LANDFILL ENVIRONMENTAL MANAGEMENT AND OPERATIONS PLAN (JABIRU WMF)

West Arnhem Regional Council

Updated September 2024

This document describes WARC's adherence to regulatory compliance requirements to appropriately manage operational activities associated with the Landfill Operational Activities for the Jabiru Landfill Waste Management Facility operated by the West Arnhem Regional Council, in accordance with the Council's NT EPA licensing agreement.

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1 INTRODUCTION

1.1 Objectives

West Arnhem Regional Council (WARC) is responsible for the appropriate development, operational management and rehabilitation of its landfill sites to ensure environmental outcomes meet the requirements of its Environmental Protection Agency NT Licensing agreement. By following the plan laid out in this document, WARC will ensure the protection of the environment from all waste disposal activities regardless of size, threshold or location.

WARC adopts a risk-based approach, as described in this document, recognising that existing and proposed landfill sites are each subject to a different suite of individual site-specific circumstances. WARC understands that the environmental outcomes required by EPA NT are fixed and must be met; however, the way in which the outcomes are achieved is not fixed and must be in alignment with the requirements of each site.

The objectives of the Landfill Environmental Management & Operational Plan for the Jabiru Waste Management facility is:

- To manage possible risks associated with the landfill's operations through the implementation of effective control strategies in order to prevent harm to human health and the environment;
- To facilitate compliance with current legislation, regulations and guidelines, in particular as they relate to workplace and/or public health and environmental protection.
- To facilitate operational compliance with conditions of the Environment Protection License:
- To ensure that all operational procedures designed to protect human and environmental health are implemented, effective, and objectives are achieved by:
    - Providing effective management of waste materials.
    - Preventing unlicensed discharge of wastes to storm water drains, watercourses, groundwater and land.
    - To minimise inconveniences to local residences by eliminating / controlling dust, odour, and noise nuisance from landfill activities.

1.2 Document Structure

This plan covers three broad areas of environmental and operational management (Conceptual Site Model, Operations Overview and Site Rehabilitation). These areas include the following key phases of siting, operational management and site closure, as part of the landfill's life cycle:

1. **Conceptual Site Model**
2. **Operations Overview**
3. Structure and Responsibilities
4. Gate House Operations
5. Hazardous Waste Management
6. Water Quality Management
7. Air Quality Management
8. Hazards and Loss Amenity
9. **Site Rehabilitation**

This document sets the outcomes to be achieved for each of the above phases and provides guidance on suggested measures that could be used as part of the strategy to meet the required outcomes.

1.3 Preparation and Consultation

This plan has been reviewed and prepared by the WARC's Manager People and Capacity with the consultation, input and feedback from the Chief Operations Officer, Senior Project Manager and the Regional Operations Manager.

Contractors who have carried out monitoring and assessments of the landfill site include:

- Agon Environmental Pty Ltd

- EcOz Environmental Consultants

List of Associated Documents

This plan should be used in conjunction with the following associated documents:

- Emergency Response Management Plan (ERMP) JWMF
- Landfill Environmental Risk Assessment JWMF
- Consultation and Communication Plan JWMF
- Jabiru Remediation Assessment-HAZMATAssessment-DNP-JMSS-1819-012-POS-lot2352
- Jabiru Waste Management (ID 187697)

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2 CONCEPTUAL SITE MODEL (CSM)

This CSM is a narrative of the nature, fate and transport of discharges, wastes or contaminants that allows assessment of potential and/or actual exposure to contaminants. This CSM enables the formation of hypotheses that can be tested under a monitoring program. Based on the results of monitoring the CSM will be updated as needed.

2.1 Regional Setting

The West Arnhem Region is a local government area of the Northern Territory, Australia and is administered by the West Arnhem Regional Council. The region covers an area of 49,675 square kilometres (19,180 sq mi) and had a population of 1135 (2006 census), with an additional 400 people in the surrounding Kakadu area. The population increased to 6,902 in June 2018 and currently sits at around 500 in June 2022. Jabiru is the major township in the World Heritage listed Kakadu National Park, about 250 km east of Darwin and about 250 km north- north-east of Katherine. The town is the heart of Kakadu and the gateway to Arnhem Land.

West Arnhem Regional Council strives to provide the best services possible to residents, and waste management is an important component of these services. The original landfill site was composed of Lot 2301 and Lot 2305, and later extended to include a portion of lot 2326.

Figure 1: *Aerial topographical and schematic view of the Jabiru township.*

In October 2006 the Northern Territory Government announced the reform of local government areas. The intention of the reform was to improve and expand the delivery of services to towns and communities across the Northern Territory by establishing eleven new shires. The West Arnhem Shire was created on 1 July 2008. Elections of Shire Councillors were held on 25 October 2008.

Since 2017 the Mayor of the West Arnhem Shire is Matthew Ryan. On 1 January 2014, the Shire became the West Arnhem Region.

The Region formerly consisted of unincorporated land, plus small areas under the control of Community Government Councils or incorporated communities:

- Town of Jabiru
- Maningrida Community
- Gunbalanya Community
- Minjilang Community
- Warruwi Community

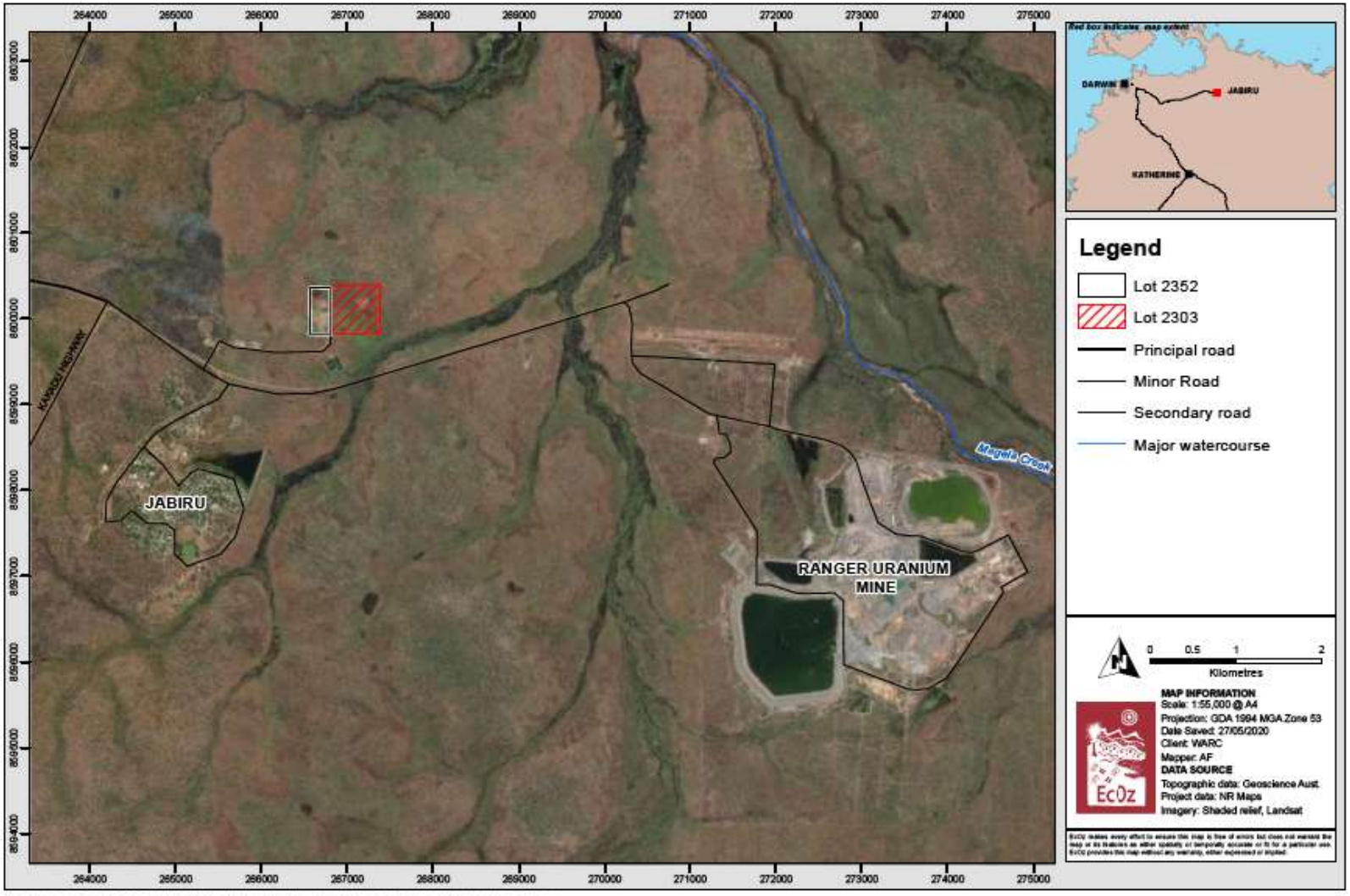

Figure 2: *Map of site location.*

2.2 Site Location

The Jabiru Waste Management Facility (Landfill) is located at Lot 2301, Lot 2305, and Lot 2326 along the West Arnhem Highway.

The Township of Jabiru is located approximately 1500m from the waste management facility.

