice to ASTC as required</td>
<td></td>
<td>• Operate site in accordance with obligations of LEMP and contractual arrangements&lt;br&gt;• Continual review of operations and improvement&lt;br&gt;• Administration and maintenance of operating systems eg OH&amp;S, Quality Mgt etc</td>
<td>• Review of annual reports&lt;br&gt;• Intervention in the event of a breach to the Waste Mgt and Pollution Control Act</td>
</tr>
<tr>
<td>Weighbridge Operation</td>
<td>• Administer weighbridge operation contract</td>
<td></td>
<td></td>
<td>• Operate weighbridge in accordance with obligations of LEMP and contractual arrangements&lt;br&gt;• Continual review of operations and improvement&lt;br&gt;• Administration and maintenance of operating systems eg OH&amp;S, Quality Mgt etc</td>
<td></td>
</tr>
<tr>
<td>Tipshop Operation</td>
<td>• Administer tipshop operation contract</td>
<td></td>
<td></td>
<td>• Operate tipshop in accordance with obligations of LEMP and contractual arrangements</td>
<td></td>
</tr>
<tr>
<td>Project Stage</td>
<td>Environment / other Consultant</td>
<td>Contractors</td>
<td>Landfill Operator</td>
<td>NRETAS</td>
<td></td>
</tr>
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<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Continual review of operations and improvement</td>
<td>• Operate HW facility in accordance with obligations of LEMP and contractual arrangements</td>
<td>• Intervention in the event of a breach to the Waste Mgt and Pollution Control Act</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Administration and maintenance of operating systems eg OH&amp;S, Quality Mgt etc</td>
<td>• Continual review of operations and improvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Administration and maintenance of operating systems eg OH&amp;S, Quality Mgt etc</td>
<td>• Administration and maintenance of operating systems eg OH&amp;S, Quality Mgt etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous Waste Facility</td>
<td>• Administer HW facility operation contract</td>
<td>• Advice to ASTC as required</td>
<td>• Operate HW facility in accordance with obligations of LEMP and contractual arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Continual review of operations and improvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Administration and maintenance of operating systems eg OH&amp;S, Quality Mgt etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Intervention in the event of a breach to the Waste Mgt and Pollution Control Act</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenwaste facility</td>
<td>• Administer tipshop operation contract</td>
<td>• Advice to ASTC as required</td>
<td>• Operate greenwaste facility in accordance with obligations of LEMP and contractual arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Continual review of operations and improvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Administration and maintenance of operating systems eg OH&amp;S, Quality Mgt etc</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Intervention in the event of a breach to the Waste Mgt and Pollution Control Act</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Stage</td>
<td>ASTC</td>
<td>Environmental / other Consultant</td>
<td>Contractors</td>
<td>Landfill Operator</td>
<td>NRETAS</td>
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<td>-------------------</td>
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<td>------------------</td>
<td>--------</td>
</tr>
</tbody>
</table>
| Glass crushing facility | • Operate glass crushing facility in accordance with obligations of LEMP and any contractual arrangements  
• Continual review of operations and improvement  
• Administration and maintenance of operating systems eg OH&S, Quality Mgt etc | • Advice to ASTC as required |                  |                  |        |
| Post Closure      | • Administer after care obligations  
• Provision of reporting to the NRETAS | • Environmental monitoring  
• Site inspections  
• Advice to ASTC as required | • Undertake post closure after care activities in accordance with obligations of contractual arrangements | • Review of reporting  
• Intervention in the event of a breach to the Waste Mgt and Pollution Control Act |        |
The Licensee may engage consultants or contractors to assist with the following tasks as required:

- Detail design for future development of the site;
- Construction Quality Assurance (CQA) As Constructed reporting of construction episodes;
- Landfill gas management;
- Environmental site monitoring (eg groundwater, surface water, leachate etc);
- Environmental auditing of the site and its operation;
- Survey;
- After care responsibility off the landfill for 30 years;
- Reviewing the LEMP as per licence conditions or every three years;
- Annual Operations and Monitoring Reporting to NRETAS.

Day to day responsibilities for carrying out operational procedures associated with the environmental management of the site is allocated to:

- The Facility Operator;
- Machinery and Weighbridge Operators; and
- Other assistants as required.

3.3 Training

The Operator shall develop and administer training in OH&S and environmental awareness. Training shall include environmentally sound work practices, which shall be regularly undertaken and updated by the landfill operator and site staff.

Environmental training shall be conducted at the site by experienced personnel and may be split into the following categories:

- Environmental Induction
  This will be a brief introduction to the environmental impacts of the site, to the regulatory requirements for environmental control and to the broad system of environmental monitoring, records and reporting for the site. The fundamental message of the induction will be that environmental management is a necessary and important part of site management, and that the environmental management system will be visible and accessible to all site personnel.

- Instruction in Basic Work Practices Aimed at Minimising Environmental Impact
  This will include clear definition of work practices for site personnel, such as covering the working face, litter control, dust control, restriction of working hours, and the environmental basis for these practices.

- Targeted Environmental Awareness Training
  This will be aimed at senior site personnel and key staff involved with the site. Aspects to be considered for this awareness training will be regulatory requirements in more detail, environmental monitoring programs and results, environmental auditing and community awareness.
The Operator shall ensure that all staff and subcontractors on the site are adequately trained on the work specific and site-specific OH&S relevant to the site. The information provided should include:

- Roles and responsibilities for all site personnel;
- Summary of existing site conditions;
- Evaluation of aspects and impacts;
- Measures to mitigate or manage identified aspects and impacts;
- Personnel protection standards and safe work instructions and procedures;
- OH&S monitoring;
- Annual reviewing of OH&S documents
- Training and communication requirements for all involved in the works;
- Evacuation procedures and emergency contacts established; and
- Emergency Response Plan awareness and training

The Operator will co-ordinate general staff training in accordance with the company training procedures.

3.4 Recording and Reporting Procedures

3.4.1 Record Keeping

The following records shall be kept, on site or at the legal address of the Licensee for a minimum of four years and be made available to Council on request:

- copy of conditions of consent and authorisation (the Licence) under the Waste Management and Pollution Control Act 1998;
- records of staff training. Records of all training are to be kept and maintained on site by the Contractor and should include:
  - Who was trained;
  - When the person was trained;
  - The name of the trainer; and
  - A general description of the training content
- records of inspections conducted by staff;
- records of complaints received;
- records of inspections by NRETAS;
- records of non-conformances and corrective and preventative actions;
- environmental auditing reports;
- copy of LEMP (including emergency response and closure and post closure plan);
- records showing waste storage locations for future possible retrieval;
- copies of the Annual Reports which will include, amongst other items:
- monitoring results for gas, leachate, surface water and groundwater including interpretations of monitoring results by qualified personnel;
- tonnages and types of waste received; and
- copies of Quarterly Reports.

It will be the responsibility of the Licensee to ensure that the above records are kept up to date, and are made available to NRETAS upon request.

3.4.2 Daily Diary

The Operator will be required to complete the Daily Diary, recording all relevant details of the day's activities, including weather conditions, litter and/or dust problems, complaints etc.

3.4.3 Weekly Inspection and Report

The Operator will inspect the site weekly to verify that the operations are being conducted in an environmentally satisfactory manner, and will complete a Weekly Inspection Report. A copy of the Weekly Inspection Report, together with copies of the Daily Log Sheets for that week shall be retained on site. The Weekly Inspection Report Proforma is given in Appendix A.

3.4.4 Quarterly Inspection and Report

During March, June, September and December of each year the Operator will carry out a detailed quarterly inspection of the site. On completion of the inspection, the Operator will prepare a Quarterly Inspection Report. The Quarterly Inspection Report Proforma is given in Appendix A.

3.4.5 Annual Operations and Monitoring Report

On an annual basis the Licensee will compile an Annual Operations Report and an Environment Monitoring Report. The Annual Operations Report shall be for internal use and the Environment Monitoring Report shall be for internal use and submission to NRETAS.

The reporting will incorporate the information detailed below. While the Licensee will be responsible for ensuring the implementation of monitoring programs and data collection, the information in some cases will be supplied by others, such as consultants. Required items to be included in the Annual Operations Report will include:

- Total tonnage and estimated volume of waste received over the weighbridge during the year.

Required items to be included with the Environment Monitoring Report:

- Environmental Monitoring report including:
  - Leachate, groundwater and landfill gas monitoring and adequacy of monitoring program given development status of site;
  - Dust, odour, noise and litter monitoring.
  - Visual inspection of site conditions as required by Section 10 and 12 of this LEMP
- Pollution incidents pursuant to Part 3 of the Waste Management and Pollution Control Act 1998, Environmental duties and Duty to notify of incidents; and
3.5 Framework for Internal and External Reporting

As part of the EMS the Licensee shall implement a number of internal and external recording and reporting procedures, to ensure regular and easy communication between all parties.

Informal internal communication will be achieved largely through regular contact among site personnel, but will be supplemented by regular operational meetings, which will provide the opportunity for environmental matters to be raised by on-site personnel. Keeping site personnel informed about environmental investigations, monitoring, reports and trends will assist greatly in sustaining general environmental awareness.

3.5.1 Internal Environmental Audits

Internal environmental audits will be undertaken by the Licensee to annually assess compliance with the Licence conditions and the LEMP.

The compliance audit will assess the following:

- waste and recyclable materials, types and quantities
- operational procedures including;
  - road and traffic management;
  - daily cover;
- leachate collection system;
- landfill gas management;
- groundwater testing management, monitoring and test results;
- stormwater management;
- landscaping;
- odour, litter, noise and dust management;
- bird, vermin and weed control;
- emergency contingency plans;
- complaints register and actions/remedies effected.

3.5.2 Communication with NRETAS

Communication with NRETAS will be both formal, through reporting routines, and informal through regular contact. Formal reporting routines include:

- Waste data reporting;
• Annual Operations and Monitoring Reports, LEMP updates.

Informal or non-routine correspondence may include discussions relating to the following:
• General environment management or operational enquiries;
• Receipt and investigation of environmental complaints, and timely responses in dealing with manageable issues.

3.5.3 Communication with Community

Any need for active engagement or communication with the local community will be considered by Council in consultation with the ASTC Environment Advisory Committee.

3.6 Complaints

A record of complaints regarding the facility will be kept by the Operator in the site office. An example reporting proforma is given in Appendix A.

The complaints shall include the following information:
• Date and time complaint was reported;
• Name and address of complainant;
• Details of the complaint;
• Date and time of events giving rise to the complaint and the likely cause at the time of the events;
• A description of weather conditions (e.g. temperature, wind speed, wind direction and rainfall) at the time of the events giving rise to the complaint;
• Name and position of person receiving complaint;
• Action taken in response to the complaint; and
• Action taken to prevent a recurrence of the complaint.

3.7 Non-Conformance and Corrective / Preventative Action

A Non-Conformance and Corrective / Preventative Action form will be completed in response to events and/or issues occurring at the site that lead to non-conformance, namely:
• as part of an environmental audit;
• from observations made by personnel on site and recorded in daily log and quarterly inspection reports;
• from complaints made by the general public or by users of the site, and recorded on a complaint form; and/or
• as a consequence of the interpretation of monitoring data.

Completed Non-Conformance and Corrective / Preventative Action forms will be kept on site to provide a traceable record of non-conformance events or issues and a copy provided to the Site Manager. A sample Non-Conformance and Corrective/Preventative Action form is included in Appendix A. Corrective and preventive actions will be specified in non-conformance documentation, which will be signed off by the ASTC Director of
Technical Services when appropriate actions have been completed. The non-conformance and the corrective and/or preventative actions will be documented in the Annual Report.

The majority of environmental observations made by personnel on site will be most appropriately dealt with through daily inspections, with the non-conformance system used to address environmental issues as necessary. Similarly, complaints made by users or the community may be dealt with through the non-conformance system, as required.

Corrective and preventive actions arising as a result of interpretation of monitoring data will usually be recorded as written recommendations in monitoring reports. However, Non-Conformance and Corrective / Preventative Action forms will also be used as a means of tracking the implementation of corrective actions.

Procedures for dealing with non-conformance will be based on:

- identifying the cause of the non-conformance;
- identifying, recording and implementing the necessary corrective action;
- making any changes necessary to avoid repetition of the non conformance (i.e. preventive action); and
- recording in writing any changes in operating procedures that result from corrective / preventive actions.

Any changes to procedures will be reported annually and reflected in future updates of the LEMP, for the operation and management of the site.
4 Site Operations

4.1 General Operations

The site shall only be operated in accordance with the activities for which the Licence has been issued as stipulated in the Licence and shall not modify or alter the site to accommodate activities for which the site is not licensed.

The site consists of the following existing facilities and operational areas:

- Gatehouse and weighbridge;
- Site office and tip shop;
- The landflling area;
- C&D processing area (mobile);
- Greenwaste processing area;
- Asbestos disposal area; and
- Hazardous waste compound.

A waste transfer station and glass processing facility are proposed for future development.

4.2 Site Control

4.2.1 Hours of Operation

The site is open to the public seven days a week from 7.30 am – 5.30 pm.

The Landfill and Tip Shop are closed Christmas Day and Good Friday.

4.2.2 Staffing

Generally the site is operated by at least four (4) staff members.

Duties required to be fulfilled by the site attendants could include the following:

- Landfill Site/Weighbridge Attendant
  - Daily diary and reporting;
  - Internal record keeping (daily, quarterly, annual) and handling telephone enquires;
  - General office management and administration;
  - Inspection and supervision of waste loads deposited;
  - Give detailed directions to waste transporters as to correct procedures.
- Machine Operator/Site Foreman
  - Ensure correct procedures followed during drop off and disposal;
- maintenance of the facility structures in a clean and tidy condition;
- depositing and compacting waste at tipping face, keeping tipping face orderly;
- covering waste at the end of each working day, or at more regular intervals as required;
- windblown litter daily pick up;
- incident reporting;
- placing interim cover layers over completed areas;
- carrying out inspection, maintenance and repairs on equipment;
- inspection of the waste compaction and cover etc;
- establishing litter control fencing around the tipping face;
- maintaining the drains and stormwater detention basins;
- preparing areas for the reception of waste; and
- carrying out dust suppression of unsealed roads and stockpiles.