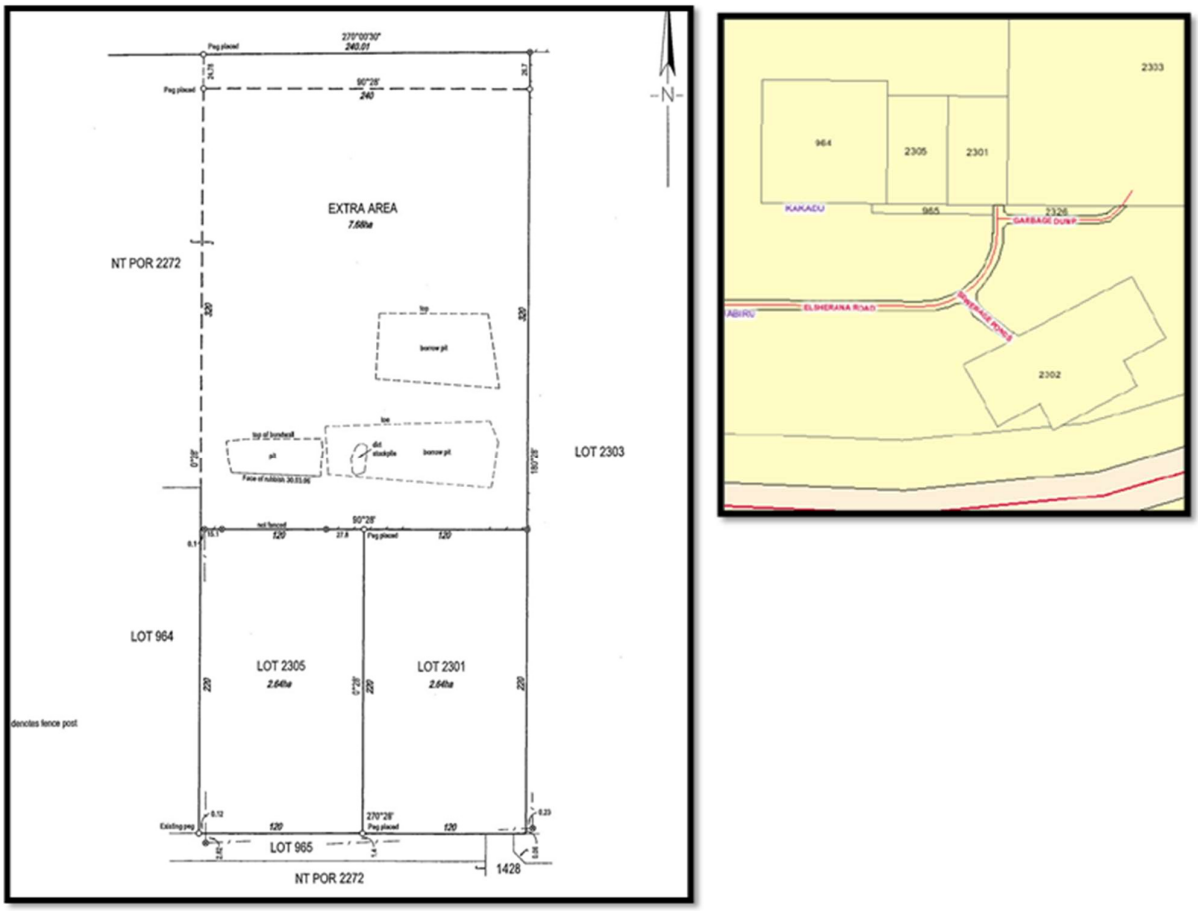

***Figure 3**: Schematics of the Jabiru WMF boundaries.*

2.3 Road Access

The site is located north-east of the Town of Jabiru, at the end of a sealed road. It is expected that the only traffic that will occur on this road will be local and be for the purpose of waste disposal or accessing the sewage ponds. Access to the site is via the Arnhem Highway. This is a bitumen all weather road.

2.4 Site Ownership, Zoning and Tenure Details

Table 1: Main details of the Jabiru Waste Management facility

Facility:	Jabiru Waste Management
Facility Location:	Lot 2301, Lot 2305, and Lot 2326 Jabiru
Environmental Protection Status:	Expired Environmental Protection Licence Number 9
Category B landfill	Servicing population 500-2000 people

In 2005/2006 5,587,400 litres of waste was disposed of at the Jabiru Waste Disposal facility (GHD, September 2006).

Current estimates are that this would be the ongoing standard.

The current lease for the Jabiru town ship expires in 2021 and the current landfill disposal trench will be accepting waste as long as the town is occupied. Under the current plans it is estimated that the landfill site will continue while the town is operational, however proposals are that a better and more cost effective solution be found in regards to waste management which could mean transferring waste to a centralised landfill site in Darwin or Katherine.

2.5 Surrounding Site Neighbours

The site is adjacent to the existing landfill site and is neighboured by a sewage treatment facility and vacant land. Due to its proximity to the existing landfill, its accessibility to the users would not be impacted. The area that is Lot 2303 is a potential site for the development of a new waste transfer station and is superfluous to the area requirements of a waste transfer station.

Table 2: Land users bordering Jabiru Waste Management Facility.

Lot #	Land Used By
Lot 964	Telstra
Lot 2326	Jabiru Township, Director National Parks
Lot 2303	Sewerage Irrigation System, WARC
Lot 965	Bitumen entry to landfill

2.6 Site History and Development

In 1982 Jabiru was established to service the Ranger Uranium Mine. Jabiru hosts a range of services for residents and tourists alike and is the gateway to many of the amazing sights in Kakadu National Park. It is also the location of the head office of West Arnhem Regional Council. The Mirrar people are the traditional owners of the Jabiru area.

The site is zoned as Community Purpose (CP) for the purpose of utilities (UJ) in the town planning zone of Jabiru, under the NT Planning Act and as referenced in the Jabiru Town Plan (NT Government 2019). The approval of recycling depots on sites zoned as CP is discretionary based on the relevant clauses of the NT Planning Scheme but not prohibited. The site is currently utilised as an irrigation area for the neighboring sewage treatment facility. It is understood that the irrigation activities would cease and the area remediated as necessary prior to development of alternative activities on this site.

Table 3: Site considerations for siting the Jabiru Waste Management Facility.

Category	Criteria
Planning	• Appropriate zoning • Land ownership • Available buffers • Not in an environmentally sensitive or inappropriate area
Technical	• Integration with existing and future waste network • Opportunities for Regional co-operation • Centrality • Accessibility • Existing services and utilities • Size of area required
Environmental	• Geology • Groundwater • Surface Water • Ecology • Visibility • Traffic • Topography • Noise • Dust • Odour • Amenity
Community and Social	• Environmental impacts • Social impacts

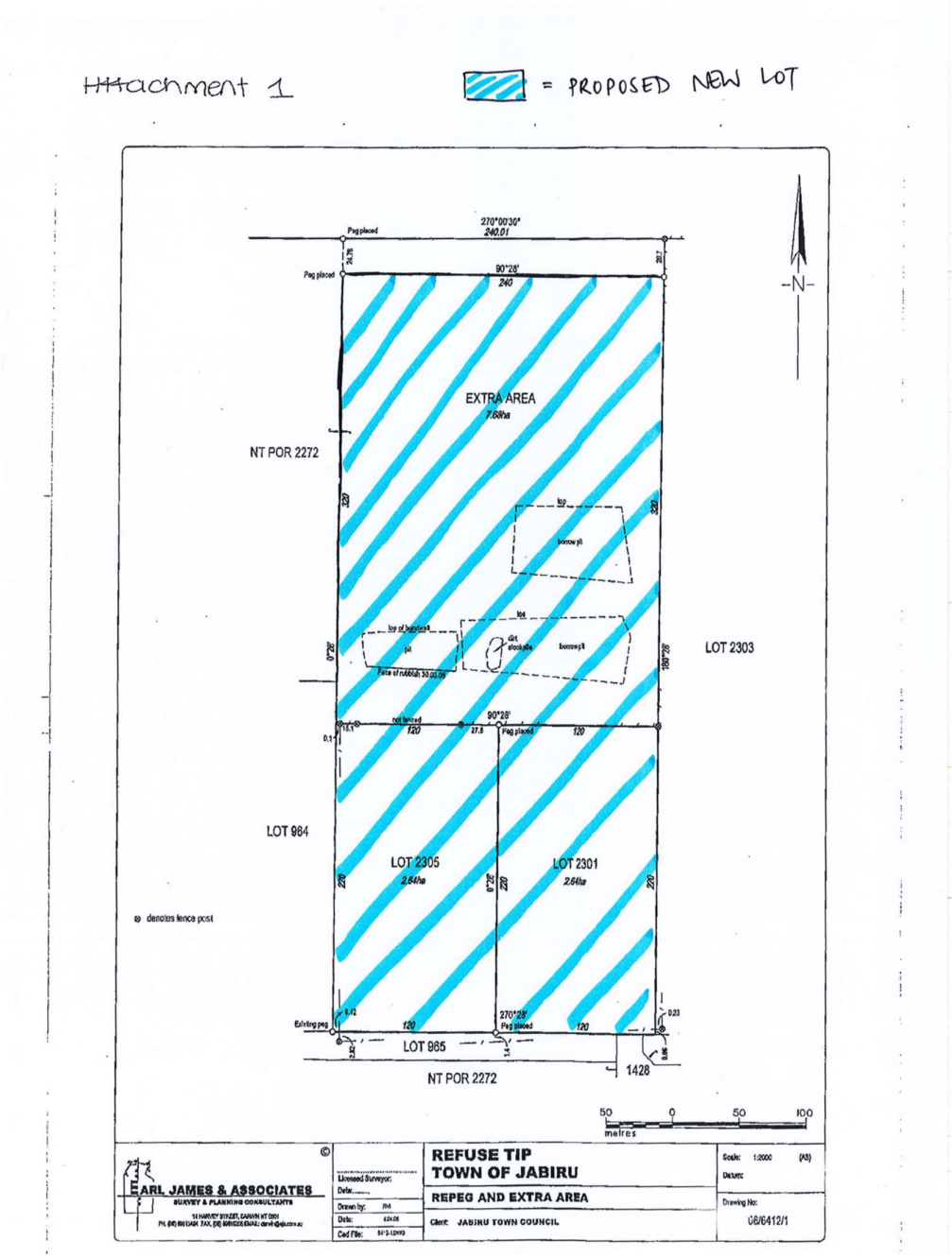

Figure 4: *Boundaries mapped out for the individual lots of the JWMF during the design phase.*

2.7 Topography

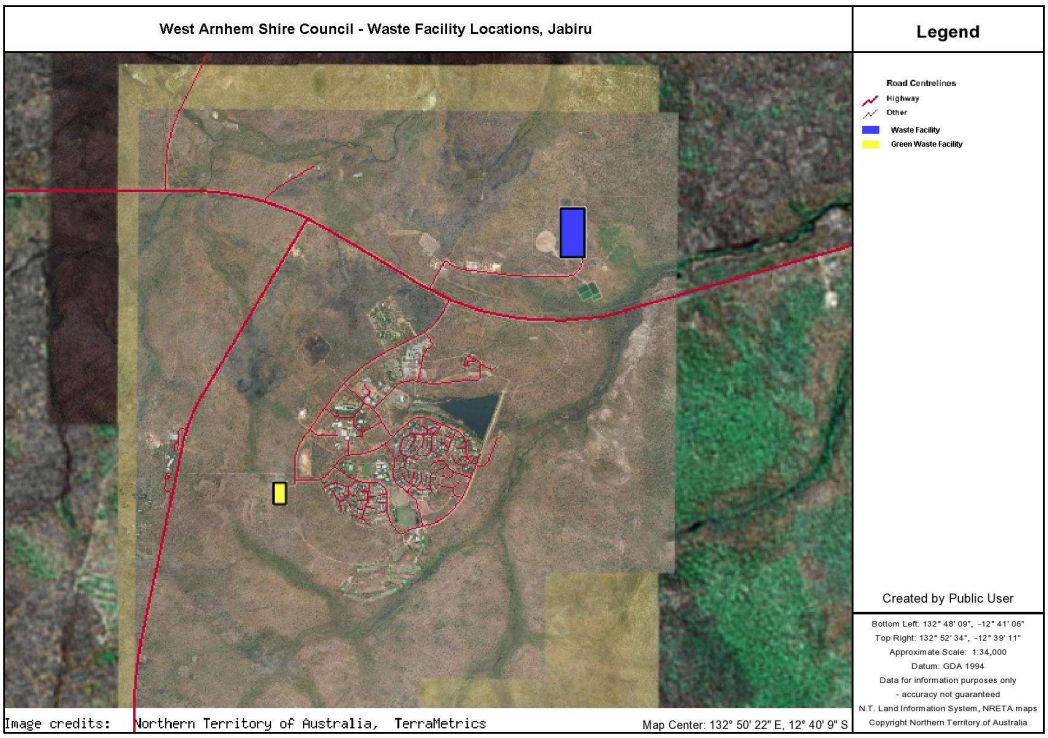

Figure 5: Waste facility locations, Jabiru.

Figure 6: Jabiru Green waste facility.

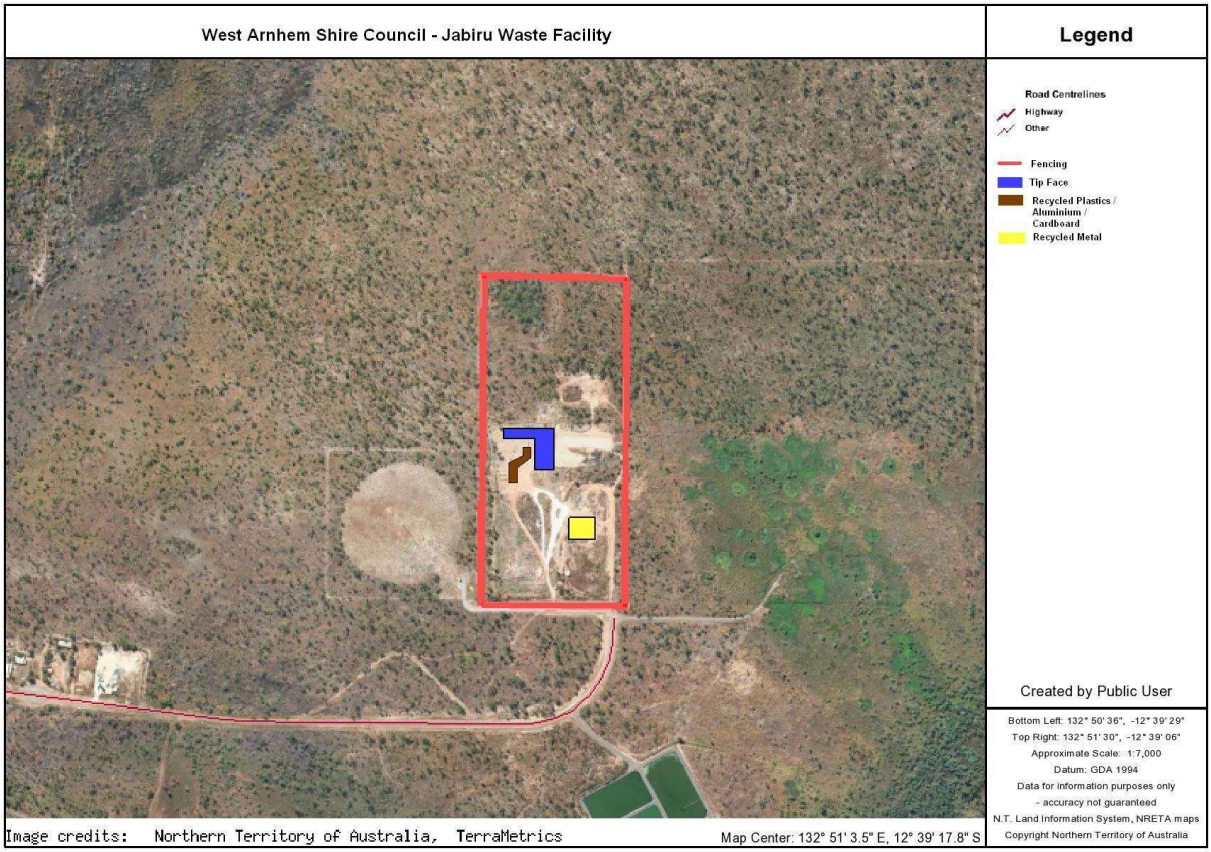

Figure 7: Jabiru waste facility topography.

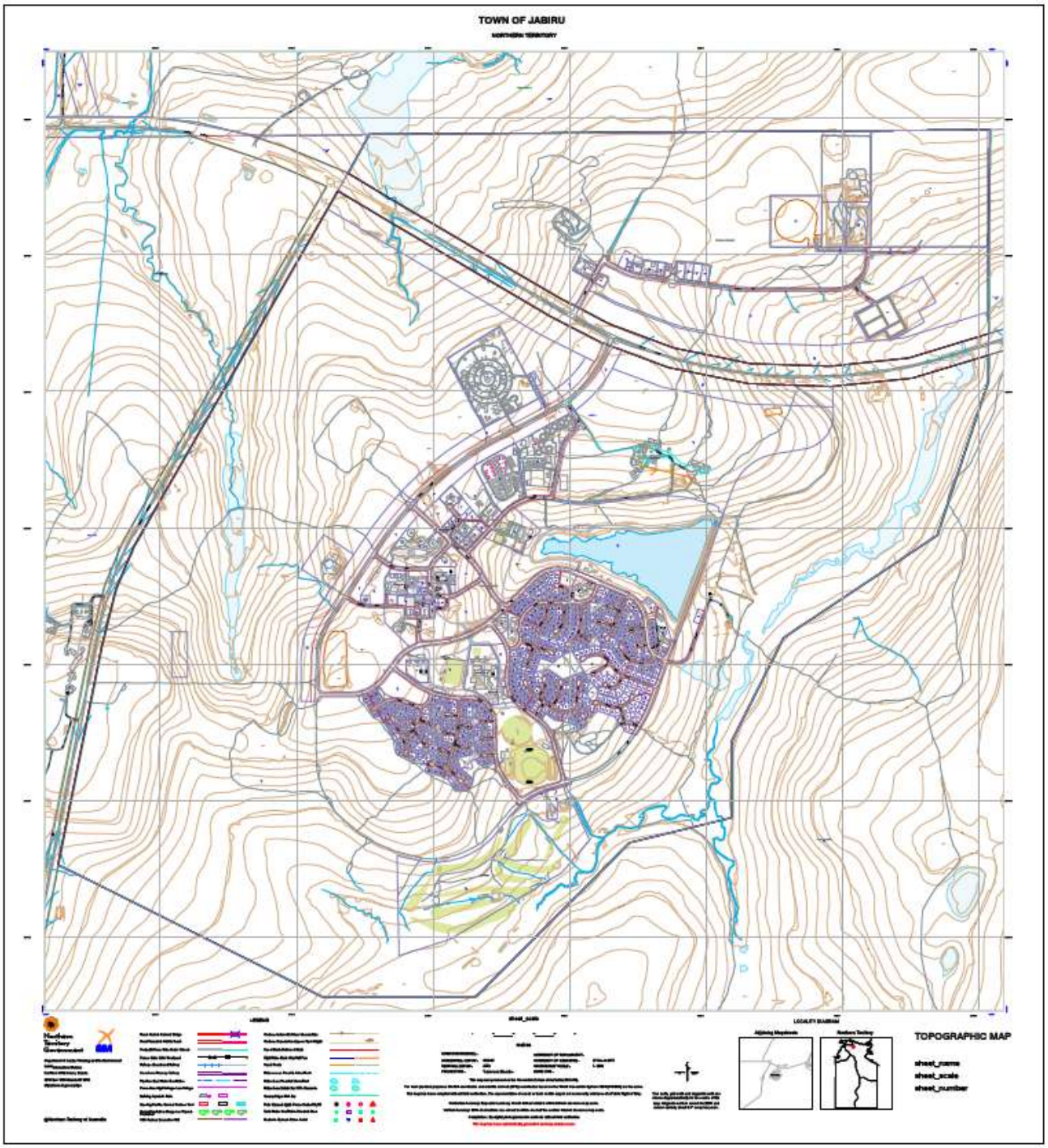

Figure 8: Topographical site view.