Duties to be undertaken by the Licensee or undertaken by the Licensee’s representative may include:

- monitoring site in accordance with monitoring programs;
- preparing reports and correspondence for NRETAS.

4.3 Access and Traffic Management

4.3.1 Gatehouse and Entrance Facilities

The site's entrance consists of the entrance gates (to prevent unauthorised access to the site both during and after hours (e.g operating hours for the landfill are between 7:30 am to 5:30 pm)), employees car park and visitors car park, the gatehouse, weighbridges, the office and amenities (see Figure 1).

All visitors to the site other than those disposing of waste or browsing the Tip Shop are required to sign in and out of the site visitor register or as directed by Council.

4.3.2 Site Entrance

Vehicles entering the site must enter through the entrance gates on Commonage Road before proceeding to the gatehouse and weighbridge. Vehicles exit the facility via the same gates. All vehicles entering the landfill must cross the weighbridge before proceeding to the disposal areas as directed by the gatehouse attendant.

4.3.3 Internal Access Roads

Vehicles travelling to and from the landfilling area are to only use the access road provided. The main road through the landfill is Commonage road (e.g Public road), which includes sealed and unsealed parts and has a maximum speed limit of 20 km/hour.

The construction specification for the internal access roads will be on a ‘fit for purpose’ basis, with due consideration being given to local conditions, the levels of traffic and the types of vehicles that will use the road. All roads used for public access shall be constructed for all-weather access with good selection of gravel and non-gravel material and regular maintenance to minimise erosion and access issues.
Generally, all roads that are to be used extensively by external vehicles shall have the following specifications:

- Primary access road wide enough for two (2) vehicles to pass safely (i.e. 2-lane) or a minimum of 8 m road surface plus 2.5 m shoulders on each side;
- Secondary access roads wide enough for two (2) vehicles to pass safely (i.e. 2-lane) or a minimum of 6 m road surface plus 1 m shoulders on each side;
- maximum longitudinal gradient 1 (vertical) is to 8 (horizontal); and
- minimum one-way crossfall 4% (note: two-way (of 2.5%) cross fall is preferred).

4.4 Signage

The Licensee will ensure that all appropriate commercially manufactured signage is installed and maintained as required by the Guidelines, including but not limited to signage indicating:

- that the Licensee holds an authorisation to operate the site as a landfill under the Waste Management and Pollution Control Act 1998 and the Authorisation number;
- at the site entrance the types of wastes the site is licensed to receive including listed wastes and gate fees;
- emergency 24 hour contact details;
- warning signs displayed prominently;
- traffic directional signage, appropriate for the safe and orderly management of traffic on the site;
- “Access prohibited to unauthorised persons”;
- speed limits;
- operating hours;
- concerns and complaints arrangements;
- Fuel Storage.

Fuel for on-site machinery will only be stored at the site in an appropriately bunded facility that is separate from structures or greenwaste stockpiles.

No fuel will be stored in the disposal cell area; and machinery will refuel at the bunded facility or fuel will be transported to machinery on an “as needs” basis.

4.5 Waste Transfer Station

Once established, the purpose of the waste transfer station will be to:

- no longer allow public access to the tipface and operational areas of the site;
- promote safe and efficient drop off of waste by the public;
- promote resource recovery and recycling;
- reduce airspace consumption through waste diversion from landfill (resource recovery etc) and screening out of bulky materials for diversion or improved size reduction measures.

The operator shall manage and maintain the waste transfer station to promote its use to the public and to reduce the potential for accidents and incidents at the facility.
The operator shall clear the drop off of general municipal solid waste daily and shall have other materials removed regularly to ensure tidy facility and minimal loss of value of resources and recyclable items.

Upon completion of the waste transfer station there will be no unauthorised public access to the disposal operations or tip face unless authorised otherwise by Council or the Contractor.

4.6 Landfilling

4.6.1 Residual Waste Generation Rate

Weighbridge data supplied by Council has been reviewed to assess actual waste to landfill for the year 2008/09 to project a future lifespan based on current waste acceptance and landfilling rates. The breakdown of the weighbridge data is presented in the table below.

When considering the waste data for volume of material arriving at the weighbridge and volume of material diverted from landfill as recyclable or recoverable materials, the remaining residual waste going to landfill for 08/09 period was approximately 51,069 tonnes as indicated in Table 4-1.

Table 4-1 Weighbridge Data for 2008/09

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>Accepted</th>
<th>Recycled</th>
<th>Total to Landfill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal Solid Waste (MSW)</td>
<td>27,620</td>
<td>771</td>
<td>26,849</td>
</tr>
<tr>
<td>Green Waste</td>
<td>4,878</td>
<td>2,267</td>
<td>(2,611)</td>
</tr>
<tr>
<td>Construction &amp; Demolition waste (C&amp;D)</td>
<td>3,064</td>
<td>2,556</td>
<td>508</td>
</tr>
<tr>
<td>Liquid Waste</td>
<td>772</td>
<td>-</td>
<td>772</td>
</tr>
<tr>
<td>Metal</td>
<td>105</td>
<td>105</td>
<td>-</td>
</tr>
<tr>
<td>Tyres</td>
<td>3.64</td>
<td>2.0</td>
<td>1.64</td>
</tr>
<tr>
<td>Asbestos</td>
<td>755</td>
<td>-</td>
<td>(755)</td>
</tr>
<tr>
<td>Cover Material</td>
<td>22,938</td>
<td>-</td>
<td>22,938</td>
</tr>
</tbody>
</table>

| Total                                  | 60,136   | 5,701    | 51,069            |

( ) indicates diverted from general landfill

4.6.2 Remaining Landfill Capacity Review

It is estimated that the site has approximately 750,000 m³ of gross airspace remaining between the surveyed existing surface (as at survey date of May 2009) and the top of the final proposed landform.

If we assume that the final capping layer will be 1.0 m thick (0.3 m interim cover, 0.6 m soil layer and a 0.1 m topsoil layer) this reduces the practical fillable airspace of approximately a nett 560,000 m³.

When comparing weighbridge data for waste disposed of to landfill and waste surface survey information, the estimated waste compaction is in the order of 1.07 t/m³ including soil cover. It is estimated that at current landfilling rates, available airspace will be exhausted in approximately 9.4 years.
As large amounts of soil are currently being used in landfilling practices, the soil cover significantly contributes to the relatively high compaction density of 1.07 t/m³. When considering waste density alone, i.e. excluding soil cover material, the estimated waste compaction density is approximately 0.750 t/m³. To maximise the opportunity to increase the landfill's lifespan the target waste compaction rate should be in the order of 0.850 t/m³.

Further opportunity exists for landfill lifespan to be improved through improved resource recovery, reduction of the use of daily cover and improved compaction practices.

4.6.3 Landfill Site Development and Proposed Staging

The remaining landfill airspace shall be filled progressively to facilitate progressive capping and rehabilitation works. Council has determined the proposed staging for landfilling based on identified rehabilitation priority areas such as areas visible from roads or neighbouring properties, areas nearest to sensitive receptors or to facilitate future proposed development at the site such as a waste transfer station or processing area. Proposed staging of landfilling progress is indicated in Figure 6.

Whilst landfilling “stages” have been proposed, these will guide progression of filling and capping as opposed to being strictly defined filling and capping zones. Areas will be capped as they become of suitable extent to facilitate an efficient and cost effective capping campaign as determined by the Licensee.

The Licensee will periodically review landfilling progress and may alter the course of the capping progress based on site specific conditions and other circumstances that may arise.

4.7 Recycling and Resource Recovery Tip Shop

4.7.1 General

The site currently incorporates a Tip Shop for recycled, salvageable items diverted from landfill for sale to the public.

These items typically consist of:

- Recovered building materials;
- Approved electrical appliances/electronic waste;
- Household items and whitegoods;
- Bicycles, toys etc.

4.7.2 Tip Shop Status and Management

The Tip Shop will collect and sell unwanted materials that are collected from the waste stream or donated by the public or local businesses. Electrical items must be certified by an Electrician prior to sale.

The Tip Shop shall be effectively managed in order to prevent the unauthorised entry of persons or waste, promote the sale of salvageable, reusable or recyclable items and provide a clean and tidy environment that is safe for staff and public.

Tip Shop management and operations guidelines are included in Appendix G.
4.8 **Hazardous Waste Compound**

Council has established a hazardous waste storage compound for the temporary storage of hazardous waste prior to periodic removal by waste contractors licensed to remove and appropriately manage these materials. The compound layout is shown in Appendix F.

All chemicals received from public are registered prior to being stored in the hazardous waste compound. Commercial quantities of hazardous waste are not accepted and shall be directed to hazardous waste contractors.

The hazardous waste compound is fully fenced with a 2.4 m high chain mesh security fence with barbed wire top, has bunded areas, ventilated sheds, used oil receptacles and storage space capable of storing a range of household hazardous waste.

Household hazardous waste accepted at the hazardous waste compound includes:

- household chemicals less than 5 litres such as aerosol cans, insect sprays, pest poisons, household cleaners, pharmaceuticals, mothballs and old smoke detectors;
- garden chemicals less than 5 litres such as fertilisers, fungicides, herbicides and insecticides;
- automotive chemicals such as batteries and oils less than 10 litres (including motor and sump oils);
- Gas cylinders etc.
- Only the NT Fire and Emergency Service is allowed to control fires at the hazardous waste compound.

4.9 **Green Waste Processing**

Council have established a green waste drop-off, size reduction and processing area on the western side of the site. Several processes are being trialled such as chipping, mulching and composting of green waste for beneficial uses. The processed product will be utilised by Council for Council projects or for sale to the public.

The green waste processing facility shall be operated in accordance with current best practice standards and guidelines for mulching and composting processes and products sold shall be developed to comply with Australian Standards for various compost products.

The operator shall be familiar with the Waste Management Association of Australia *Best Practice Guidelines: Composting, 2004*. Recycled organics products and products with recycled organic content are defined in the following Australian Standards:

- AS 4454 (2003) Composts, Mulches and Soil Conditioners;

At a minimum, all greenwaste processing undertaken at the site shall be done so in accordance with the Alice Springs Mulch Standards which are included in Appendix H. These standards are based on AS 4454- 2003.

Any mulching/composting activities shall take place at least 100 m away from any fuel depot or infrastructure. A 300 mm high soil bund shall be constructed to surround the Greenwaste processing area as required by the Licence.
4.10 Glass Crushing Facility

Council proposes to develop a glass crushing facility on the western side of the site, adjacent the green waste processing area for sorting, size reduction and preparation of crushed glass for transport to market.

4.11 Plant and Equipment

All plant and machinery shall be operated by persons trained and competent in operation of that equipment, or under the vigilant supervision of a person who is competent in operating such plant. The landfill operator shall be able to provide documentation to Council or an NRETAS authorised person within five days of request, which demonstrates that an employee is competent to operate the machinery directly involved with the Licensed activity.

All plant and machinery shall be adequately maintained and operated to ensure efficient and effective use of the equipment. This will promote the reliability of the equipment and reduce potential impacts to the environment such as excessive noise, burning of fuels and emissions to air. The operator must repair or replace broken plant and machinery within 24 hours.

Maintenance records shall be maintained, including safety checks and be made available to Council on request.
5 Waste Management

5.1 Waste Process Flow

A schematic of the waste process flow is presented in Figure 3.

5.2 Residual Wastes Disposed of at the Landfill

The Operator shall not deliberately burn waste, or cause the burning of waste.

The types of waste accepted at the site and disposed of by burial include:

- Kerbside collected waste;
- Municipal solid waste (MSW) (putrescible and non-putrescible) by public drop-off;
- Residual Construction and Demolition (C&D) waste;
- Commercial and Industrial (C&I) Waste;
- Shredded tyres and asbestos (the only Listed Wastes accepted for burial); and
- Clean fill material (generally imported to site by Council and disposed of as daily and interim cover).

List 1 of the Licence states the site can accept certain other Listed Waste which must not be disposed of by burial at the site.

Waste soil will not be accepted from the public or commercial operations unless a soil contamination report by an environmental consultant (including chemical analysis data from a NATA accredited soil testing laboratory) confirms that the soil does not contain contaminants including asbestos beyond acceptable thresholds. As a general rule, Alice Springs Landfill does not accept extra-municipal waste. In the event of interstate Listed Waste arriving at the landfill the following procedure will be implemented:

- The transport contractor will be asked to present the Waste Transfer Certificate and details of their Listed Waste Licence. Failure to provide the documents will result in the waste materials not being accepted.
- In the case of a Certificate and Licence:
  - The following details must be recorded: the registration number of the delivery truck, their Listed Waste licence and certificate, details of transport contractor, and type, weight etc. of all waste.
- In the case of no Certificate or Licence:
  - The following details must be recorded where possible: the registration number of the delivery truck, the details of the trucking contractor and the waste type.
  - the trucking contractor will be instructed of its obligations under the “Interstate Transport of Controlled Wastes NEPM”
  - the relevant NT and interstate environmental state authorities will be informed of the incident.
5.3 Reuse and Recycling

5.3.1 Reusable and Recyclable Materials Drop-off

Reuse and recycling activities occur at the site and appropriate facilities are provided to receive these wastes. Items are dropped off as directed by the gatehouse attendant. Users of the facility will have the opportunity to unload the following materials at the waste transfer station or the Tip Shop, for recovery by the operator:

- glass;
- plastic;
- paper and cardboard;
- ferrous metals and non-ferrous metals;
- electronic equipment etc;
- reusable products not requiring recycling or reprocessing, e.g. water tanks, white goods;
- inert soil materials;
- building and demolition waste;
- timber; and
- tyres.

Uncontaminated green waste is accepted at the site and is processed into a resource.

5.4 Waste Management Operations

5.4.1 Receiving Waste

The Operator will record waste quantities accepted, in accordance with the schedule set out in Table 5-1.