2.8 Site Soils and Geology

The West Arnhem Regional Council Waste Management Facility is located in the MacArthur Basin/Pine Creek Geosyncline. Northern Territory Land Systems categorises the site as plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other dispositional product and sandy/ earth soils. The landform is described as level to gently undulating plains on deeply weathered rocks. Topographical information available for the site shows the preferred transfer station area as being relatively flat with a 1-2 % slope towards the south-eastern boundary.

Table 4: Soil composition of the Jabiru Waste Management Facility.

Geology:	Folded siltstone, sandstone and dolomite.
Soils:	Tenosols

The site is not located in any drafted or declared water management zones or allocation plan areas. The aquifer composition is fractured weathered rocks with minor groundwater resources, and is within the Pine Creek orogeny geological region.

There are no current or historical bores present on the site and the current groundwater quality in the region is unknown. Water supply for the Jabiru town ship is produced from bores located approximately 18 km east of the site, therefore the transfer station is unlikely to result in impacts to the town groundwater supply. It is recommended that groundwater monitoring bores are installed at the site to determine background water quality and monitor any potential site impacts during operation.

There are no waterbodies or defined drainage lines within the site. There is a minor non-perennial, intermittent stream located approximately 250 m south east of the lot boundary. This minor stream runs adjacent to the Arnhem Highway and feeds into Magella Creek. Drainage from the site would flow in a south-easterly direction towards this stream in the form of overland flow.

2.9 Climate

The closest Bureau of Meteorology (BoM) weather monitoring station to the site is Jabiru Airport (station number 014198), which has long-term mean rainfall and evaporation data from 1971 to present. Average annual rainfall reported at this station is 1,544 mm, with the highest rainfall occurring in January and the lowest in June. Over 89% of annual average rainfall falls between November and March. Average annual evaporation reported at this station is 7.2 mm with the highest rate of evaporation occurring in October and the lowest in March (Table 5).

Table 5: Average rainfall and evaporation (BoM).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	358.4	353.9	310.2	88.9	17.1	1.0	3.1	2.5	11.7	40.0	138.6	221.1
Evaporation (mm)	5.8	5.7	5.6	6.7	7.0	6.7	7.0	8.0	9.1	9.5	8.0	6.8

Table 6: Average temperature and rainfall (BoM).

Temperature average Wet Season	Maximum 34°C
	Minimum 24
Temperature average Dry Season	Maximum 31.5 °C
	Minimum 19 °C
Number of days with > 1 mm rainfall	88 days/year

2.10 Hydrology

The closest bore to the landfill is RN032816. Ground water is 5m below surface at this bore. Bores have been sunk closer to the landfill site (E.G. RN 009333) but did not yield water after a drill depth of 36 metres and were abandoned. The landfill site is located on gently undulating ground which would also be higher in elevation than bore RN 032816.

Bores which supply town water supply are approximately 20km away from the landfill

2.11 Flora and Fauna

The site of the Waste Management Facility has been used as a landfill since the establishment of the town in 1982. It has been cleared to allow for waste management operations and as a result of these activities populations of significant flora and fauna are not present. Operations are not expected to impact on any flora or fauna populations outside the facility area. The landfill fence will prevent animals scavenging at the site, and it is proposed that a 20mt buffer or exclusion zone be observed around the inside of the boundary.

2.12 Indigenous Heritage

Aboriginal Areas Protection Authority (AAPA) advised that there is no record of Registered or Recorded sites listed within the Jabiru area (contact Donna Dwyer, Manager Technical Section).

The Northern Territory Heritage Branch also confirmed that there are no heritage conservation sites in the area affected (contact David Steinberg).

3 OPERATIONS OVERVIEW

Waste disposal at the facility currently occurs in a trench-like manner, however the active waste cells are filled from natural ground level up to the current landform height (approximately 5 m). In order to achieve a trench effect, earth berms are constructed at right angles from the face of the landform, approximately 10m long and 4m apart. This allows sufficient space for a dozer to run between the berms and achieve optimal compaction rates. The waste is compacted daily and covered with 150 mm of cover material extracted on-site. Once a trench is filled, it is covered with 600 mm of compacted clay material sourced from site and a new trench is constructed.

Leachate at the facility will be managed on-site through natural evaporation. Trenches are constructed around the active tip face to direct any leachate towards designated low-lying areas, which are designed to facilitate maximum evaporation. No leachate collection dam is present. During periods of high rainfall, site grading and soil absorption will minimize runoff, and overflow water will be allowed to evaporate naturally. Any accumulation of water on-site will be monitored, and additional grading may be implemented as necessary to improve evaporation rates.

The facility operates weekdays from 7am to 3pm only with segregation bays available for afterhours drop off. WARC currently employ 2 full-time equivalents to operate the site, which includes provision of gatehouse services and dozer operations for landfilling material.

3.1 Regulatory Background

The Waste Management and Pollution Control Act is the main legislation regarding waste disposal, however there are other legislation, guidelines and standards that are applicable. Table 7 below lists these documents and they should also be consulted to ensure compliance.

Table 7: Applicable regulations, standards and guidelines to operate a landfill site in NT.

Related Legislation and Guidelines (NT)	Enforcement Agency
Waste Management and Pollution Control Act 1998 The Waste Management and Pollution Control (Administration) Regulations 1998 Water Act 1992 Water Regulations 1992	NTEPA
Public Health (General Sanitation, Mosquito Prevention, Rat exclusion and Prevention) Regulations Environmental Health Standards for Remote Communities in the Northern Territory 2001	Department of Health
Health and Community Services Complaints Act 1998	Department of Health
Local Government Act 2008	Department of Local Government and Housing (www.dlgh.nt.gov.au)
WORK HEALTH AND SAFETY (NATIONAL UNIFORM LEGISLATION) ACT 2011 WORK HEALTH AND SAFETY (NATIONAL UNIFORM LEGISLATION) REGULATIONS 2011	NT WorkSafe (www.worksafe.nt.gov.au)
Weed Management Act 2001 Weeds Compliance Policy	NTEPA
Relevant Commonwealth Legislation	**Enforcement Agency**
Environmental Protection and Biodiversity Conservation Act 1999	Dept of Agriculture, Water and the Environment
Other Relevant Standards and Guidelines	**Enforcement Agency**
Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the NT (Jan 2013)	NTEPA
LANDFILL_siting_design_landfills	NTEPA

The Northern Territory Guideline for Disposal of Waste by Incineration	NTEPA
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3.2 Key Site Features

3.4.1 Easements / Buffer

There is a 20m easement that surrounds the entire landfill site to separate it from its neighbouring sites and the road.

3.4.2 Landfill Design

The Jabiru landfill is a trench design. Excavated soil is piled around the trench to prevent surface water from entering the waste pile.

3.4.3 Landfill Staging

Once each trench/cell is filled it will be closed as per closure procedures and a new disposal area prepared. Future trenches will be staged in this way, and GPS coordinates recorded and placed on an updated site map for future reference.

3.4.4 Leachate Ponds

The following ongoing measures are implemented to treat / minimise generated leachate. Prevention / minimisation of surface water infiltration by;

1) Maintaining a back sloping unloading/turning area, away from the operational area,
2) Daily pushing of the unloaded waste,
3) Daily/weekly covering of the filled area with onsite borrow material
4) Phased restoration of the site
5) Mounding the top of each filled trench area to create a uniform gradient (minimum 5%) away from the top of the centre of the trench

Leachate at the facility is managed entirely on-site through evaporation. Trenches around the active disposal areas direct any leachate towards low-lying areas designed to enhance natural evaporation. There are no leachate collection pits or ponds. In the event of high rainfall, site grading will ensure efficient water dispersion, allowing natural soil absorption and evaporation to minimize overflow risk.

3.4.5 Water Use and Site Water Management

The following ongoing control methods will be implemented to prevent storm water contamination from waste and assist in storm water management:

1) Shaping/mounding all progressively completed waste fill areas to shed clean rainfall to the surrounding environment.
2) Directing surface gradients from areas of active filling into the leachate pond
3) Regular daily/weekly waste pushing, shaping and covering
4) Phased restoration
5) Maintenance of drains which divert clean water away from the landfill active area

3.4.6 Landfill Gas Containment

The waste stream entering the Jabiru Waste Management Facility consists of a high proportion of packing materials, inert construction and demolition waste materials including steel, relatively lesser volumes of putrescible waste and other rapidly biodegradable materials. This should generate relatively small amounts of carbon dioxide and little methane gas during the dry season.

The total volume of general waste placed at the tip face is too small to become anaerobic and biodegradation of the organic portion of the lightly compacted waste will generate very small quantities of carbon dioxide as a by-product but little methane.

Gas emissions (CO2 + CO4) from landfill operations are contained or minimised by:

1. The daily covering program with inert soil and the final capping soil layer which requires the operator to:
    - Place a layer of 150mm of on-site soil over each week's waste once it is pushed into place
    - Place a final layer of 600mm of on-site soil over the finally graded landform (5% gradient)
    - Place 100mm topsoil layer over the final cover
    - Mulch the surface with a 300mm thick cover of shredded / mulched green waste as it becomes available
2. The segregation and subsequent refuse as mulch of green waste such as lawn cuttings, leaves, tree stumps etc further assists landfill gas management.

3.5 Erosion Management

Clearly defined tracks will be used by landfill visitors and staff to prevent erosion caused by off road driving. Where possible land forming will present gentle gradients to decrease surface water speed and associated erosion.

Vegetation will be retained where possible and encouraged to establish where it has been cleared to act as a natural erosion minimiser. Any areas that are identified as problem areas for erosion will have treatment works which may include further land forming and/or constructed controls.

3.6 On-Site Facilities

Facilities on site include the following:

- Gatehouse, including the landfill operator's offices and record keeping
- Storage compound for equipment, vehicles and fuel
- Amenities building
- Workshop
- Generator building, fuel bund
- Weighbridge
- Wheel wash (future possibly)
- Bins or dedicated areas for recyclables
- Bin wash/ sterilisation
- Container triple wash evaporation pan
- Composting facility

3.7 Hours of Operation

The landfill operates specific hours to appropriately service the town ship.

Table 8: The JWMF operation hours.

DAY	OPERATING HOURS
Monday	7am – 3.30
Tuesday	7am – 5pm
Wednesday	7am – 5pm
Thursday	7am – 5pm
Friday	7am – 5pm
Saturday	8am – 12pm
Sunday	*CLOSED*

Public Holidays	*CLOSED*
Christmas Day	*CLOSED*
Good Friday	*CLOSED*

3.8 Fire Management

The following ongoing control methods are implemented to prevent the occurrence of fires at, or originating from, the facility:

a) Preventing the public from accessing the tip face by having segregated areas for household waste and building materials.
b) Waste is placed and compacted, as much as machinery allows, each day into as small an area as is practicable within active filling area and covered with soil.
c) Exposed waste in other parts of the landfill are covered with soil.
d) A sign is installed prohibiting the lighting of fires within the facility by unauthorised personnel.
e) The Jabiru Waste Management Facility will have a 20m wide fire break installed inside the perimeter fence. Internal roads will also act as fire breaks. In addition, a fire break will be maintained around the active landfill disposal area.
f) Any detection of unplanned fire will be immediately dealt with in line with the Emergency Response Management Plan, and local fire authorities must be contacted.

The JWNF fire management methods and incident response procedures have been discussed with the local fire authority.

Fire Incident Response Procedures are provided in the Incident Procedures Section of this plan.

3.9 Pest Animal & Insect Management

Pest animals and insects are controlled by the following methods;

a) Waste is covered daily
b) Pesticide sprays will be used as required if outbreaks of flies or mosquitoes occurs
c) Weekly inspection and report by the Site Operator or Technical Services Manager
d) Weekly inspection by the Site Operator of sewers, culverts, drains, and collection ponds to detect animal activity or mosquito larvae. Treatment as required.

3.10 Weed Management

Noxious weeds will be managed by the following methods;

a) In accordance with the *Weed Management Act 2001* and regulations, noxious weeds will not be accepted into the facility. West Arnhem Regional Council will apply for a Noxious Weed Designated Dumping Site Permit from the Department of Natural Resources, Environment and the Arts and if approved, a weed disposal procedure will be prepared.
b) Monthly inspections of the site undertaken by the Site operator to identify weed outbreaks.
c) Prompt treatment of identified weeds.

3.11 Litter Control

Litter will be managed by the daily/weekly covering of the active tip face. Additional litter management methods include installation of fencing and litter clean ups.

A movable fence 1800mm high has been installed around the active disposal area to catch any windblown litter. This fence will be relocated to the new active area when the current trench is closed. A permanent 1800mm fence has been erected around the entire Waste Management Facility site which will catch windblown litter which has escaped the transportable fence.

Staff will patrol the site weekly to collect any litter that is seen and to address litter sources if possible.

One of the most difficult types of litter to be managed is plastic bags, and these have been banned from Jabiru.

4 STRUCTURE AND RESPONSIBLITIES

4.1 Staffing

The Jabiru Waste Management Facility will be managed by a dedicated team through WARC, reporting to the Services Manager Jabiru. They carry out, daily, weekly and monthly duties as outlined in the maintenance schedule. All non-protrusible and industrial waste is removed from the area, and the protrusible waste is buried.

4.2 Training

All individual staff involved in the operation of Landfill will undergo mandatory and suitable training. A training package will be developed to ensure the Landfill is operated in such a manner to comply with the requirements of this plan and in accordance with the EPA Licence and relevant legislation.

4.3 Complaints

WARC has a customer complaints policy and procedure that will apply at the Landfill operations. We also have in place a formal Communication and Consultation Plan that is used with relevant stakeholders.

Refer to the Consultation and Communication Plan for the JWMF.

4.3.1 Social Impacts

The social and aesthetic impacts are minimal due to the facility being located in a non-residential area. The services provided by the facility are essential to the residents of Jabiru as no other waste disposal facility is available in the area.

Residents will not be charged to dispose of domestic waste at the facility.

Commercial users and businesses registered within the Jabiru town ship will be charged an annual fee for disposing of commercial wastes in place of general dumping fees.

4.3.2 Public Health Impacts

Possible impacts from the facilities are likely to originate from:

a) Pests, animals, and insects, i.e. mosquitoes
b) Through fire incidents
c) Through the accidental discharge of contaminated liquids

All of these risks are addressed in this plan and in Section 4.4 - Incident Handling Procedures and as per the Landfill Risk Assessment.

4.4 Incident Handling Procedures

4.4.1 Incident Logbook

An Environment Incident logbook will be kept at the landfill. The Site Operator will record any incidents and complaints in the book immediately.

The Services Manager checks the log book each week for incidents and implements appropriate measures. Site operator to implement incident procedures as outlined in the Emergency Response Management Plan and the Consultation and Communication Plan - call for assistance as required.

4.5 Incident Investigation

Incidents of a significant nature are to be reported to the Council Services Manager immediately for investigation / referral / remedial actions. Significant incidents include injuries to people, any incident which has or could impact areas off site, any incident that breaches EPA License conditions.

4.6 Inspection Reports

Weekly Inspection reports are to be completed by the Site Operator.

Site Inspection report checklist can be found in **APPENDIX 3.**

5 GATE HOUSE OPERATIONS

5.1 Landfill Signs

Adequate signage needs to be in place to inform who has access to the site (the public is usually prohibited), where key aspects are located, and fundamental rules for the operation of the site, etc. By ensuring adequate signage, misunderstandings and misuse of the Landfill are avoided and emergency vehicle access assisted in a timely fashion.

Our Jabiru site contains signage to access road sign:

a) Landfill location

Main gate signs:

b) Landfill name, operator, and contact details
c) Operating procedures
d) Prohibited wastes
e) Emergency procedures and contacts
f) Landfill operating hours
g) Fire and scavenging prohibition

Internal site signs:

h) Directional signs on internal tracks
i) Designated waste disposal points for batteries, recyclables, waste oils and paints, green waste, wrecked vehicles etc.
j) Safety procedures at the facility management building.
k) Areas not open to the public as required for regeneration areas and safety hazards.

5.2 Screening of Waste and Recording of Quantities

Incoming waste will be screened by:

a) Access to the pit face restricted to the public. Specific designated areas allocated at the entrance of the landfill site for their use. Prohibited wastes will be collected and relocated to the appropriate designated point for removal by authorised operators.
b) The onsite Operator checking incoming waste, sorting and removing any recyclable and/or unwanted material prior to placing the waste into the cell.
c) A sign at the main entrance gate notifying users of accepted and prohibited wastes
d) The Site Operator conducting a visual inspection of the waste active face prior to applying the daily/weekly cover.
e) The appropriate authorities will be notified when individual loads are ready for removal

Waste disposal quantities will be recorded by:

a) Daily recording of estimated quantities of waste completed by Site Operator
b) Yearly disposal quantity calculated by deducting the volume of cover soil used in daily waste covering from the borrow soil pile.
c)

5.3 Active Tip face

The active disposal face will be managed by the site operator. Waste will be disposed of at the active

face and then pushed into the trench and covered with 150mm of soil daily/weekly as required by licence conditions.

5.4 General Waste

General waste includes any waste not included in the following categories that is not capable of being composted, recycled, reprocessed or re-used. This category also includes treated clinical waste, incontinence pads, drained dialysis waste and disposable nappies. All general waste can be disposed of in landfill.

5.5 Recyclable Products

These are items composed of materials or components that are capable of being re-manufactured or re- used. Items considered recyclable **only** if facilities are available to collect and re-process them. Where no recycling facilities are

5.6 Compaction of Waste

Waste will be compacted by;

a) Pushing loose waste into a small as area as possible with available equipment
b) Spreading the waste in thin lifts (generally <600mm) as equipment allows
c) Compacting until a uniform surface is achieved as much as equipment allows
d) Covering the waste with inert soil cover (150mm daily/weekly)

5.7 Covering of Waste

a) On site inert soil will be used to cover waste
b) 150mm of cover soil will be placed over waste daily/weekly as required by the NTEPA for Category B landfill sites.