The Operator will monitor waste placed on the landfill floor prior to disposal and compaction for recoverable or hazardous materials. When recyclable items or hazardous items (such as used tyres, gas cylinders and car batteries etc) are found they shall be removed and sent to the appropriate storage location at the site until eventual removal from site.
# Table 5-1 Records of Waste Types and Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Information</td>
<td>Numbers and types of delivery vehicles&lt;br&gt;Waste quantities (computerised weighbridge)&lt;br&gt;Volumetric survey of placed waste and estimate of remaining airspace</td>
</tr>
<tr>
<td>Location</td>
<td>Weighbridge</td>
</tr>
<tr>
<td>Methodology</td>
<td>Maintain accurate, comprehensive and up to date records&lt;br&gt;Carry out spot checks on incoming loads to ensure compliance</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Operator</td>
</tr>
<tr>
<td>Frequency</td>
<td>Continuous&lt;br&gt;Annual survey as a minimum</td>
</tr>
<tr>
<td>Duration</td>
<td>Operating life of site</td>
</tr>
<tr>
<td>Acceptance Criteria</td>
<td>All key information recorded and appropriate stored and reported</td>
</tr>
<tr>
<td>Reporting - Internal</td>
<td>Daily returns completed by the weighbridge operator&lt;br&gt;Monthly summaries of returns collated by the Operator</td>
</tr>
<tr>
<td>Reporting - External</td>
<td>Annual Report submitted to NRETAS</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Refuse to accept non complying materials&lt;br&gt;Check/review adequacy of above monitoring procedures&lt;br&gt;Review training/need for training&lt;br&gt;Implement corrective actions and modify procedures as necessary</td>
</tr>
<tr>
<td>Management Review</td>
<td>Licensee to review procedures and implement recommendations from Annual Operational and Environmental Monitoring Report</td>
</tr>
</tbody>
</table>

## 5.4.2 Waste Drop-off

The site will operate as summarised below:

- Vehicles transporting waste to the site will enter the site via the access road off Commonage Road;
- Waste materials will be inspected and fees collected by site staff at the gatehouse;
- Vehicles, public or contractor will be directed to the appropriate disposal location (waste transfer station, hazardous waste compound, Tip Shop or green waste area);
- Listed Waste materials, apart from shredded tyres and asbestos, shall be directed to the hazardous waste compound;
- Vehicles shall enter the assigned area, deposit waste at or adjacent to the drop-off location, as directed, and exit the area;
• Barricading shall be provided to separate public vehicles from Contractor plant and equipment.
• Waste collected at the waste transfer station will be stored temporarily and processed on-site or off-site, or resold in the Tip Shop;
• Waste collected at the hazardous waste compound will be stored temporarily until removal by appropriate contractors off-site (See Section 5.5);
• Liquid waste shall be temporarily stored until removal by appropriate contractors off-site;
• Recyclable or salvageable materials dropped off at the waste transfer station will be sorted by the Operator and resold in the top shop or other markets.

5.4.3 Waste Disposal and Compaction

The primary measures to protect the environment and preserve landfill airspace are by effective placement and compaction of the waste and efficient use of daily cover. The following measures shall be undertaken to ensure effective and efficient waste disposal and compaction at the site:

• The Operator shall remove or appropriately manage bulky items that hinder compaction eg white goods, mattresses, timber pallets, cardboard, tyres etc;
• The landfill Operator shall establish a second tip face to aid resource recovery. All recyclable vehicle loads shall be directed to the second tip face;
• The tipping face must be surrounded by a 300 mm high impermeable bund to prevent stormwater from flowing across the tipping face;
• Daily cover shall be stripped back and stockpiled the following day prior to daily filling for reuse as daily cover. Cover soil contaminated with waste shall be used in the first layer of daily cover;
• The residual waste at the tip face will be pushed across the working face and will be compacted in layers (maximum 600 mm uncompacted thickness) by trafficking over each layer with specialised waste compaction equipment, until the lift height (approximately 2 m) has been attained (Caterpillar Performance Handbook; Caterpillar 2007);
• With this machinery the operator should be aiming for three to five passes (one pass being back and forth over the waste) to achieve optimum density. A greater number of passes may not achieve any greater density so will be wasted effort and this will be gauged by the operator (Caterpillar Performance Handbook; Caterpillar 2007);
• Where possible, the operator should compact waste up against a sideslope in the order of 1H:3W (Caterpillar Performance Handbook; Caterpillar 2007). The compaction effort should be in the direction upgrade to the slope. This way the braking force of the compactor delivers its force more directly into the waste face. If a working face does not allow compaction upslope, reasonably effective compaction can be achieved along a flat surface. Whenever possible, the Operator should avoid compacting waste in a downslope direction;
• The Operator will aim to achieve a target compacted waste density of 850 kg/m³ (as monitored by topographical survey and weighbridge records) by applying an evenly consolidated load by waste compacting equipment;
• A minimum of 150 mm of daily cover (7 days week) will be applied to the compacted wastes at the end of each day as a minimum, no putrescible waste shall remain uncovered at the end of the working day. More frequent application of daily cover may be required, such as on windy days.
• If clean fill for soil cover totals more than 15% of the total waste received annually through the gate then alternative daily cover options shall be investigated.
Alternative daily cover applications such as metal hoods, sprays, films or waste-derived materials may be used in lieu of or in conjunction with soil application. Alternative measures must be cost effective when compared to soil usage and approved by Council and NRETAS;

At approximate final formation, or if the cell is left for any length of time, for example to commence a new cell, then the surface will be covered with a 300 mm thick layer of interim cover material to prevent exposure of waste for the period until the final capping layer is constructed;

When waste placement returns to an area covered with interim cover, this cover soil material shall be stripped back and stockpiled for reuse as daily cover soil;

At approximate final formation the cell where practical will be covered with a cap constructed to the specified design and grades (as described in Section 16);

Unauthorised waste will be identified, where possible, at the time of disposal and appropriate measures taken to remove it from the waste stream. Where possible waste vehicles containing unauthorised waste will be prevented from tipping their load.

<table>
<thead>
<tr>
<th>Table 5-2</th>
<th>Waste Disposal Performance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameter</strong></td>
<td><strong>Performance Criteria</strong></td>
</tr>
<tr>
<td>Waste Layer Thickness</td>
<td>Max 0.6 m</td>
</tr>
<tr>
<td>Total Lift height</td>
<td>Min 2.0 m</td>
</tr>
<tr>
<td>Waste disposal area (daily cell/ tip face)</td>
<td>Max 80 m²</td>
</tr>
<tr>
<td></td>
<td>Eg Approx. 9 m (L) x 9 (W)</td>
</tr>
<tr>
<td>Compaction method</td>
<td>Upslope 1(H):3(W)</td>
</tr>
<tr>
<td>Final batter slope construction</td>
<td>Slope 1(H): 4W</td>
</tr>
<tr>
<td>Final capping cover</td>
<td>Min 1000 mm</td>
</tr>
<tr>
<td>Target Waste Density</td>
<td>Min 850 kg/m³</td>
</tr>
<tr>
<td>Daily Cover</td>
<td>Min 150 mm</td>
</tr>
<tr>
<td>Alternative daily cover</td>
<td>Cost effective alternative to soil usage</td>
</tr>
<tr>
<td>Interim Cover</td>
<td>Min 300 mm</td>
</tr>
<tr>
<td>Cover stockpile</td>
<td>Min 1 000 m³</td>
</tr>
</tbody>
</table>
5.4.4 Cover Stockpiles

A daily cover stockpile of at least 1,000 m³ of suitable soil will be maintained on site. The stockpile will be accessible in all weather conditions and no higher than two metres.

Stockpiles of materials for the final landfill cap will be maintained as necessary for the construction of the cap.

5.4.5 Processing of Materials

Green Waste

Green waste shall be processed at the landfill site in accordance with Section 4.9. This includes shredding, and mulching or composting to produce a product suitable for use on the rehabilitated landfill, or on-sold for other applications in and around Alice Springs.

All green waste shall continue to be diverted from landfill to the processing area for temporary storage prior to further processing. No green waste shall be disposed of at the tip face.

Inert Waste

Inert waste such as clean soil material, confirmed uncontaminated rock samples and rocky soil material shall be stockpiled, classified (testing to confirm contamination status) and sorted prior to use as daily or final cover material on the landfill. Stockpiles shall be no higher than two metres to promote vision about the stockpile and prevent collapse.

Construction and Demolition Waste

Construction and demolition waste shall be sorted, processed and stockpiled to produce cover materials for the landfill, or crushed concrete materials for sale. Residual materials resulting from the sorting and processing of the waste C&D material shall be land filled.

Crushed concrete aggregate produced shall be a uniformly graded coarse aggregate (4-32 mm) as determined by particle size distribution (PSD) testing from a NATA accredited laboratory, produced by crushing waste concrete with total contaminant levels of all material other than concrete lower than 2% of the bulk mass (by weight). Contaminant material includes wood, plastic, glass, asphalt, shale, gneiss or clean fill. The presence of clean soil within the crushed concrete product is considered a contaminant and therefore the material cannot be classified and crushed concrete aggregate. Clean fill should be separated at all times from crushing and processing and used as daily cover only.

The source waste concrete material shall be sorted and clean concrete generated from building rubble, demolished structures or service pavements, for the purpose of crushing and grading to produce uniform quality crushed concrete aggregate.

Steel/Metal Waste

Recovered steel and metal items shall be stockpiled prior to processing and removal from site. Stockpiles shall be no higher than two metres to promote vision around the site and minimise the risk a stockpile collapse.

Caution and appropriate measures must be taken when storing sheet metal items or other items susceptible to being moved by wind.
5.4.6 Resale of Materials

Recycled, recovered or salvaged items will be sold at the Tip Shop as discussed in Section 4.7 and in accordance with the Tip Shop Operations and Management Guidelines in Appendix G.

An area around the Tip Shop could be reserved for the sale of compost and mulch materials.

5.4.7 Daily Cover

In accordance with the conditions attached to the Environment Protection Licence, the Licensee will ensure that waste is covered at the end of each day’s operation with a minimum of 150 mm of clean fill, or similar approved material, or other approved alternative daily covering such as removable lids, spray on materials or films etc.

5.5 Hazardous Waste

A hazardous waste compound has been established on site for storage of hazardous wastes prior to removal by specialist contractors.

The compound houses a bunded waste oil receptacle, LPG bottle receptacle, bunded battery storage area, a drum muster area and several enclosures for specified hazardous wastes based on their hazard classification. The compound is surrounded by a barbed wire topped 1.8 m chain mesh fence.

5.5.1 Hazardous Waste Drop-off

The following items may be dropped off at the hazardous waste facility:

- Batteries (car and household);
- household hazardous materials such as bathroom cleaning products, herbicides, pesticides, fertilizers, floor care products, photographic liquids and water based paints;
- waste car fluids such as brake and transmission fluid, engine and sump oil, petrol, diesel and kerosene;
- cooking oil, fats and greases; and
- gas bottles.

Only domestic household quantities of hazardous wastes shall be accepted at the facility.

5.5.2 Hazardous Waste Handling

Hazardous household wastes shall only be accepted during limited times as specified by the Operator. All hazardous waste delivered to the site must be stored within the appropriate receptacles within the hazardous waste compound which shall remain locked at all times.

The Operator will ensure that all site staff that may be responsible for handling hazardous wastes are appropriately trained to handle all hazardous waste types accepted at the facility, and are knowledgeable in the appropriate storage methods for all hazardous waste types accepted.

5.5.3 Hazardous Waste Storage and Collection

The collected hazardous waste will be stored in the appropriate waste receptacles and periodically removed by an appropriately qualified, licensed and Approved Contractor.
The Licensee shall ensure that a suitably licensed Listed Waste Transporter under the *Waste Management and Pollution Control Act* is used to receive and remove Listed Waste to and from the site and all other parties involved in handling Listed Waste that is to be treated and/or disposed of in the Northern Territory must deposit the waste at a premises that is licensed under the *Waste Management and Pollution Control Act* to receive that type of waste.

Additionally, the Licensee and all other parties involved in handling Listed Waste to be treated and/or disposed of elsewhere in Australia must deposit the waste at premises licensed or approved by that State's or Territory's Authorising Agency to receive that type of waste and in accordance with the National Environmental Protection Measure for the Movement of Controlled Waste between States and Territories. A copy of the completed Waste Transport Certificate is to be submitted to NRETAS when Listed Waste is transported interstate.

Where the hazardous waste is deemed to be flammable and/or combustible, storage shall meet with the requirements contained under AS 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids*.

Batteries will be collected and stored within a bunded area on timber pallets. Batteries shall be stacked not more than two rows high. A maximum of six pallets may be stored at the site prior to being removed.

Asbestos management is discussed in Section 13.
6 Groundwater Management

6.1 Groundwater Monitoring Wells

Six groundwater monitoring wells are established and operational. The six wells (MW1 – MW4, MW5A and MW6A) are sampled and tested for groundwater quality annually. These wells have been continuously monitored since 1999.

The data from future annual monitoring episodes will be used in subsequent operational and post closure monitoring for comparison.

The groundwater monitoring wells have been surveyed to the top of steel casing, and together with their construction details are presented below in Table 6-1.

<table>
<thead>
<tr>
<th>Well Label</th>
<th>Date Installed</th>
<th>Total Depth of well (m)</th>
<th>Elevation Top of Casing (mAHD)</th>
<th>Depth to G/water* (m)</th>
<th>RL G/water (mAHD)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW1</td>
<td>02/10/1998</td>
<td>25.5</td>
<td>565.96</td>
<td>6.58</td>
<td>559.39</td>
</tr>
<tr>
<td>MW2</td>
<td>02/10/1998</td>
<td>12</td>
<td>565.41</td>
<td>4.32</td>
<td>561.10</td>
</tr>
<tr>
<td>MW3</td>
<td>02/10/1998</td>
<td>37</td>
<td>579.93</td>
<td>20.67</td>
<td>559.27</td>
</tr>
<tr>
<td>MW4</td>
<td>-</td>
<td>8</td>
<td>564.35</td>
<td>2.14</td>
<td>562.2</td>
</tr>
<tr>
<td>MW5A</td>
<td>19/02/2006</td>
<td>18</td>
<td>571.05</td>
<td>11.73</td>
<td>559.32</td>
</tr>
<tr>
<td>MW6A</td>
<td>19/02/2006</td>
<td>23.4</td>
<td>577.13</td>
<td>17.79</td>
<td>559.33</td>
</tr>
<tr>
<td>EMO1</td>
<td>Proposed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MW(P)01</td>
<td>Proposed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Based on observed levels during February 2009 monitoring round

The locations of the existing groundwater monitoring wells are shown in Figure 4.

6.2 Groundwater Monitoring

Groundwater monitoring activities will be carried out in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM 1999) and AS/NZS 5667.1 Water Quality—Sampling—Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples and include appropriate Quality Assurance and Quality Control (QA/QC) procedures including field blanks, duplicate samples, sample preservation and chain of custody documentation and decontamination procedures.

Minimum annual inspection and monitoring of the groundwater will be conducted by suitably qualified personnel. Water quality analysis will be conducted by a NATA registered laboratory. Groundwater sample recovery and field analysis will be made by suitably qualified and experienced individuals or organisations using calibrated field instruments. Groundwater reporting shall include a review of the groundwater contours for the site and updating as required.

When additional groundwater wells are established at the site the information gathered from the installation works shall be reviewed and the groundwater contour model shall be updated.
Groundwater monitoring will continue after full closure of the site. The duration of post-closure monitoring will be dependent on the results and trend analysis, potential risks and will be subject to annual review, which may indicate that post closure monitoring can be reduced or ceased.

### Table 6-2  Groundwater Monitoring Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>REASONS FOR MONITORING</td>
<td></td>
</tr>
<tr>
<td>• Ensure no leachate impact on groundwater</td>
<td></td>
</tr>
<tr>
<td>• Ensure general compliance with:</td>
<td></td>
</tr>
<tr>
<td>− Environment Protection Licence conditions</td>
<td></td>
</tr>
<tr>
<td>− National Environment Protection (Assessment of Site Contamination) Measure 1999</td>
<td></td>
</tr>
<tr>
<td>− General Environmental Duty (Waste Management and Pollution Control Act 1998)</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Comment</td>
</tr>
<tr>
<td>Key Information</td>
<td>Field Measured Parameters – EC, DO, Eh, pH, Temperature</td>
</tr>
<tr>
<td></td>
<td>Laboratory Measured Parameters – as per Table 6-3</td>
</tr>
<tr>
<td></td>
<td>Standing Water Level (to AHD)</td>
</tr>
<tr>
<td></td>
<td>Condition of monitoring infrastructure including access</td>
</tr>
<tr>
<td>Locations</td>
<td>All wells (MW1 to MW6a)</td>
</tr>
<tr>
<td>Methodology</td>
<td>As per:</td>
</tr>
<tr>
<td></td>
<td>− National Environment Protection (Assessment of Site Contamination) Measure 1999</td>
</tr>
<tr>
<td></td>
<td>− AS/NZS 5667.1 Water Quality—Sampling—Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (1998).</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Licensee or Qualified consultant</td>
</tr>
<tr>
<td>Frequency</td>
<td>Annually, targeting 4 weeks either side of early February to limit the effect of seasonal fluctuations unless annual review indicates this frequency should be amended otherwise.</td>
</tr>
<tr>
<td>Duration</td>
<td>Throughout operations and post closure subject to annual review</td>
</tr>
<tr>
<td>Acceptance Criteria</td>
<td>Trend analysis and no evidence of leachate impact on groundwater (subject to interpretation by Consultant)</td>
</tr>
<tr>
<td></td>
<td>Monitoring wells accessible and in good working order</td>
</tr>
<tr>
<td>Reporting - Internal</td>
<td>Annual report</td>
</tr>
<tr>
<td>Reporting - External</td>
<td>Annual Report to be submitted to NRETAS</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Carry out further investigations</td>
</tr>
<tr>
<td></td>
<td>Implement measures to minimise further leachate impacts on groundwater</td>
</tr>
<tr>
<td></td>
<td>Repair/Reinstate if damaged</td>
</tr>
</tbody>
</table>
### Table 6-3  Groundwater Analysis Requirements – All wells

<table>
<thead>
<tr>
<th>Laboratory Analysis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>Total iron</td>
</tr>
<tr>
<td>TDS</td>
<td>Phenols (by speciation)</td>
</tr>
<tr>
<td>Eh</td>
<td>Arsenic (As)</td>
</tr>
<tr>
<td>COD</td>
<td>Boron</td>
</tr>
<tr>
<td>TOC</td>
<td>Cadmium (Cd)</td>
</tr>
<tr>
<td>Nitrogen (as Ammonia)</td>
<td>Chromium (Cr)</td>
</tr>
<tr>
<td>Nitrite and nitrate</td>
<td>Copper (Cu)</td>
</tr>
<tr>
<td>TKN</td>
<td>Nickel (Ni)</td>
</tr>
<tr>
<td>TSS</td>
<td>Lead (Pb)</td>
</tr>
<tr>
<td>BOD</td>
<td>Mercury (Hg)</td>
</tr>
<tr>
<td>phosphorus</td>
<td>Selenium (Se)</td>
</tr>
<tr>
<td>fluoride</td>
<td>Manganese (Mn)</td>
</tr>
<tr>
<td>calcium</td>
<td>Zinc (Zn)</td>
</tr>
<tr>
<td>Magnesium</td>
<td>TPH</td>
</tr>
<tr>
<td>Sodium</td>
<td>BTEX</td>
</tr>
<tr>
<td>potassium</td>
<td>PAH</td>
</tr>
<tr>
<td>chloride</td>
<td>Pesticides and Herbicides</td>
</tr>
<tr>
<td>bicarbonate</td>
<td>VOC’S</td>
</tr>
<tr>
<td>sulphate</td>
<td>SVOC’s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field Analysis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Redox Potential (Eh)</td>
</tr>
<tr>
<td>Standing water level (to AHD)</td>
<td>Electrical Conductivity (EC)</td>
</tr>
<tr>
<td>pH</td>
<td>Dissolved Oxygen</td>
</tr>
</tbody>
</table>

### 6.3 Reporting

A summary report of all sampling and monitoring undertaken on site will be prepared annually. The report will include:

- all field and laboratory analytical data collected during the review period;
- all groundwater levels measured;
- details of any changes in waste facility operation procedures that may have impacted on the quality of groundwater beneath the site;
- any incidents which may have resulted in release of leachate to the environment;
- an assessment of monitoring results including trend analysis;
- a summary of recommendations; and
- updated groundwater contour model.
7 Leachate Management

7.1 General

Leachate generation is limited at the site due to local climatic conditions, the relatively dry makeup of landfill wastes and the use of soil to cover waste.

On average the area experiences approximately 280 mm of rainfall and approximately 3,106 mm of evaporation annually.

In accordance with good landfilling practice, soil coverage is applied to the compacted waste to isolate the waste from the environment and human contact until the landfilling area is eventually capped in accordance with an approved Closure Plan.

Surface water runoff generated from within the landfilling area following rain events is considered leachate due to the potential of the material to come into contact with the deposited wastes. When present this runoff shall be directed via surface drainage to local surface depressions within the landfill site for temporary storage. This limits its impact on landfilling operations and offsite receptors and ensures that the water remains ponded until it evaporates. Leachate shall remain separated from clean surface water runoff such as clean offsite water that enters the site on the western side of the site and ponds temporarily. Clean and potential leachate affected surface water shall be directed or intercepted to the leachate area as shown in Figure 5.

The majority of rainfall that infiltrates into the soil covering the waste mass will be managed via evaporation.

7.2 Leachate Monitoring Wells

Two leachate monitoring wells are established and operational. The two wells (MW37 and MW38) are sampled and tested for levels and water quality annually. These wells have been continuously monitored since 1999.

Leachate monitoring data is useful in the event of a suspected leachate to groundwater impact detected at any of the external groundwater monitoring wells through comparison of the leachate analysis with the suspected impacted groundwater sample.

The locations of the existing leachate monitoring wells are shown in Figure 4.

7.3 Leachate Monitoring

The Licensee will carry out leachate monitoring in accordance Section 6.2 and with the schedule set out in Table 7-1 below.
### Table 7-1 Leachate Monitoring Schedule

**REASONS FOR MONITORING**
- Check presence and quality of leachate
- Ensure general compliance with:
  - Environment Protection Licence conditions
  - National Environment Protection (Assessment of Site Contamination) Measure 1999
  - General Environmental Duty (Waste Management and Pollution Control Act 1998)

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Information</td>
<td>Field Measured Parameters – EC, DO, Eh, pH, Temperature Laboratory Measured Parameters – as per Table 7-2 Leachate levels in collection sump within the leachate monitoring wells (to AHD) Condition of monitoring infrastructure</td>
</tr>
<tr>
<td>Locations</td>
<td>MW37 and MW38</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Licensee or Qualified consultant</td>
</tr>
<tr>
<td>Frequency</td>
<td>Annually, targeting 4 weeks either side of early February to limit the effect of seasonal fluctuations unless annual review indicates this frequency should be amended otherwise.</td>
</tr>
<tr>
<td>Duration</td>
<td>Throughout operations and post closure subject to annual review</td>
</tr>
<tr>
<td>Acceptance Criteria</td>
<td>Samples analysed for comparison with groundwater sample test results Monitoring wells accessible and in good working order</td>
</tr>
<tr>
<td>Reporting - Internal</td>
<td>Annual report</td>
</tr>
<tr>
<td>Reporting - External</td>
<td>Annual Report to be submitted to NRETAS</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Repair/Reinstate if damaged prior to next monitoring round</td>
</tr>
</tbody>
</table>
Table 7-2  Leachate Analysis Requirements – All wells

<table>
<thead>
<tr>
<th>Laboratory Analysis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>Total iron</td>
</tr>
<tr>
<td>TDS</td>
<td>Phenols (by speciation)</td>
</tr>
<tr>
<td>Eh</td>
<td>Arsenic (As)</td>
</tr>
<tr>
<td>COD</td>
<td>Boron</td>
</tr>
<tr>
<td>TOC</td>
<td>Cadmium (Cd)</td>
</tr>
<tr>
<td>Nitrogen (as Ammonia)</td>
<td>Chromium (Cr)</td>
</tr>
<tr>
<td>Nitrite and nitrate</td>
<td>Copper (Cu)</td>
</tr>
<tr>
<td>TKN</td>
<td>Nickel (Ni)</td>
</tr>
<tr>
<td>TSS</td>
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</tr>
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<td>BOD</td>
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<tr>
<td>phosphorus</td>
<td>Selenium (Se)</td>
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<tr>
<td>fluoride</td>
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<td>Zinc (Zn)</td>
</tr>
<tr>
<td>Magnesium</td>
<td>TPH</td>
</tr>
<tr>
<td>Sodium</td>
<td>BTEX</td>
</tr>
<tr>
<td>potassium</td>
<td>PAH</td>
</tr>
<tr>
<td>chloride</td>
<td>Pesticides and Herbicides</td>
</tr>
<tr>
<td>bicarbonate</td>
<td>VOC'S</td>
</tr>
<tr>
<td>sulphate</td>
<td>SVOC's</td>
</tr>
</tbody>
</table>

Field Analysis

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Redox Potential (Eh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing water level (to AHD)</td>
<td>Electrical Conductivity (EC)</td>
</tr>
<tr>
<td>pH</td>
<td>Dissolved Oxygen</td>
</tr>
</tbody>
</table>

7.4 Reporting

A summary report of all sampling and monitoring undertaken on site will be prepared annually. The report will include:

- all field and laboratory analytical data collected during the review period;
- all leachate levels measured;
- details of any changes in waste facility operation procedures that may have impacted on the characteristics beneath the site;
- an assessment of monitoring results compared to groundwater analysis; and
- a summary of recommendations.
8 Surface Water, Erosion and Mud Management

8.1 Surface Water Controls

The surface water flow around the facility during the operational phase (external) will be controlled by cut off swales and drains. Flow direction and ponding of surface water in shown in Figure 5.

Water falling into the operational areas (internal) will be controlled so that it is separated into both clean surface water runoff and potentially contaminated runoff (leachate).

8.1.1 External Drainage

External drainage refers to surface water runoff outside the landfilling footprint. Drainage swales and bunding shall be established based on surface runoff direction and maintained so that this water is diverted around the facility and discharged back into the naturally occurring surface water system. Drainage will be sized to preclude the inundation of the operational area from a 1 in 100 year ARI rain event.

8.1.2 Internal Drainage

Internal drainage shall consist of swales and bunding managing clean surface water runoff on the landfill footprint and considered potentially contaminated surface water by leachate.

Clean water runoff from the batters slopes around the disposal cell will be directed to the surface water detention area. Leachate will be contained within the disposal cell area.

Surface runoff falling within the operational areas of the facility and not contacting waste will be managed at the site to ensure:

- as much surface water as possible is excluded from entering the active disposal areas;
- ensure uncontrolled ponding of water in operational areas is prevented;
- ensure access roads remain accessible in most weather conditions;
- manage surface water within the facility, preventing uncontrolled offsite surface water discharges;
- minimise the generation of leachate from exposure of clean water to contaminants to minimise leachate generation; and
- prevent soil erosion and uncontrolled exposure of waste due to loss of soils cover.

Maintenance of effective surface water controls will be carried out, as required, as part of operational works associated with the facility.

Surface water runoff generated from within a working cell is to be treated as leachate and contained to the disposal cell area or the surface water detention area.

8.2 Mud and Slurry Control

The main sources of fugitive mud and slurry are from the crushing and screening plant, landfilling areas covered with interim cover soils, interim cover soil erosion and vehicles driving on soil surfaces and access roads.
To ensure effective mud and slurry management and control:

- Ensure site drainage is in good order;
- Check access roads are shaped for effective runoff;
- Clear and regrade roads as required;
- Check all access roads for muddy conditions;
- Temporarily close access to wet and soft surfaces; and
- De-silt sedimentation in drains and ponding location if silt build up is excessive.

8.2.1 Future Surface Water and Erosion Management

Additional surface water management elements will be implemented, as required, as disposal progresses within a given stage and new cells are developed and capped. Future surface water management elements will include:

- Progressive construction of swales and service water diversion drainage around the perimeter of the finished cell capping to direct runoff to the clean surface water area as shown in Figure 5; and
- Erosion control measures.