5.8 Burning of Waste

Burning of waste should be avoided as the process of burning pollutes the air with toxic emissions (e.g. toxins, sulphur dioxide, lead, mercury and ash) and enhances the chance of deposition or inhalation of toxic substances. Protection burning around the landfill will be undertaken each year to minimise the risk of bushfire through the landfill area (refer to Section 6.1).

5.9 Waste Disposal Charges

The facility charges set fees for the disposal of certain types of waste.

Table 9: Waste Disposal Charges.

FACILITY USER / ITEM FOR DISPOSAL	CHARGE
Domestic waste - trailer	$33 cubic meter
Domestic waste – car or ute	$33 cubic meter
Commercial user	As per current Council Fees & Charges
Tyers – whole	$10 / Car $15 / Light truck $15 / Large truck $20 / Heavy machinery
Asbestos	Not accepted at this facility
Green Waste	No charge
Car Wreck	$60 / wreck

If required, cardboard burning may be undertaken in a designated pit. Waste separation will ensure only cardboard is disposed of in this tip.

a) Cardboard burning will be a short, clean and smoke free as possible
b) The public will be excluded from the site during burns
c) Staff will not conduct normal duties while burns are taking place.
d) Fire prevention methods will be in place (soil bunding walls, fire breaks established)
e) Discussions on fire safety and practices will be undertaken with the local fire authority
f) Staff will have appropriate fire training
g) Fire Incident Response Procedures are prepared.

Tyre storage on-ste complies with our EPA L##:

- the height of the stack will not exceed 2m;
- the base of the stack will not exceed 45m in length and 5m in width;
- the slope of any stack will not exceed 45 degrees; and
- the stacks will be separated from each other by no less than 10m.

A detailed plan is covered in the Emergency Response Management Plan (ERMP).

5.10 Waste Minimisation

A study on the projected economic status and population of Jabiru post mine closure, was undertaken by Geografia in 2017. The study factored in population impacts over the next 20 years, including:

- Population decline as a result of the mine closure
- Temporary population increases a result of construction in Kakadu and Jabiru township to achieve the tourism transition
- Growth in tourism

Overall, the study found that the population will decline from present day numbers (approximately 1,100) down to between 850 and 950 in 20 years' time (Figure 2-2). In relation to waste production, these figures are not expected to have a major impact on the future operation of the landfill or transfer station and therefore forecasts have been based on current day volumes.

Jabiru Town Council has initiated a number of waste minimisation techniques. These are:

a) A 'Recycling Drop off Point' is established at the waste management facility.
b) Residents and visitors can drop off recyclable resources during facility operating hours.
c) Aluminum cans are collected by Council.
d) The Site Operator inspects incoming waste for recyclable resources and where possible diverts such items to the appropriate collection point. This process also prevents unaccepted waste including ACMs from inadvertently entering the site
e) Where possible large recyclable items such as old whitegoods, steel, copper etc are collected from arriving loads and the active face.
f) A green waste disposal site is available at the facility.
g) Residents will be encouraged to home compost.
h) Commercial waste recyclers will be called to collect targeted recyclable waste when sufficient quantities exist (e.g. wrecked cars).
i) Residents will be encouraged to minimise their own waste
j) Items which can be reused will be stored at a designated collection point (E.G bicycles, fence posts, crates etc).
k) The placement of Public Place Recycling (PPR) Points throughout the town and high volume

sites. These PPR points will accept recyclable materials such as aluminium cans, plastic beverage containers, glass, and paper.

l) West Arnhem Regional Council offer a kerb side recycling service to residents.

6 HAZARDOUS WASTE MANAGEMENT

In accordance with Licence to Operate a Landfill Environmental Protection Licence Number 9, listed wastes arising from commercial activities will not be accepted at the Jabiru Town Council Waste Disposal Facility. For a list of commercial listed wastes please refer to Appendix 2 and the Jabiru Remediation Assessment-HAZMAT Assessment-DNP_JMSS-1819-012-POS-lot2352.

The following hazardous wastes will have designated disposal sites and will be disposed of or collected when sufficient quantities allow:

a) Car batteries;
b) Waste oil;
c) Clinical waste;
d) Chemical waste;
e) Car tyres (water holding waste);
f) Fridges and freezers (domestic white goods);
g) Lockable boxes;
h) Gas bottles; and
i) Animal carcasses.

Figure 9: *Location of test pits for old waste, asbestos waste and debris on the JWMF.*

Under no circumstances will asbestos or asbestos based products be accepted at this waste management facility. All enquiries should be directed to the Shoal Bay waste management facility in Darwin.

The surface leachate pond will allow collected leachate waters to evaporate quickly. The rainfall for the area is approximately 1500mm and the annual evaporation rate is approximately 2500mm. Significant rainfall events in the wet season may cause accidental leachate discharge into adjacent environment. This potential for accidental loss will be managed through the measures outlined in the Operations Overview Section of this plan and regular maintenance of control measures.

The landfill site has a higher elevation than the sewerage irrigation area next door in Lot 2303. Any run off of water or leachade will therefore travel across the sewerage irrigation area. A water testing bore is located on the other side of lot 2303 and samples are to be taken from here routinely to check for the presence of heavy metals and monitor bacteria levels. This is to ensure that no contaminants are allowed to continue on to water causes in the area.

6.1 Clinical Waste

Health Centres should generate very little clinical waste other than sharps. By definition, clinical waste is that which has the potential to cause sharps injury, infection or public offence, and includes sharps, human tissue waste (includes identifiable human tissue, materials or solutions that contain free-flowing or expressible blood), laboratory waste, animal waste resulting from medical, dental or veterinary research or treatment that has the potential to cause disease. Examples such as disposable nappies, tampons, lightly blood stained dressings are not considered to be clinical waste and are appropriately disposed of as general waste.

Medical and Clinical Waste is not accepted into the Jabiru waste management facility. This is controlled by the Jabiru medical clinic, and transported into Darwin for disposal. Clinical and released wastes are defined as wastes arising from medical, nursing, dental, veterinary, pharmaceutical, or similar practices and wastes generated in hospitals and other facilities during the investigation or treatment of patients or in research projects. Darwin's clinical waste is predominantly processed (i.e. rendered non-infectious and unrecognisable) by an autoclave at the Royal Darwin Hospital (RDH) Waste Management Facility. The Shoal Bay Waste Management Facility accepts clinical waste that is processed by the RDH Waste Management Facility's autoclave.

The Territory Health Services define medical and clinical wastes in the following way:

- human tissue (other than hair, teeth and nails)
- body fluids or blood
- visibly blood-stained body fluids, materials or equipment
- laboratory specimens or cultures
- animal tissue, carcasses or other waste from animals used for medical research.

Disposal of medical waste must be disposed of in accordance with the GUIDELINE FOR REMOTE CLINICAL WASTE by the ntepa and the Waste Management and Pollution Control Act.

6.2 Radioactive Waste

Radioactive waste is extremely hazardous to human health and requires strict management methods. With the exception of domestic smoke detectors it is unlikely that small waste management facilities would be required to accept any radioactive waste. If there are any doubts on the management of radioactive waste it is recommended that advice be sought from the appropriate authorities.

Domestic smoke detectors have very small amounts of radioactive waste and can be accepted into the general waste stream.

Information on radioactive waste management can be found at the Australian Nuclear Science and Technology Organisation.

To get advice on the management of radioactive waste call toll free 1800 682 704 or refer to the Radiation (Safety Control) Act of the Northern Territory.

6.3 Waste Oil

Waste oils are accepted at the Jabiru landfill and placed in large containers and collected and transported for recycling purposes.

For more information of the management of waste oils go to
http://www.environment.gov.au/protection/used- oil-recycling/recycling-your-oil or
http://www.lgant.nt.gov.au/home/member_services/waste_oil_project

6.4 Asbestos Containing Materials (ACM)

Asbestos is a hazardous waste that can be extremely dangerous to human health if it is not properly managed. Asbestos is not accepted at the Jabiru landfill site, and all enquiries about ACM waste by the public or contractors are directed to the Shoal Bay Waste Management Facility in Darwin. To reduce the risk of ACMs contaminating the site - waste from building remediation activities are not accepted at the facility, which is the only way that ACMs.

6.5 Paints and Solvents

Chemicals including herbicides and pesticides, paints and aerosols cannot be disposed of at the landfill but may be stored in designated and bunded areas for off-site removal as required. If deposited directly into landfill, paint poses a potential risk to the environment, especially in cases where the landfills are not adequately constructed and managed to protect groundwater and surface water.

Safety Data Sheets (SDS's) must be obtained for all chemicals at the landfill, and stored at the landfill near the chemical storage areas. SDS's provide information about the hazardous nature of the substance, storage requirements, environmental and human exposure risks, and spill response requirements. Separation of chemicals must occur and they must be stored in allocated, bunded, weather proof and lockable areas (e.g. cages or cupboards).

6.6 Organic Products

This category includes wood, garden waste, food, vegetable and natural fibrous material waste, which are capable of being composted or could be used to enhance lawns or gardens. This category of waste can be disposed of as general waste.

6.7 Sewerage, Sewerage Residues, and Agricultural Manures

These wastes are hazardous to human health and must not be included in general waste management.

6.8 Animal Carcasses

Large animal carcasses can harbour disease and facilitate insect infestations. They also can create unpleasant odours as they decompose. Animal carcasses should not be disposed of at the landfill without first consulting with council. They should not be burnt with other waste. It is recommended that animal carcasses be buried immediately after disposal.

6.9 Chemicals and Chemical waste

Many chemicals and chemical wastes are hazardous to human health. The management of these wastes are controlled by the Northern Territory Waste Management and Pollution Control Act. Commercial chemicals and chemical wastes should not to be accepted at the waste management

facility. Domestic chemicals should be stored on site in a lockable structure.

For further information on prohibited other hazardous wastes and Jabiru WMF's hazardous register please refer to APPENDIX 3 and the AGON Environmental report: Jabiru Remediation Assessment-HAZMAT Assessment-DNP-JMSS-1819-012-POS-lot2352

6.10. Ongoing Landfill Operation

Each new waste cell has a capacity of 200 m3 and takes approximately four weeks to fill. Accounting for a 600 mm clay capping layer, and assuming 15% of airspace is also occupied by cover material, each cell has an estimated capacity of 160 m3 of waste (the equivalent of one month kerbside waste collection of uncompacted waste).

The landfill site currently has approximately 5 ha of available space for landfill expansion. Based on current disposal rates and operations, the landfill expands by 50 m2 a month and therefore it would take 80 years to fill the available area. Realistically, the lifespan would be much less as environmental regulations become stricter and legacy unlined landfills are phased out. It is difficult to predict when the landfill activities may be forced to close down, however it is advisable that contingencies are investigated within the next 10 years.

7 WATER QUALITY MANAGEMENT

7.1 Introduction

A Detection Monitoring Programme (DMP) is used by WARC to monitor and manage environmental parameters that could be contaminated due of the operation of the landfill site.

7.1.1 Leachate Barrier System

Leachate is managed in a way which will prevent escape from the site or infiltration in to ground waters or surface waters. The DMP is designed to effectively detect any release of leachate contamination from the licensed landfill to ground waters or surface waters after significant rainfall events. The landfill is managed to ensure that the performance requirements of the Environmental Protection Licence are met during the operational life of the facility and post closure of the facility

7.1.2 Surface Water and Sediment Controls

Ground water monitoring bores are currently not installed at the Jabiru Waste Management Facility. Installation of monitoring bores may be considered in the future if waste disposal volumes rise above 50,000 tonnes per annum.

Due to the level surface area of the site and the landfill construction type (water diverted away from active tip face) surface run off from the site should be greatly reduced.

After heavy rainfall, storms or cyclones when surface water is present the following sampling sequence will be adhered to:

a) Sampling of surface water flows will be carried out during rainfall events large enough to create pools with a depth of at least 50mm within the active tipping face
b) Sampling will be carried out after any major storm/cyclone/flood event which is capable of leaving pools of surface water of at least 50mm depth on site for longer than 72 hours.

7.2 Detecting Water Pollution

The impact monitoring for the site consists of a number of visual observations, compliant monitoring and pH analysis of ponded water or leachate collected in the leachate ponds and storm water drainage.

Selection of pH as the water quality (physio-chemical) for the Jabiru Waste Management Facility took

account of the chemical composition of leachate which varies greatly depending on the age of the emplaced waste.

During the acid phase of decomposition pH will be low and concentrations of BODs, TOC, COD, nutrients and heavy metals will be high.

During the methane fermentation phase the pH will be in the range of 6.5 - 7.5 and the BODs, TOC, COD, and nutrient concentrations will be significantly lower.

Monitoring the pH levels of surface waters and of liquid collected in leachate ponds will give an indication of leachate escape, regardless of whether it was generated from recently emplaced wastes or older waste.

7.2.1 Surface Water Monitoring Program

The following maintenance procedure applies:

1) Regrade soil cover to promote flow of surface water away from the working face towards sealed landfill areas where it does not come in contact with waste.
2) Push waste in a grade that ensures rainwater in contact with waste or leachate from waste is directed into leachate evaporation ponds.
3) Fill in erosion channels and regrade perimeter of landfill batters if waste becomes exposed.
4) Re-establish any breaches of leachate evaporation through pond bunding immediately as they occur
5) Maintain the open drain around the landfill to minimize the volume of clean rainwater coming in contact with waste.

8 AIR QUALITY MANAGEMENT

8.1 Landfill Gas Containment System

The total volume of general putrescible waste disposed of annually at the facility is considered insufficient to result in anaerobic conditions at the site. Possible gaseous emissions will be controlled through the measures outlined in the Operations Overview Section. Controlled burning will also assist in the reduction of any emissions and/or discharges.

8.2 Fire Prevention

Preventative measures to be implemented at the landfill include:

- Waste separation to remove ignition sources (e.g. coals and lead acid batteries) from pits.
- Avoid starting fires near pits.
- Only burn cardboard in an allocated, bunded and monitored pit.
- Keep a water cart on-site for extinguishing small spot fires.

8.2.1 Landfill fire

Landfill fires, particularly in pits, emit toxic fumes into the atmosphere and present safety hazard due to the risk of fire spread, explosion and/or collapse of cells and capped landfills. Prevention of landfill fires is the best method to minimise fire risks.

Preventative measures to be implemented at the landfill include:

- Waste separation to remove ignition sources (e.g. coals and lead acid batteries) from pits.
- Avoid starting fires near pits.
- Only burn cardboard in an allocated, bunded and monitored pit.
- Keep a water cart on-site for extinguishing small spot fires.

8.2.2 Fire response

A water tank and hose that reaches all landfill areas will be stored at the landfill for responding to small spot fires. Only staff trained in fire response can respond to fires.

In the event of a significant fire, emergency response personnel should be engaged to respond to the fire. No landfill staff should attempt to respond to a large scale fire as they are not suitably trained.

An evacuation plan for the site should be developed to implement in the event of a large scale fire. The plan should identify evacuation routes, muster points, and emergency contact information, and should be displayed in prominent locations around the landfill.

Refer to document ERMP.

9 HAZARDS AND LOSS OF AMENITY

An inspection report is to be completed after conducting the Detection Monitoring Program.

Table 10: Detection Monitoring Program

MONITORING	MEANS OF DETECTION	FREQUENCY	RESPONSIBILITY
Surface Gases	Odours detected	Weekly	Site Operator
Hazardous Wastes	Visual inspections	Weekly across site daily as waste arrives and during pushing and covering	Site Operator
Leachate Ponds	Visual Inspections	Weekly	Site Operator
Litter	Visual Inspections	Weekly	Site Operator
Dust	Visual Inspections and complaint monitoring	Daily	Site Operator
Pest, animal & insect	Visual Inspections	Weekly	Site Operator
Noise	Complaint Monitoring	As required	Site Operator
Weeds	Visual Inspections	Monthly	Site Operator
Surface Water & Leachate Monitoring	pH must be between 4.5 and 9.5	Monthly	Site Operator
Site Security & Vandalism	Visual Inspections	Daily or as required	Site Operator

Inspection Reports can be found in Appendix 2 of this plan.

9.1 Security of Site

During the operational life of the facility the area is fully fenced and secure. Weekly site inspections will be conducted by the site operator or the Services Manager to minimise any unauthorised out of hours dumping. Damage or vandalism to the security fence, gate, signage, and other facility infrastructure will be repaired as necessary. After hours monitoring will be conducted via CCTV, which will be stored and viewed at the Council office Jabiru.

9.2 Litter Control

Where daily/weekly covering of waste is found to be incomplete or inadequate additional soil cover will be placed on the affected area.

9.3 Dust Control

Daily inspections by the site operator will assess dust levels at the site. Water spraying and other dust control methods may be instigated if required. The capping, revegetation, maintenance, and daily inspections of the site outlined in this EMP will ensure that dust does not become a significant issue for the facility.

9.4 Pest, Vermin and Noxious Weed Control

During the operational life of the facility animal and insect pests will be monitored and managed as required and as outlined in the Operations Overview Section of this plan.

Following closure animal and insect pests will be controlled by the final cover layer.

During the operational life of the facility noxious weeds will be monitored and controlled as they are identified.

Following closure the site will be inspected for noxious weeds on a monthly basis as a part of the post closure monitoring procedure.

9.5 Odour Control

During the operational life of the facility odour is controlled by daily covering of waste with soil.

If particularly obnoxious odours are detected they will be controlled by extra coverings of soil or by the use of masking spray by the site operator.

Post closure odours will be controlled by the final cover of soil and the revegetation program. Breaches in the final cover will be repaired as they are detected.

9.6 Noise and Visual Control

The landfill is located in a non-residential area. Noise from operations includes trucks and other vehicles, earth moving machinery, and operational noises such as rubbish being dumped or moved.

Noise from the active tip face is buffered on three sides by the excavated soil mounds. Noise from the site is buffered by vegetation which surrounds the facility. Noise complaints will be reported to the Services Manager and acted on according to the procedures set out in the Monitoring and Reporting Sections of this plan.

9.7 Vegetation and Biodiversity Management

1) Patch and reseal any area of cover which has been eroded
2) Place additional topsoil and protect with 300mm of mulch any areas which have been eroded or removed
3) Actively encourage revegetation in any areas greater than 10m2 which have failed to develop a suitable vegetation cover (where possible collect local seeds).
4) Spray and/or manually remove noxious weeds that develop within the landfill site.

During the operational stage of this landfill regular inspection, as outlined in Table 6. The maintenance Schedule will identify any areas in need of maintenance before problems arise.

Table 11: Maintenance Schedule.