8.3 Surface Water Monitoring

Surface water drainage at the site will be inspected weekly by the Operator and if erosion and/or silting are evident, the cause will be investigated and the damage will be repaired and the drainage system reinstated, as appropriate.

During the operational life of the facility, soil cover and water management bunds will be inspected for erosion and if cracks or holes are evident, the missing cover materials will be replaced immediately to ensure separation between waste and the environment.

8.4 Surface Water and Erosion Maintenance

The condition of the surface water drainage system including swales, drains, ponds and erosion protection shall be inspected weekly and after major rainfall events.

The maintenance, repairs and remediation measures to be undertaken by the Operator for the duration of operations at the site is outlined in Table 8-1.

Scouring shall be repaired by reapplication of eroded materials and measures implemented to reduce the potential for reoccurrence.

### Table 8-1 Surface Water, Erosion and Mud Maintenance Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Performance indicators</th>
<th>Potential Maintenance, repairs and remediation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Roads</td>
<td>Erosion of surface materials</td>
<td>Replace lost materials, regrade as needed</td>
</tr>
<tr>
<td>Surface Water Drainage System</td>
<td>Erosion and ponding of water</td>
<td>Remove silt or excessive vegetation and dispose; Remove accumulated silt from perimeter drains as required; Repair and/or replace damaged components; Regrade or reroute as needed</td>
</tr>
<tr>
<td>Item</td>
<td>Performance indicators</td>
<td>Potential Maintenance, repairs and remediation measures</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Interim cover/Cap</td>
<td>Erosion, settlement, cracks or holes</td>
<td>Re-establish surface water drainage system Reconstruct missing cover replacing all materials to the same standard as designed, constructed and certified Additional cover if desiccation and cracking is observed, installed to the same standard as designed, constructed and certified Drain or pump off water, fill depressions, regrade slopes and revegetate as described above</td>
</tr>
<tr>
<td></td>
<td>Ponding of water</td>
<td></td>
</tr>
<tr>
<td>Revegetation and Landscaping</td>
<td>Loss of grass cover</td>
<td>Investigate cause and remedy appropriate; re-topsoil and reseed</td>
</tr>
<tr>
<td></td>
<td>Loss of plantings</td>
<td>Investigate cause and remedy as appropriate; replace plantings</td>
</tr>
<tr>
<td></td>
<td>Excessive Pest Plants growth</td>
<td>Spray or remove pest plants if practical to do so; if removed, dispose off in designated disposal areas (e.g. landfill)</td>
</tr>
</tbody>
</table>
9 Landfill Gas Management

9.1 Landfill Gas Production

Landfill Gas (LFG) is produced as the organic matter in waste is decomposed by bacteria under anaerobic conditions. LFG is typically produced within 6 to 12 months of initial waste placement and may continue for decades in dry environments. The gas generation within any facility generally rises to a peak shortly after final capping of the site and then declines at a rate that is dependent on waste placement and compaction, composition, moisture content and other environmental factors.

The environmental impacts of LFG are in three areas:

- global – methane from LFG is a greenhouse gas;
- regional – LFG can cause odours off-site; and
- local – LFG can prevent the revegetation of the site and surrounds.

In addition, LFG can pose a human health and/or explosion hazard if it migrates into building structures on and adjacent to facilities. The risk of adverse impacts to human health and/or the environment on or near this site are increased as there is no barrier layer or liner to confine the LFG to the waste mass, thereby promoting the migration potential of the LFG.

LFG emissions will be monitored during the life of the facility operation and after site closure until potential emissions no longer pose unacceptable health or environmental risks.

9.2 LFG Management

Landfill management current best practice requires that the potential hazards posed by LFG such as adverse environmental impacts, explosion hazard and asphyxiation are managed during the facility’s operational and post closure phases.

The required outcomes for best practice LFG management relative to this site include:

- no adverse impacts on-site or offsite from LFG;
- minimise greenhouse gas emissions as far as practical;
- LFG concentrations at the boundary to not exceed 1% methane by volume or 1.5% carbon dioxide by volume;
- Prevention of explosive concentrations and impact to human health or infrastructure;
- Prevention of nuisance odours and management of airborne toxic gases or pathogens so as to not impact on the community;
- Monitoring of LFG to ensure risk of impacts minimised and to monitor performance to guide future LFG management measures.
9.3 LFG Monitoring

The Licensee utilising an experienced contractor will be responsible for monitoring of the LFG wells. The Consultant will carry out LFG monitoring, in accordance with the schedule set out in Table 9-1 below.

Monitoring will occur at locations as shown in Figure 4.

### Table 9-1 Landfill Gas Monitoring Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>REASONS FOR MONITORING</td>
<td>Protect public health and safety, and responsible environmental control</td>
</tr>
<tr>
<td></td>
<td>Prevent accumulation of explosive concentrations</td>
</tr>
<tr>
<td></td>
<td>Assess for indicators of LFG migration</td>
</tr>
<tr>
<td></td>
<td>Ensure general compliance with:</td>
</tr>
<tr>
<td></td>
<td>– Environment Protection Licence conditions</td>
</tr>
<tr>
<td></td>
<td>– General Environmental Duty (<em>Waste Management and Pollution Control Act 1998</em>)</td>
</tr>
<tr>
<td>Key Information</td>
<td>Field measured parameters – CH₄, CO₂, O₂, atmospheric pressure</td>
</tr>
<tr>
<td>Locations</td>
<td>All LFG monitoring wells (EM01, LG 7, 8, 9, 10A(U, L), 12(U, M, L), &amp; 13)</td>
</tr>
<tr>
<td></td>
<td>Enclosed/confined spaces in buildings or infrastructure within 250 m of landfilling footprint</td>
</tr>
<tr>
<td>Methodology</td>
<td>Concentrations measured by handheld specialist LFG monitoring equipment. Measured as a percentage by volume.</td>
</tr>
<tr>
<td></td>
<td>Inspect condition of wells or additional introduced infrastructure</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Licensee</td>
</tr>
<tr>
<td>Frequency</td>
<td>Annually to coincide with other monitoring whilst consultants on site.</td>
</tr>
<tr>
<td>Duration</td>
<td>Throughout operations and post closure subject to annual review</td>
</tr>
<tr>
<td>Acceptance Criteria</td>
<td>Methane less than 1% (by volume) and CO₂ is less than 1.5% (by volume)</td>
</tr>
<tr>
<td></td>
<td>within perimeter wells</td>
</tr>
<tr>
<td></td>
<td>Wells in serviceable condition</td>
</tr>
<tr>
<td>Reporting - Internal</td>
<td>Annual Report to be prepared</td>
</tr>
<tr>
<td>Reporting - External</td>
<td>Annual Report to be prepared by Licensee and submitted to NRETAS</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Licensee to notify NRETAS within 48 hrs of notification of exceedance</td>
</tr>
<tr>
<td></td>
<td>Carry out further investigations, as appropriate.</td>
</tr>
<tr>
<td></td>
<td>Detail actions taken in Annual Report as appropriate</td>
</tr>
<tr>
<td></td>
<td>Maintenance and repairs as necessary. Reinstate well if damage beyond repair</td>
</tr>
<tr>
<td>Management Review</td>
<td>Licensee to review procedures and implement recommendations from</td>
</tr>
<tr>
<td></td>
<td>Annual Operations and Environmental Monitoring Report</td>
</tr>
</tbody>
</table>

9.4 Additional Information

Any buildings or structures erected on the site within 50 m of the waste mass shall have gas monitoring beneath slabs or in unventilated enclosures or rooms, or have ventilation added.
10 Vegetation and Visual Impact Management

10.1 General

This section shall apply to established vegetation on the periphery to landfilling activities, vegetated buffers and screening and vegetation established as part of capping and rehabilitation works. These areas shall be continually monitored for adequate condition, growth and survival.

Generally the site as it currently exists, the extent of historical landfilling is completely devoid of vegetation due to its landfilling history. The post-closure use of the site is to return to a rehabilitated natural state as capping is completed. Therefore no significant plantings other than small shallow rooting shrubs and grasses are anticipated over the capped areas.

10.2 Implementation

It is recommended that where additional revegetation to that currently existing is undertaken, direct seeding or tube stock planting be carried out for all revegetation of trees, shrubs and native grasses primarily for ease of maintenance and higher success rates. Direct seeding is known to have a high success rate in the region of the facility and shall be the preferred revegetation option. Plastic collars and stakes may be necessary to ensure that rabbit populations do not destroy the young vegetation.

The plants will require watering at the time of planting, and if the following summer is particularly harsh will require additional watering. It is recommended that planting occur in the autumn months or early in the spring months to ensure establishment prior to summer. After the summer season these plants could be left unattended other than occasional monitoring.

10.3 Vegetation Monitoring

Monitoring of vegetation shall be undertaken on annually basis as detailed in Table 10-1. The success of vegetation measures and pest plant control shall be monitored quarterly and coinciding with the end of each summer period to inspect adequate growth and survival. This will enable replanting if required or supplemental planting during cooler, wetter months.

Once vegetation has been re-established a summary report of all monitoring will be prepared annually. The report will include:

- field data and photographs collected during the monitoring period;
- details of any noticeable impacts;
- a summary of monitoring results.
<table>
<thead>
<tr>
<th>Item</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Information</td>
<td>Condition of vegetation and emergence of pest vegetation</td>
</tr>
<tr>
<td>Locations</td>
<td>Walkover of vegetated areas and mounds</td>
</tr>
<tr>
<td>Methodology</td>
<td>Visual inspection</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Licensee</td>
</tr>
<tr>
<td>Frequency</td>
<td>Annually at the end of summer or 6 weeks after major rainfall.</td>
</tr>
<tr>
<td>Duration</td>
<td>Throughout operation of the site and post closure subject to review</td>
</tr>
<tr>
<td>Acceptance Criteria</td>
<td>Established, fair condition, growth and coverage</td>
</tr>
<tr>
<td>Reporting – Internal</td>
<td>Annual results to Licensee</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Revegetate where necessary</td>
</tr>
<tr>
<td>Management Review</td>
<td>Licensee to review and implement recommendations from Annual Operations and Environmental Monitoring Report</td>
</tr>
</tbody>
</table>
11 Air Quality and Noise Management

11.1 Dust Management

The main sources of dust are from the construction and demolition (C&D) crushing and screening plant, landfilling areas covered with interim cover soils, works at the operating face and vehicles driving on interim cover and access roads.

To ensure effective dust, the Licensee will adhere to procedures set out in Table 11-1.

Table 11-1 Procedures for Dust and Mud/Slurry Control

<table>
<thead>
<tr>
<th>REASONS FOR CONTROL</th>
<th>Comment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust can cause environmental nuisance, both on and off site</td>
<td>Field measures – continuous visual surveillance for dust emissions</td>
</tr>
<tr>
<td>Ensure general compliance with:</td>
<td>Routine Monitoring – PM10 averaged over 1 hour</td>
</tr>
<tr>
<td>- Environment Protection Licence conditions</td>
<td></td>
</tr>
<tr>
<td>- Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites</td>
<td></td>
</tr>
<tr>
<td>in the Northern Territory (2003).</td>
<td></td>
</tr>
<tr>
<td>- General Environmental Duty (<em>Waste Management and Pollution Control Act 1998</em>)</td>
<td></td>
</tr>
<tr>
<td>- National Environment Protection Council (NEPC) National Environment Protection</td>
<td></td>
</tr>
<tr>
<td>Measure (NEPM) for Ambient Air Quality</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Information</td>
<td>Field measures – continuous visual surveillance for dust emissions</td>
</tr>
<tr>
<td></td>
<td>Routine Monitoring – PM10 averaged over 1 hour</td>
</tr>
<tr>
<td>General Dust Control Procedures</td>
<td>Construct and maintain designated all weather access roads</td>
</tr>
<tr>
<td></td>
<td>Ensure dust suppressant (water cart) is operational at all times</td>
</tr>
<tr>
<td></td>
<td>Check need for dust suppression on access roads, based on weather and usage</td>
</tr>
<tr>
<td></td>
<td>Use water tanker as required</td>
</tr>
<tr>
<td></td>
<td>Inspect bare surfaces and stockpiles daily for dusty conditions</td>
</tr>
<tr>
<td></td>
<td>traffic speeds kept below 15 km/hour to minimise dust generation</td>
</tr>
<tr>
<td>Crushing Equipment Dust Control</td>
<td>Where possible avoid locating crushing plant in the path of prevailing wind</td>
</tr>
<tr>
<td>Procedures</td>
<td>towards Little Sisters Camp</td>
</tr>
<tr>
<td></td>
<td>Avoid establishing crushing plant near any site boundary</td>
</tr>
<tr>
<td></td>
<td>Avoid using the crushing equipment when wind direction is towards the Little</td>
</tr>
<tr>
<td></td>
<td>Sisters Camp</td>
</tr>
<tr>
<td></td>
<td>No use off crushing plant when wind exceeds 20 km/hr in direction of Little</td>
</tr>
<tr>
<td></td>
<td>Sisters Camp</td>
</tr>
<tr>
<td></td>
<td>Avoid using the crushing equipment when wind exceeds 30 km/hr in any direction</td>
</tr>
<tr>
<td></td>
<td>Water trucks fitted with hoses with spray nozzles shall be used during crushing</td>
</tr>
<tr>
<td></td>
<td>and relocation of fines stockpiles</td>
</tr>
<tr>
<td></td>
<td>All fines stockpiles to be wetted or removed during moderate or higher wind</td>
</tr>
<tr>
<td></td>
<td>conditions</td>
</tr>
<tr>
<td>Field Monitoring</td>
<td>Weekly visual inspections and complete checklist</td>
</tr>
</tbody>
</table>
| Routine Monitoring Methodology | Dust monitoring in accordance with AS 3580 using specialised continuous dust monitoring equipment
Airborne dust levels to be monitored for PM10 and averaged over 24 hours
Time intervals for all data to be reported
Meteorological information recorded for each monitoring period recorded – wind speed and direction, temperature, rainfall
Data to be analysed weekly following data recovery and actions taken immediately as required |
| Frequency | D01 and D02 located alternately using a single monitoring device
D03 continuously monitored
Data collected from all units weekly |
| Duration | Throughout operations and post closure subject to annual review |
| Responsibility | Licensee |
| Locations | As noted on Figure 4 |
| Conformance Criteria | No off-site impacts
No adverse on-site impacts, including human health and environmental nuisance
24 hour average PM10 not to exceed 50 µg/m³ on more than 5 days per year
(as per National Environment Protection Council (NEPC) National Environment Protection Measure (NEPM) for Ambient Air Quality) |
| Reporting - Internal | Annual report |
| Reporting - External | Annual Report to be submitted to NRETAS |
| Non Conformance Procedures | Investigate cause of unacceptable dust levels
Check adequacy of procedures
Implement corrective actions and modify procedures |
11.2 Litter Control

The most common form of litter associated with disposal of domestic waste is plastic bags, together with paper products. The movement of the litter away from the operating cell is proportional to wind speed. The elevated topography of the facility relative to the surrounds can also produce winds which influence litter movement.

To ensure effective litter control, the Operator will adhere to procedures set out in Table 11-2 below.

Table 11-2 Procedures for Litter Control

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment/Action</th>
</tr>
</thead>
</table>
| Conformance Criteria | No litter to escape site boundaries  
Litter within facility not to be visible from offsite properties or transport corridors  
Litter to be collected and disposed of as often as necessary to maintain tidy appearance |
| General Strategies | Provide litter control measures around current cell (e.g litter fence)  
Minimise area of working face  
Apply daily cover (soil, plastic sheeting or fabricated metal lids) or more frequently as required  
Ensure prompt compaction of waste  
Ensure all vehicles entering facility have loads covered if transporting waste which can produce litter  
Regular visual checks and weekly litter pick ups  
Good housekeeping and tidiness  
Inspection of boundaries and beyond the landfill area for litter each week |
| Litter Pick Up Procedures | Check litter control fence, site boundary fences, all landscaped areas daily and as required  
Pick up litter if required, put into bags, leaving bags at litter locations  
At end of each day, collect all litter bags and empty in operating cell  
Check external properties including roadways adjacent to site boundaries following each days operation to ensure these are free of litter |
| Special Procedures for Windy Days (greater than 25 km/h forecast) | Implement all litter pick up procedures as above  
Apply layer of daily cover to waste as soon as practicable after it is deposited |
| Recording & Reporting | Weekly Inspection and complete checklist by Operator for Licensee. |
| Non Conformance Procedures | Investigate cause of uncontrolled litter  
Check adequacy of procedures  
Implement corrective actions and modify procedures |
11.3 Noise

To ensure effective noise control, the Operator will adhere to procedures set out in Table 11-3 below.

In accordance with the NT Workplace Health and Safety Regulations - Part 6 S.56, an employer must ensure that a worker is not exposed at a workplace to noise exceeding the national standard for exposure to occupational noise as specified in National Occupational Health and Safety Commission - NOHSC: 1007.

Table 11-3 Procedures for Noise Control

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>REASONS FOR CONTROL</td>
<td>Minimise occupational workplace noise and potential for off-site nuisance due to use of machinery</td>
</tr>
<tr>
<td></td>
<td>Ensure general compliance with:</td>
</tr>
<tr>
<td></td>
<td>− Environment Protection Licence conditions</td>
</tr>
<tr>
<td></td>
<td>− General Environmental Duty (Waste Management and Pollution Control Act 1998)</td>
</tr>
<tr>
<td></td>
<td>− Northern Territory Workplace Health and Safety Regulations, 2008</td>
</tr>
<tr>
<td>Conformance Criteria</td>
<td>Maximum permitted noise levels as permitted by National Occupational Health and Safety Commission - NOHSC: 1007</td>
</tr>
<tr>
<td></td>
<td>The national standard for exposure to noise in the occupational environment is an eight-hour equivalent continuous A-weighted sound pressure level, L\text{Aeq,8h}, of 85 \text{dB(A)}. For peak noise, the national standard is a C-weighted peak sound pressure level, L_{\text{C,peak}}, of 140 \text{dB(C)}.</td>
</tr>
<tr>
<td>Noise Control Procedures</td>
<td>Ensure all staff operating plant or machinery or in the vicinity of operational areas of the site are equipped with, and utilising personal protective equipment (PPE).</td>
</tr>
<tr>
<td></td>
<td>Ensure all facility equipment is fitted with noise suppressants, including mobile plant for large scale/intensive works</td>
</tr>
<tr>
<td></td>
<td>Ensure that machinery is only operated between approved working hours</td>
</tr>
<tr>
<td></td>
<td>Ensure all facility equipment is adequately maintained</td>
</tr>
<tr>
<td></td>
<td>Ensure correct operation of all facility equipment</td>
</tr>
<tr>
<td></td>
<td>Monitor all incoming vehicles for noise and if necessary, refuse access to vehicles producing excessive noise</td>
</tr>
<tr>
<td>Recording and Reporting</td>
<td>Regular perimeter monitoring and Weekly Inspection (visual) to ensure PPE being utilised. Complete checklist.</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Investigate cause of reported elevated noise</td>
</tr>
<tr>
<td></td>
<td>Check adequacy of site operational procedures</td>
</tr>
<tr>
<td></td>
<td>Implement corrective actions and modify procedures</td>
</tr>
</tbody>
</table>
11.4 Odour

The chief source of odour emanating from the operating cell occurs when putrescible waste is being tipped and compacted. Experience at many depots indicates that these odours are rarely detected at 500 m from the operating cell.

Observations of odour will be made at locations along the site boundary that border occupied properties. Measures will be undertaken to identify the source and the cause of such odour, and to rectify the situation immediately.

Staff monitoring odour should be aware of and note wind direction and determine whether any odours present are emanating from the waste water lagoons on the adjacent property.

To ensure effective odour control, the Operator will adhere to procedures set out in Table 11-4 below.

Table 11-4 Procedures for Odour Control

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conformance Criteria</td>
<td>No unacceptable site generated odours extending off-site</td>
</tr>
<tr>
<td>Odour Control Procedures</td>
<td>Ensure application of daily cover to all wastes at the end of each day, or more frequently if required</td>
</tr>
<tr>
<td>Recording and Reporting</td>
<td>Weekly Inspection</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Investigate cause of odour</td>
</tr>
<tr>
<td></td>
<td>Check adequacy of procedures</td>
</tr>
<tr>
<td></td>
<td>Implement corrective actions and modify procedures</td>
</tr>
</tbody>
</table>
12 Bird, Vermin, Pest and Weed Management

Weed and pest control will be implemented on-site as required by the Operator or as instructed by Licensee. As part of the weekly inspections of the site, the occurrence of birds, vermin, dogs, cats or weeds will be observed and action taken as appropriate, as detailed in Table 12-1 below.

Table 12-1 Procedures for Bird, Vermin, Pest and Weed Management

<table>
<thead>
<tr>
<th>Item</th>
<th>Conformance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Procedures</td>
<td>Ensure application of daily cover to all wastes at the end of each day, or more frequently if required</td>
</tr>
<tr>
<td></td>
<td>If bird numbers become excessive undertaken steps to remedy the situation as appropriate i.e. by applying more clean cover material to minimise the occurrence of birds, or by developing an active bird control program acceptable to NRETAS;</td>
</tr>
<tr>
<td></td>
<td>If rats or similar vermin, are observed an improved control program shall be implemented and monitored, in particular, to protect those areas to be direct seeded. This may include destroying rabbit warrens and baiting strategies;</td>
</tr>
<tr>
<td></td>
<td>If potentially airborne weeds are observed on stockpiled materials, or water borne seeds are detected on lower lying areas of the site, they shall be immediately sprayed. Other areas shall be sprayed in accordance with the annual weed spraying program as part of the landscaping plan.</td>
</tr>
<tr>
<td></td>
<td>Alice Springs Town Council does not accept declared weeds in the green waste stockpile. If declared weeds are discovered in the green waste stockpile they shall be removed immediately by the landfill operator and transferred to the tipface where they can be buried in-situ.</td>
</tr>
<tr>
<td></td>
<td>Where declared weeds are illegally disposed of at the landfill, or are found growing at the landfill they should be treated and destroyed in accordance with the requirements of the Weeds Branch of NRETA.</td>
</tr>
<tr>
<td></td>
<td>Personnel maintaining the landfill should able to identify the various types of declared weeds which may exist in the region so that they can monitor for their presence at the facility and undertake appropriate treatment and destruction action.</td>
</tr>
<tr>
<td>Recording and Reporting</td>
<td>Weekly Inspection</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Investigate cause of occurrence</td>
</tr>
<tr>
<td></td>
<td>Check adequacy of procedures</td>
</tr>
<tr>
<td></td>
<td>Implement corrective actions and modify procedures</td>
</tr>
</tbody>
</table>
13 Asbestos Management

13.1 Asbestos

Asbestos was widely used in over 3000 building and construction products in Australia between the 1940s and late 1980s. Asbestos is a group of naturally occurring fibrous materials that can pose serious health risks if fibres become airborne and are inhaled. Fibres that become trapped in the lungs can result in serious lung diseases many years later such as asbestosis, lung cancer and mesothelioma.

Asbestos can either be in friable or non-friable forms. Friable asbestos can be crumbled, pulverised or broken into a powder by hand pressure. This form is the most likely to pose a health risk due to the high chance of fibres becoming airborne. Friable asbestos waste may be from sources such as insulation from old household heaters and stoves, and insulation from public or commercial buildings.

Non-friable asbestos is unlikely to cause fibres to become airborne unless it is broken, drilled, cut or other activities that are likely to produce dust. This is a less risky form of asbestos, but should still be handled with care. Non-friable asbestos may typically be found in cement (or “fibro”) sheeting from household walls and roofing, asbestos cement roofing materials, water pipes and flues, vinyl tiles impregnated with asbestos fibre and brake linings, among many other materials.

To aid in the identification of asbestos arriving at site Appendix D contains Appendix 3 of the Asbestos Management Guidelines Roles and Responsibilities for Government Agencies, Northern Territory Department of Health and Families, 2008, which identifies some of the various asbestos containing materials that may present at the landfill site.

The Guidelines require that special procedures be developed for the handling and disposal of this type of waste. The following sections summarise the procedures that should be followed by all staff, sub-contractors, visitors and customers of the site.

In all instances, asbestos shall be managed at the landfill site in a manner that will provide protection of humans and the environment, during acceptance at the site and during disposal and long term once buried, from the potential adverse effects of exposure to asbestos.

13.2 Asbestos Management Roles and Responsibilities

13.2.1 Council

As the Licensee, Council retains overall responsibility for the appropriate disposal of asbestos at the landfill site and protection of humans and the environment from the potential adverse effects of exposure to asbestos.

Council will be responsible for regularly reviewing the asbestos management procedures and will assist in terms of the risk assessment to ensure it retains its relevance to best practice Asbestos disposal procedures, site operations and human safety. The Asbestos Management Plan shall provide minimum standards for the Operator relating to the acceptance, disposal and reporting of asbestos. Whenever the Asbestos Management Plan is updated and released, Council shall provide the Operator with the latest version.

Council will be responsible for ensuring the Operator manages asbestos appropriately. This will include periodic inspections of the site to:
13.2.2 Operator

The Operator is responsible for the acceptance, handling, disposal and recording of disposal locations as stipulated in this Asbestos Management Plan.

Additionally, the Operator as an employer, has responsibility to comply with government policy and legislative requirements in the management of asbestos containing materials (ACM) in workplaces and maintain a safe working environment under the provisions of:

- Regulation 3.1a of the Occupational Safety and Health Regulations 1996 (OSH Regulations 1996), which requires an employer to identify hazards at a workplace, assess the risk of harm to a person from each hazard and to take steps to reduce the risk.
- Regulation 5.43 (OSH Regulations 1996) which specifically requires the presence and location of asbestos at a workplace to be identified and that the process of identification and risk assessment is conducted in accordance with the Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018 (2005)].

The Operator will be responsible for developing their own risk assessment of human health and environmental impacts for asbestos disposal at the site which will facilitate development of their own asbestos management procedures and Asbestos Management Work Plan at the site.

The Operator will be responsible for following the procedures as described in their Asbestos Management Work Plan.

13.2.3 Disposer (Customer)

Customers wishing to dispose of asbestos at the landfill site have a responsibility to present asbestos for disposal in accordance with the Operators requirements for receipt of asbestos. Packing, transport and disposal of asbestos must conform to NOHSC:2002 (2005).

If refused entry, the public have the responsibility of appropriately packaging the material prior to returning to the site to dispose of the material.

13.3 Asbestos Management Minimum Procedures

13.3.1 Asbestos Acceptance

Asbestos products will be collected, transported, and disposed of in accordance with regulations which govern the disposal of asbestos waste. The site is licensed to accept asbestos with no limitations on the form that may be accepted (ie both friable and non-friable are able to be accepted).

Asbestos products which are not correctly packaged for delivery and disposal will be refused entry at the landfill. This includes mixed loads ie loads of general waste containing asbestos. Mixed loads must be entirely treated as an asbestos load and therefore completed encapsulated in double wrap plastic. The fee payable will be the asbestos disposal fee for the entire load.
Council will charge for the disposal of asbestos waste at its waste management facilities in accordance with the current fee & charges schedule as listed at the front gate. Commercial quantities of asbestos are not accepted unless by prior arrangement with Council.

13.3.2 Receiving Asbestos

Alice Springs residents that wish to deposit asbestos must make a booking with the Landfill Operator 24 hours before anticipated delivery. The landfill contractor will complete an entry into the asbestos register at the weighbridge, which includes the weight, type and origin of the material. Details of the property and building that the material originated from must be included.

Extra-municipal waste, or waste from outside the Municipality of Alice Springs, will not be accepted at the Alice Springs Landfill until such time as a regional asbestos and hazardous waste facility is commissioned.

Asbestos must be securely double-wrapped in plastic film and completely sealed upon arrival.

The attendant at the gatehouse must check that the asbestos is wrapped as noted above; otherwise the load will be refused.

The gate attendant shall also conduct checks of possible or suspected loads where asbestos material may be present but was not declared. Similarly, non-conforming loads (eg insufficiently wrapped or with damaged wrapping) will be refused.