INSPECTION ITEM	FREQUENCY OF INSPECTION	POTENTIAL PROBLEM TO BE IDENTIFIED
Vegetation cover	Weekly	Dead Plants
Surface drainage	Weekly	Debris in drain, soil erosion, windblown litter
Weeds	Monthly	Noxious weeds
Landfill gases	Weekly	Odours
Pest animals and insects	Weekly	Stagnant water, mosquito larvae, animal activity signs, animal droppings

9.8 Records and Reports

The operator, West Arnhem Regional Council, will keep the following records at the Council office in Jabiru;

a) Survey records and plans
b) Planning consents, property ownership correspondence, licences, approvals & supporting documentation including changes and modifications
c) Waste input details, special waste consignments and transfer notes including details of carriers and waste disposal locations
d) Photographic records
e) Detection monitoring program data, including factual and interpretive data and reports, for leachate, noise, odours, dust
f) Environment Incident reports, register of complaints, records of no compliance and remedial measures
g) Statutory records relating to health and safety including accidents
h) Other Waste Management Facility Reports, both external and internal
i) Status reports on landfill monitoring will be compiled annually for West Arnhem Regional Council and licensing authorities by the Services Manager in accordance with the following schedule. Records will be kept at the Council office in Jabiru.

Table 12: Contaminant Report.

CONTAMINANT	STATUS REPORT
Surface Water	Services Manager to arrange sampling and testing in accordance with Detection Monitoring Programme. Manager Health Services to review / maintain compliance records and arrange for independent interpretation if necessary. Routine water samples taken at the water testing bore.
Landfill Gas / Odours	Site operator to record and report odours, reporting to the Services Manager. Services Manager to report on odour complaints and monitoring in annual report to Council and Licensing Authority.
Hazardous Wastes	Site operator to make note on weekly pro-forma checklist of any detected hazardous wastes detected and action taken to remove to appropriate site. Site operator to make brief monthly summary of detection / actions to Services Manager. Services Manager to review / maintain Compliance Record and prepare annual reporting.

CONTAMINANT	STATUS REPORT
Litter	Site operator to make note on pro-forma check list. Site operator to make brief monthly summary to Services Manager. Manager Health Services to review / maintain Compliance Record and complete annual reporting.
Dust	Site operator to make note on pro-forma check list. Site operator to make brief monthly summary to Services Manager. Services Manager to review/maintain Compliance Record and prepare annual reporting.
Noise	Services Manager to monitor/collate and report on any noise complaints and subsequent remedial action taken in annual reporting.

10 SITE REHABILITATION

Specific to this plan, guidelines have been developed for the preparation of a rehabilitation plan.

10.1 Closure and Post Closure

It is recommended that landfill capping and rehabilitation is undertaken within two years of final waste placement. As the 600mm capping layer is placed progressively, the post-closure rehabilitation requirements would involve placement of topsoil and revegetation works across all operational areas. All other infrastructure would need to be removed from site prior to rehabilitation.

Closed landfills also require extensive monitoring and maintenance for up to 30 years post-closure, to ensure there are no ongoing environmental impacts on receiving environments. This may include the following aspects (NTEPA, 2013):

- Maintenance of surface water drainage systems
- Maintenance of leachate management systems
- Maintenance of final cover, including revegetation, restoration of eroded area or regrading
- Surface water, ground water and landfill gas monitoring

A closure and post-closure plan needs to be developed and approved by the NT EPA prior to implementation.

Closure of the landfill will include but not be limited to the following works:

1) Mounding of the landfill rea to final grades of not less than 5%
2) Placement of 600mm thick cover of onsite inert soil across the top of the tipping face
3) Placement of a 100mm thick top soil layer over the final mounded platform
4) Placement of a 300mm thick layer of shredded/mulched green waste over the top soil
5) Placement of a notice notifying the public that the enclosed/fenced area is the site of a disused/closed landfill

A detailed closure plan will be prepared in later years based on the following elements and activities:

1) Post closure land use
   - Design and adoption
2) Final cover design
   - Selection of infiltration barrier
   - Final surface slopes
   - Vegetation
3) Surface water and drainage control

- Calculation of storm water quantities for run off
- Selection of perimeter channel location and sizes to collect run off and/or prevent run-on

4) Control of landfill gases:
   - Selection of locations for and frequency of gas monitoring
5) Control of leachate:
   - Determination of operation schedule for leachate monitoring and treatment measures as required
6) Environmental management system:
   - Selection of sampling locations
   - Frequency of monitoring
   - Constituents to be measured

Refer to the AGON Environmental report: **Jabiru Remediation Assessment-HAZMAT Assessment-DNP-JMSS-1819-012-POS-lot2352**

APPENDIX 1 - CONTAMINANT RELEASE PROCEDURE

If visual and pH monitoring results after heavy rainfall indicate contaminant release from the site, the following measures will be taken:

1) Inspection of surface area of active waste placement to locate source of contaminants
2) Reduction of the active area via construction of a low bund across the soil covered access batter thus retaining any waters within the filling area
3) Installation of a further barrier as required, stopping waters leaving affected areas
4) Install a sign instructing users to deposit wastes beyond the bund only
5) Immediate covering of exposed waste within the soil
6) Patching of erosion areas where waste is exposed to surface water run off
7) Sealing of completed fill areas with 600mm of clayey soil cover
8) Once rains have stopped contaminated water that has been collected should be irrigated back into the waste fill area.

APPENDIX 2 – PROHIBITED & HAZARDOUS WASTE LIST

As described in the *Waste Management and Pollution Control (Administration) Regulations*.

- Acidic solutions or acids in solid form
- Animal effluent and residues (abattoir effluent, poultry and fish processing waste)
- Antimony, antimony compounds
- Arsenic, arsenic compounds
- Asbestos
- Barium compounds other than barium sulphate
- Basic solutions or bases in solid form
- Beryllium, beryllium compounds
- Boron compounds
- Cadmium, cadmium compounds
- Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos
- Chlorates
- Chromium compounds that are hexavalent or trivalent
- Clinical and related wastes
- Cobalt compounds
- Containers that are contaminated with residues of a listed waste
- Copper compounds
- Cyanides (inorganic)
- Cyanides (organic)
- Encapsulated, chemically fixed, solidified or polymerised wastes
- Ethers
- Filter cake
- Fire debris and fire wash waters
- Fly ash
- Grease trap waste
- Halogenated organic solvents
- Highly odorous organic chemicals (including mercaptans and acrylates)
- Inorganic fluorine compounds excluding calcium fluoride
- Inorganic sulphides Isocyanate compounds
- Lead, lead compounds
- Mercury, mercury compounds
- Metal carbonyls
- Nickel compounds
- Non-toxic salts
- Organic phosphorus compounds
- Organic solvents excluding halogenated solvents
- Organo halogen compounds that are not otherwise specified in this
- Schedule Perchlorates
- Phenols, phenol compounds including chlorophenols
- Phosphorus compounds other than mineral phosphates
- Polychlorinated dibenzo-furan (any congener)
- Polychlorinated dibenzo-p-dioxin (any congener)

- Residue from industrial waste treatment or disposal operations
- Selenium, selenium compounds
- Sewerage sludge and residues including night soil and septic tank sludge
- Soils contaminated with a liquid waste
- Surface active agents (surfactants) that contain principally organic constituents and that may contain metals and inorganic materials
- Tannery wastes (including leather, dust, ash, sludges and flours)
- Tellurium, tellurium compounds
- Thallium, thallium compounds
- Triethylamine catalysts for setting foundry sands
- Tyres
- Vanadium compounds
- Waste chemical substances arising from research and development or teaching activities, including those substances which are not identified and/or are new and the effects of which on human health and/or the environment are not known
- Wastes containing peroxides other than hydrogen peroxide
- Waste, containing cyanides, from heat treatment and tempering operations
- Waste from the manufacture, formulation and use of wood preserving chemicals
- Waste from the production, formulation and use of biocides and phytopharmaceuticals
- Waste from the production, formulation and use of inks, dyes, pigments, paints lacquers and varnish
- Waste from the production, formulation and use of organic solvents
- Waste from the production, formulation and use of photographic chemicals and processing materials
- Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives
- Waste from the production and preparation of pharmaceutical products
- Waste mineral oils unfit for their original intended use
- Waste mixtures, or waste emulsions, of oil and water or hydrocarbon and water
- Waste pharmaceuticals, waste drugs and waste medicines
- Waste resulting from surface treatment of metals and plastics
- Waste tarry residues arising from refining, distillation and any pyrolytic treatment
- Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated naphthalene's (PCNs), polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)
- Waste of an explosive nature not subject to the *Dangerous Goods Act*
- Wool scouring waste
- Zinc compounds

APPENDIX 3 – SITE INSPECTION REPORT

Date:_____ Inspecting Officer: _____

	ITEM	X	OBSERVATION CONDITION	X	ACTON REQUIRED	X	ACTION TAKEN
DAILY	**Dust**				Water spraying		
	Hazardous Waste						
	Odour				Cover waste with soil Masking spray		
WEEKLY	**Landfill/Surface Gas**		Odour detected		150mm soil over waste Mulch with green waste		
	Litter		Litter present		Cover active tip face Clean up / collect Check temp fence ok		
	Pests, vermin, insects		Stagnant water Mosquito larvae Animal activity Animal droppings		Cover waste daily Pesticide spray		
MONTHLY	**Surface Water & Leachate** *pH must be between 4.5 & 9.5*		Water pooling Debris in drain Soil erosion Windblown litter		Re-grade Fill in erosion channels Re-establish pond bunding Maintain water drain around perimeter		
	Weeds		Noxious weeds		Spray Remove		
	Vegetation Cover		Dead plants		Cap eroded cover Additional top soil 300mm mulch Encourage revegetation		
AS NEEDED	**Site Security & Vandalism**		Damage to: Security fence Gate Signage Other		Repair		
	Noise				Receive complaint Record details		
	Other						
	Water Sample Testing						