Waste soil containing asbestos will not be accepted at the landfill.

13.3.3 Handling Asbestos

Employees handling asbestos material must wear a conforming Filtered Breathing Mask at all times during the handling, transport and disposal of asbestos.

Customers will drop off their asbestos as directed by site staff but are not permitted into the asbestos waste cell. Employees are also required to wear masks if handling packaged asbestos on the landfill site.

13.3.4 Disposal and Covering of Asbestos

Once asbestos has entered the site the customer is directed to the asbestos waste cell where they unload their waste into the cell, under constant supervision from the contractor, via a ramp. Once unloaded the customer shall immediately leave the area. Disposal of asbestos from the top of the cell, must be avoided at all times and where possible use a cell and ramp system.

Asbestos fibre and dust waste shall be buried at a minimum or three metres, stabilised asbestos waste in a bonded matrix must be buried at a minimum depth of one metre.

A machine operator will then carefully lift or push the waste into the cell. Machine operators must be extremely careful to avoid breaking of the plastic wrap or breaking of the waste itself. In the case of any asbestos spillage the operator must implement the contractor’s asbestos management work plan.

Pre-planning and using the right equipment by operators during burial of asbestos is important to ensure efficient space utilisation and safety (e.g. use of loader with a 4 in 1 bucket).
The asbestos waste is covered with 500 mm of fill preferably immediately, otherwise must be covered by the end of the day. Fill should be screened to exclude rocks etc. larger than 100 mm in size to minimise the risk of breaking the plastic wrap. A stock pile of 100 cubic meter fill must be maintained adjacent to the asbestos cell.

An orange marker mesh shall be buried 1 meter below the final capped surface to reduce the risk of disturbing any asbestos. The contractor must seek the approval of Council before any new asbestos cell is developed outside the current asbestos burial site.

Asbestos waste cells must be clearly identified and bunded or fenced, and located with GPS coordinates for future reference.

In the event of asbestos being identified at the tip face that has been illegally placed, it should be removed from the tip face and/or handled in a manner that's in accordance with the contractor's asbestos handling procedures.

13.3.5 Historically Disposed Asbestos

Historically disposed asbestos shall be identified as encountered with star pickets, hazard tape and signage warning of its existence and located and logged by GPS coordinates for future reference.
**Table 13-1  Procedures for Asbestos Management**

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REASONS FOR CONTROL</strong></td>
<td>Prevention of asbestos exposure to site staff and the public.</td>
</tr>
<tr>
<td></td>
<td>Ensure general compliance with:</td>
</tr>
<tr>
<td></td>
<td>− Environment Protection Licence conditions</td>
</tr>
<tr>
<td></td>
<td>− General Environmental Duty (<em>Waste Management and Pollution Control Act 1998</em>)</td>
</tr>
<tr>
<td></td>
<td>− Guidelines (NT <em>Workplace Health and Safety Regulations 2008</em>)</td>
</tr>
<tr>
<td><strong>Gatehouse Acceptance Procedures</strong></td>
<td>Booking with landfill Operator by residents made 24 hours in advance through contact with weighbridge (gatehouse operator)</td>
</tr>
<tr>
<td></td>
<td>Asbestos double-wrapped in plastic and securely sealed</td>
</tr>
<tr>
<td></td>
<td>Zero acceptance of non-conforming asbestos waste, including mixed loads</td>
</tr>
<tr>
<td><strong>Handling and Disposal Procedures</strong></td>
<td>All employees to wear appropriate filtered breathing masks at all times when handling asbestos waste</td>
</tr>
<tr>
<td></td>
<td>Customers not permitted into the waste cell unless supervised by the contractor</td>
</tr>
<tr>
<td></td>
<td>Plastic wrap around waste not to be compromised</td>
</tr>
<tr>
<td></td>
<td>Waste covered with 500 mm of fill immediately or at least by the end of the day</td>
</tr>
<tr>
<td></td>
<td>No rocks etc. larger than 100 mm to be contained in the cover fill</td>
</tr>
<tr>
<td></td>
<td>Clearly identified and fenced/bunded asbestos cell</td>
</tr>
<tr>
<td></td>
<td>GPS locating/mapping of current asbestos disposal</td>
</tr>
<tr>
<td></td>
<td>GPS locating/mapping of historically disposed asbestos as encountered</td>
</tr>
<tr>
<td></td>
<td>Use orange marker mesh 1m below the final cap surface</td>
</tr>
<tr>
<td><strong>Recording and Reporting</strong></td>
<td>Asbestos Register updated at weighbridge with details of time and date of delivery to site, property/building of origin of asbestos, type of waste and weight, vehicle registration, name, contact details of disposer and the source of the asbestos (e.g regional or local)</td>
</tr>
<tr>
<td></td>
<td>Weekly Inspections of the asbestos disposal area</td>
</tr>
<tr>
<td></td>
<td>Total volumes included in annual reporting</td>
</tr>
<tr>
<td><strong>Non Conformance Procedures</strong></td>
<td>Investigate causes of non-conforming waste</td>
</tr>
<tr>
<td></td>
<td>Check adequacy of procedures</td>
</tr>
<tr>
<td></td>
<td>Implement corrective actions and modify procedures</td>
</tr>
<tr>
<td><strong>Management Review</strong></td>
<td>Document in Annual Operations Report and Environmental Monitoring Report including review and comment</td>
</tr>
</tbody>
</table>
14 Used Tyres Management

14.1 Used Tyres

18 million tyres are estimated to be produced each year in Australia alone. This represents a large number of waste tyres that are sent to landfill at the end of their life. Whole tyres take up large volumes of air space when buried in a landfill and pose a serious fire hazard when stored (or buried) in large quantities.

Larges storages of tyres can self-combust and tyre fires cause intense heat and thick smoke, which are very difficult to control and extinguish, requiring large amounts of water. Neighbouring buildings can also be damaged from the intense heat, and adverse environmental impacts can occur to the soil and surrounding waterways. Tyre storages also provide a breeding habitat for insects and other vectors.

The appropriate management of both stored and buried tyres is required to extend the longevity of landfill, promote fire safety and minimise the potential for adverse environmental impacts.

The General Guidelines for the Outdoors Storage of Used Tyres by the South Australia Fire Services is a comprehensive and useful document and has therefore been referred to in this section to establish the landfill’s management practices.

The landfill’s licence states that whole tyres can be accepted, but that only shredded tyres can be buried. The Guidelines require that special procedures be developed for the handling and disposal of this type of waste. The following sections summarise the procedures that should be followed in the storage and disposal of tyres.

14.2 Used Tyre Acceptance

Tyres will only be accepted at the landfill if they are properly declared at the weighbridge. Council will charge for the disposal of tyres in accordance with the current fee & charges schedule as listed at the front gate. Commercial quantities of whole tyres are not accepted. Whole tyres from mining trucks are also prohibited.

14.3 Used Tyre Management

In accordance with the Environment Protection Licence for the site, no whole tyres shall be disposed of to landfill.

Whilst resource recovery options for Council may be limited in Alice Springs due to the distance to processing facilities and markets and limited number of tyres disposed of, Council shall continue to investigate measures to facilitate resource recovery of the tyres which will result in beneficial reuse or recovery of salvageable resources.

If no option other than landfill disposal remains for whole of tyre fractions, tyres shall only be disposed of if appropriately shredded.

14.4 Receiving Used Tyres

The landfill Operator will record the weight, number and type of tyres at the weighbridge. The gate attendant shall also conduct checks of possible or suspected non-conforming loads where tyres may be present but where not declared. Loads not conforming with Section 14.2 will be refused.
Customers to the landfill will be directed to a drop-off area for temporary storage, this storage must follow appropriate measures as outlined below.

14.5 Temporary Storage of Used Tyres

Tyres must be stored in a manner to allow adequate separation between site boundaries, buildings and tyre storages. Piles must be limited in size and allow adequate access in-between to allow for fire-fighting if necessary. A level site should be chosen, away from water courses and inhabited buildings.

Storages should be six metres from the site’s boundaries, but can be limited to the three metres if the boundary is next to a public road and 12 m from any structures. Storage heights shall not exceed three metres. Storage aisles between piles must be well maintained and be a minimum width of 1.5 times the tyre height. The maximum length of the pile will be 20 meters and a maximum width of two times the tyre height. Long and narrow tyre piles are preferred over square piles in order to assist fire-fighting in the event that it is necessary.

Tyres should be punctured to prevent the breeding of mosquitoes.

Other combustible materials should be stored in a separate area to prevent the possible further spread of fire. Safety precautions should also prevent potential ignitions sources in the area where tyres are stored. This may include welding and grinding, faulty electrical or mechanical equipment. No storage of flammable materials should occur within 30 metres of a tyre storage.

14.6 Disposal of Used Tyres

The Operator must only dispose of shredded tyres in the landfill. Shredded tyre pieces shall not exceed 350 mm in length, width or height. However, the rings that remain after removal of the base of the tread and the sidewall and which exceed this size, are acceptable for burial. Whole tyres will not be allowed to be disposed of in the landfill.

Where ever possible, tyres should be stored for collection by external contractors who specialise in the resource recovery/recycling of used tyres. Where practical, tyres shall be stripped for any recycling potential and shredded. This may require that tyres are stored until a sufficient quantity has been accumulated. If that is the case, the tyres must be stored appropriately as described in the section above.

If necessary it is appropriate to take back shredded tyre carcasses for disposal within the landfill.
Table 14-1 Procedures for Tyre Management

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REASONS FOR CONTROL</strong></td>
<td></td>
</tr>
<tr>
<td>Prevention of fire-hazards</td>
<td>Prevention of fire-hazards of tyre storage and extend the longevity of landfill</td>
</tr>
<tr>
<td>of tyre storage and extend</td>
<td>Ensure general compliance with:</td>
</tr>
<tr>
<td>the longevity of landfill</td>
<td>− Environment Protection Licence conditions</td>
</tr>
<tr>
<td>Ensure general compliance</td>
<td>− Guidelines for the Siting, Design and Management of Solid Waste Disposal</td>
</tr>
<tr>
<td>with:</td>
<td>Sites in the Northern Territory (2003).</td>
</tr>
<tr>
<td>− General Environmental</td>
<td>− General Environmental Duty (<em>Waste Management and Pollution Control Act 1998</em>)</td>
</tr>
<tr>
<td>Duty (*Waste Management and</td>
<td></td>
</tr>
<tr>
<td>Pollution Control Act 1998*</td>
<td></td>
</tr>
<tr>
<td><strong>Item</strong></td>
<td><strong>Comment/Action</strong></td>
</tr>
<tr>
<td>Conformance Criteria</td>
<td>No off-site impacts</td>
</tr>
<tr>
<td></td>
<td>No adverse on-site impacts, including environmental nuisance</td>
</tr>
<tr>
<td></td>
<td>Appropriate tyre storage and burial procedures</td>
</tr>
<tr>
<td>Gatehouse Acceptance</td>
<td>Zero acceptance of mining vehicle tyres.</td>
</tr>
<tr>
<td>Procedures</td>
<td>Landfilling of shredded tyres only</td>
</tr>
<tr>
<td></td>
<td>Commercial quantities not to be accepted</td>
</tr>
<tr>
<td>Tyre Storage Procedures</td>
<td>Tyres stored until a sufficient quantity has been accumulated prior to removal</td>
</tr>
<tr>
<td></td>
<td>done so in accordance with *General Guidelines for the Outdoors Storage of</td>
</tr>
<tr>
<td></td>
<td>Used Tyres* by the South Australia Fire Services and must have adequate</td>
</tr>
<tr>
<td></td>
<td>separation between site boundaries, buildings and tyre storages. Piles must</td>
</tr>
<tr>
<td></td>
<td>allow for fire-fighting access if necessary.</td>
</tr>
<tr>
<td></td>
<td>A level site should be chosen, away from water courses and inhabited buildings.</td>
</tr>
<tr>
<td></td>
<td>Long and narrow tyre piles are preferred over square piles, and storages must</td>
</tr>
<tr>
<td></td>
<td>be:</td>
</tr>
<tr>
<td></td>
<td>• 6 metres from the site’s boundaries (3m if the boundary adjoins a public</td>
</tr>
<tr>
<td></td>
<td>road) and under and structures</td>
</tr>
<tr>
<td></td>
<td>• No higher than 3 metres</td>
</tr>
<tr>
<td></td>
<td>• Aisles of minimum width of 1.5 times the tyre height and well maintained</td>
</tr>
<tr>
<td></td>
<td>• Maximum length of the pile will be 20 metres, and</td>
</tr>
<tr>
<td></td>
<td>• Maximum width of 2 times the tyre height</td>
</tr>
<tr>
<td></td>
<td>Tyres should be punctured to prevent the breeding of mosquitoes</td>
</tr>
<tr>
<td></td>
<td>Prevent potential ignitions sources in the area</td>
</tr>
<tr>
<td></td>
<td>No storage of flammable materials should occur within 30 metres of a tyre</td>
</tr>
<tr>
<td></td>
<td>storage.</td>
</tr>
<tr>
<td>Disposal Procedures</td>
<td>Where practical, tyres should be stripped for any recycling potential</td>
</tr>
<tr>
<td></td>
<td>If to be disposed of by burial, tyres must be buried in shredded form</td>
</tr>
<tr>
<td></td>
<td>Shredded tyre pieces shall not exceed 350 mm in length, width or height</td>
</tr>
<tr>
<td></td>
<td>Residual rings remaining after removing the base and sidewall are acceptable</td>
</tr>
<tr>
<td></td>
<td>for burial</td>
</tr>
<tr>
<td>Recording and Reporting</td>
<td>Waste registered at weighbridge with details weight, number and type of tyres</td>
</tr>
<tr>
<td></td>
<td>Weekly Inspections of the tyre storage area</td>
</tr>
<tr>
<td></td>
<td>Total volumes included in Annual Operations and Monitoring Reporting</td>
</tr>
<tr>
<td>Non Conformance Procedures</td>
<td>Investigate causes of non-conforming waste</td>
</tr>
<tr>
<td></td>
<td>Check adequacy of procedures</td>
</tr>
<tr>
<td></td>
<td>Implement corrective actions and modify procedures</td>
</tr>
<tr>
<td>Management Review</td>
<td>Quarterly review and comment</td>
</tr>
</tbody>
</table>
15 Emergency Issues

15.1 Emergency Response Plan

The facilities on this site have the potential to cause impacts to the environment. This LEMP describes measures for operating and managing the site in a manner that will minimise these potential impacts. As a further environmental protection measure, this section sets out an Emergency Response Plan, addressing the issues of:

- unauthorised deposition of hazardous substances;
- fuel storage leakage;
- flooding;
- surface water contamination;
- groundwater contamination;
- LFG issues;
- earthquake;
- uncontrollable discharge of leachate; and
- fire.

The initial emergency response procedures and responsibilities have been assigned for potential emergency events at the site as summarised in this section.

15.1.1 Emergency Response Training

The Operator must ensure that all relevant personnel and subcontractors have received training in the implementation of the emergency response plan and appropriate use of emergency spill kits. The Operator shall develop and maintain a training register which demonstrates training has been undertaken and shall provide the documentation on request to Council or an NRETAS Authorised Officer.

15.1.2 Unauthorised Deposition of Hazardous Substances

If a hazardous substance is detected outside the hazardous waste storage facility or at the tip-face, immediate steps will be taken to isolate the substance, and to cordon off the area. Bunding and clean cover material will be applied as necessary. Steps will be taken to remove the hazardous substance from the site or store if appropriate in the hazardous waste facility, and arrangements will be made for its safe transport and disposal at appropriate facilities.

15.1.3 Hazardous Liquid Storage Leakage

If a hazardous liquid such as a fuel leakage is detected or a spill occurs at the site immediate measures will be implemented to ensure leakage is contained to the bunded area in which it is situated.

If the leakage or spill is not contained to bunded area the Operator shall adopt spill management practices including spill equipment and containment devices in accordance with, but not limited to the following:
15.1.4 Flooding

External surface water will be diverted around the facility using mounds and swales etc. Due to the siting of the facility with respect to the Todd River floodplain, floodwater is unlikely to enter the site.

Whilst operational surface water runoff will be directed via a drainage system to a surface water detention area.

15.1.5 Groundwater Contamination

In the event of groundwater contamination which exceeds the relevant groundwater monitoring criteria NRETAS will be informed.

15.1.6 Landfill Gas

Appropriate emergency response procedures will need to be implemented, if the existing LFG management plan (Section 9) is considered unsatisfactory as evidenced by dangerous or unacceptable accumulation of methane or carbon dioxide.

15.1.7 Earthquake

The site is monitored for impacts on groundwater quality, surface water quality and air quality. Should an earthquake occur the earliest possible reconnaissance of the site will be undertaken to determine any apparent damage, and possible impact to these monitored parameters. Should any damage or impact be apparent, relevant actions as outlined in this section will be implemented.

15.1.8 Explosion

Should an explosion occur the earliest possible reconnaissance of the site will be undertaken to determine any personal injury and/or apparent damage. Should any personal injury arise, the site OH&S emergency procedures should be implemented immediately as further noted in Section 15.3. Should any damage or impact be apparent, relevant actions as outlined in Table 15-1 will be implemented.

15.1.9 Fire Prevention

To ensure effective fire prevention and control, the Licensee will adhere to procedures set out in Table 15-2. Fire fighting procedures and prevention are discussed further in Section 15.2.

15.1.10 Summary

Table 15-1 presents a summary of the Emergency Response Plan to:

- identify potential risks;
- state who should be notified in an emergency;
- describe short term incident management strategies; and
- outline long term response measures as required.
### Table 15-1  Emergency Response Schedule

<table>
<thead>
<tr>
<th>Incident</th>
<th>Comments/Action</th>
<th>Time Frame</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unauthorised deposition of hazardous substances</td>
<td>Contain waste</td>
<td>Immediately</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>Notify Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remove to approved disposal point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel storage leakage</td>
<td>Contain fuel</td>
<td>Immediately</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>Notify Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flooding</td>
<td>Direct contaminated stormwater to surface water detention area</td>
<td>Immediately</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>Notify Council</td>
<td>Within 24 hours of incident</td>
<td></td>
</tr>
<tr>
<td>Groundwater Contamination</td>
<td>Notify NRETAS</td>
<td>Within 24 hours of detection</td>
<td>Licensee</td>
</tr>
<tr>
<td></td>
<td>Assess extent and a design remediation strategy, submit to NRETAS for approval</td>
<td>As soon as possible</td>
<td></td>
</tr>
<tr>
<td>LFG Identified</td>
<td>Evacuate personnel</td>
<td>Immediately</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>Notify Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investigate occurrence</td>
<td>Immediately</td>
<td>Licensee</td>
</tr>
<tr>
<td></td>
<td>Implement emergency extraction/venting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notify NRETAS</td>
<td>Within 24 hours of detection</td>
<td>Licensee</td>
</tr>
<tr>
<td>Earthquake</td>
<td>Assess impacts on site and operations</td>
<td>As soon as damage detected</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>Notify Council</td>
<td>Immediately</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conduct repair work</td>
<td>As soon as possible</td>
<td>Licensee</td>
</tr>
<tr>
<td>Explosion</td>
<td>Assess impacts on site and operations</td>
<td>As soon as explosion / damage / fire detected</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>If fire results from explosion refer to Section 15.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notify Council</td>
<td>Immediately</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conduct repair work</td>
<td>As soon as possible</td>
<td>Licensee</td>
</tr>
<tr>
<td>Fire</td>
<td>Call Alice Springs Fire and Rescue</td>
<td>Immediately</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>Refer to Table 15-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notify Council</td>
<td>Immediately</td>
<td></td>
</tr>
</tbody>
</table>

### 15.2  Fire Prevention

To ensure compliance with Environment Protection Licence Conditions and general safety, with regard to effective fire prevention and control, the Operator will adhere to procedures set out in 15-2 below.
Table 15-2  Procedures for Fire Fighting and Prevention

<table>
<thead>
<tr>
<th>REASONS FOR CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Emission of dangerous fumes from the combustion of a range of waste material contained within a landfill</td>
</tr>
<tr>
<td>• Potential for waste disposal and associated activities to pose major bush fire hazard</td>
</tr>
<tr>
<td>• Avoid damage to any infrastructure by fire</td>
</tr>
<tr>
<td>• Ensure general compliance with:</td>
</tr>
<tr>
<td>− Environment Protection Licence conditions</td>
</tr>
<tr>
<td>− General Environmental Duty (Waste Management and Pollution Control Act 1998)</td>
</tr>
<tr>
<td>− General Guidelines for the Outdoors Storage of Used Tyres (South Australia Fire Service)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment/Action</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conformance Criteria</td>
<td>No deliberate burning on-site; Ensure adequate fire fighting plans and equipment for all of site including greenwaste processing area; Staff to respond to spot fire outbreaks only at any part of the facility; Only NT Fire &amp; Rescue Service to be called to contain any fire at the landfill, hazardous waste facility or greenwaste processing area; Encourage NT Fire &amp; Rescue Service to undertake annual site inspection of full site and document fire prevention report findings; Ensure Emergency Response Plan procedures adhered to</td>
<td>Operator</td>
</tr>
<tr>
<td>Water Supply and Equipment Provisions</td>
<td>Ensure mobile water tanker with suitable capacity is available at all times; Fit portable fire extinguisher to each machine working at tipping face; Ensure all machines used on site are fitted with spark arresters; Ensure fire fighting equipment available at greenwaste processing area; Ensure all fire fighting equipment kept in good working order</td>
<td>Operator</td>
</tr>
<tr>
<td>Fire Breaks and Vegetation Clearance</td>
<td>Maintain fire breaks/access tracks to provide trafficable surface; Clear vegetation off fire breaks; Keep all vegetation slashed and mown, except shrubs and trees used for landscaping</td>
<td>Operator</td>
</tr>
</tbody>
</table>

15.3 Evacuation Plan or Procedures

The Operator will be responsible for developing their own site Emergency Evacuation Plan and procedures for responding to emergency situations such as explosion, fire or other threats in accordance with Workplace Health and Safety Regulations, Regulation 47. The Plan should consider as a minimum:

- Potential site specific hazards that may cause and emergency;
- Define procedures to deal with the identified potential emergencies considering site specific issues such as staffing, type, size and occupancy of site, buildings and infrastructure;
- Develop an evacuation plan identifying egress pathways and assembly areas;
- Define roles and responsibilities and training in emergency response procedures; and
- Undertake trial evacuations.
16 Closure and Post Closure Management

16.1 Preamble

The Licensee will progressively cap the site to the maximum extent practical, as and when finished levels are achieved, to provide a separation barrier system between waste and the surrounding environment.

The capping system will be designed to provide protection to humans and the environment and satisfy the objectives and required outcomes of waste facility capping systems in accordance with landfill closure best practice.

The following sections detail the closure measures to be implemented to ensure full and sustained closure of disposal cells and satisfying the objectives and required outcomes of the Guidelines.

Detailed design of the adopted capping system resulting in Specifications and Drawings will be developed to detail the requirements for the selection and placement of the materials within the final capping system.

16.2 Capping Design, Materials and Construction

16.2.1 Phytocap Cover System

A Phytocap is also known as an evapo-transpirative (ET) cap or store-and-release cap. Phytocaps are developed to cover closed landfill sites in arid regions and take advantage of reduced rainfall, enhanced evaporation and evapo-transpiration and complimentary soils with a capacity to retain moisture rather than promoting infiltration.

A Phytocap cover, in its simplest form is a soil cover that is vegetated with native plant species of local provenance and has a sufficiently deep soil profile, so that infiltrated water is stored until removal by evaporative losses from the soil surface and by plant roots at depth in the profile. The effectiveness in storing water depends on the hydraulic properties of the soil layers. It can be shown that water storage in soils, such as silt loam, can be increased by strategic placement of a coarse soil at depth in the profile. These alternative cover systems work best in semi-arid or arid environments, where high ET rates and low precipitation make possible the removal of all the infiltrated water by ET.

The layer profile and depth of the cap is determined by water balance modelling using recognised water balance modelling software. Soil samples are retrieved from locally available or earmarked soils proposed for use in the cover system tested in the laboratory for the parameters required by the modelling software. Local climate data is also entered into the model.

16.2.2 Phytocap Construction

Construction of the Phytocap cover system shall be in accordance with the Specification and Drawings developed during the system design phase.

16.3 Surface Water Management

The implementation of surface water management elements, as summarised below shall facilitate the following:

- control and manage on-site surface water runoff to prevent erosion and scour;
• control off-site discharges and prevent excessive discharge of sediment off site;
• prevent ponding and infiltration;
• maintain site access and mobility; and
• minimise the potential for adverse impact to the environment, including offsite local waterways and groundwater, due to the transport of sediment (erosion) and/or contaminants by stormwater runoff from the site.

Monitoring plans shall assist in maintaining the integrity of the capping system where completed and enable the effectiveness of surface water management and cover performance.

External surface water management measures as indicated in Figure 5 shall remain in place following capping of the site. The capping final landform shall incorporate surface water drainage elements such as contour swales and cut off drains designed to minimise the potential for scour and erosion of the capping surface soils and waste exposure.

Runoff from the site will be directed via vegetated surface contour drains to established sedimentation basins. This will facilitate discharge of clean surface water runoff offsite under controlled conditions. Once the revegetation is established on the former disposal areas, sediment loads in the stormwater should reach background levels, however the established drainage system shall remain in place to continue to control surface water discharge from the site.

16.4 LFG Management

Design of the adopted capping system will incorporate measures to control and manage LFG to prevent offsite migration of LFG, limit accumulation of LFG within the waste and below the capping system and prevent uncontrolled emissions to the atmosphere.

16.5 Revegetation

Revegetation shall be undertaken as soon as practical following completion of capping profile construction and create an easily maintained landscape that blends with the surrounding areas.

The capped areas as discussed in Section 10 are proposed to be revegetated with grasses and shallow rooting shrubs as the final landuse reverts back to pre development use.

16.6 Cap Specification and Drawings

Detailed design of the adopted capping system resulting in Specifications and Drawings will be developed to detail the requirements for the selection and placement of the materials within the final capping system.

16.7 Final Landform, Visual Amenity and Future Use

The final landform will reflect the existing undulating landscape and shall therefore blend into the surrounding environment. The capping layer will be constructed to achieve the final landform as shown by the contours on Figure 7 with the proposed drainage and erosion controls included. When constructed the final cover layer will be constructed to achieve the final landform with surface slopes generally between 3% and 25% and with appropriate runoff drainage and erosion controls.

The visual amenity value of the site post closure will be maximised by appropriate landscaping works including the timely establishment of screening vegetation having regard for the adopted end use.
The proposed end use of the site is a returning of the land to its original use i.e. passive landscape.

The site will continue to be utilised for waste management such as a waste sorting and transfer station.

16.8 Reporting

An “as-constructed” report may be prepared following each future campaign of cap construction. The “as-constructed” report should include as a minimum:

- Material classification and placement compliance test results;
- Survey information including subgrade/interim cover and top of topsoil to confirm thickness and grades;
- Photographic record of the full construction process; and
- Comment on construction in accordance with the approved Specification, Drawings, Development Approvals and Licence (as required).

16.9 Final Capping Progress

Landfilling, and subsequently the capping is proposed to be constructed progressively as shown in Figure 6 as areas where waste filling has reached its maximum extent (to the underside of the final capping) is reached. The stage areas shown in Figure 9 may be broken into smaller more manageable regions to be capped.

16.10 Post Closure Management

Monitoring programs have been developed for the operational phase of the facility. Much of the capping works will be undertaken whilst the facility continues to be operational. These monitoring programs will remain active until routine monitoring of the sites conditions confirms monitoring may cease due to stabilisation of the waste mass or a low risk of environmental impact exists.

Monitoring is aimed to ensure that the facility does not adversely impact the surrounding environment and to provide any early warnings should such impacts possibly occur.

The monitoring plans set out monitoring locations, methodology, responsibility, frequency, duration, and acceptance criteria to satisfy for the duration of the monitoring period.