Waste Management Facility

Landfill Environmental Management Plan



WEST DALY
Regional Council

Document Authoring and Version Control

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1. Introduction

In the Northern Territory (NT), the regulatory framework for operating a landfill is primarily governed by the Northern Territory Environment Protection Authority (NT EPA). The system is designed to prevent environmental harm and promote a circular economy through a combination of legislation, licensing requirements, and technical guidelines.

Primary Legislation:

Waste Management and Pollution Control Act 1998 (WMPC Act)

This is the main law. It defines "listed wastes" and outlines the general environmental duty to prevent pollution.

Environment Protection Act 2019

Covers the environmental impact assessment (EIA) process for new or significantly expanded landfill projects.

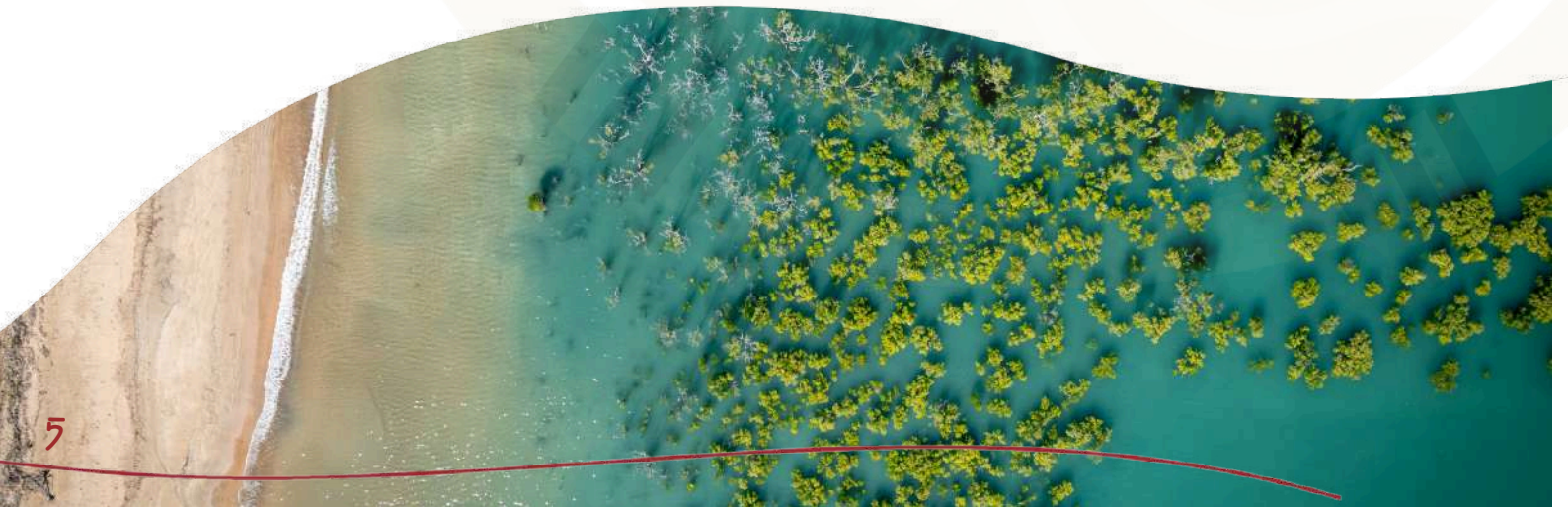
Water Act 1992

Relevant if the landfill operation involves discharging waste or contaminated water (leachate) into water bodies or groundwater.

A Landfill Environmental Management Plan (LEMP) provides the framework for the management and mitigation of environmental impacts during construction, operation and closure of the landfill, as well as for the post-closure period.

The LEMP serves as a technical reference document, design record, and general management and monitoring plan for the development and ongoing operation of a landfill site.

Waste management planning from site selection through to final rehabilitation does have long term economic and environmental benefits and do provide a sound basis for the effective ongoing management of waste facilities.





Purpose

The LEMP has been prepared for West Daly Regional Council (WDRC) to inform NT EPA of operations at the Wadeye Waste Management Facility (WMF).

The LEMP will document the environmental management objectives and the proposed strategies to achieve those objectives, and specify the expected outcomes.

The LEMP demonstrates the following principals:

- Understanding of the legislation and statutory requirements.
- WDRC's commitments to environmental policy and a standard of practice.
- A clear communication of environmental policy to all stakeholders.
- Commitment to training and development in waste management.
- A commitment to continuous improvement.

The LEMP serves a number of functions:

- To manage environmental risks to an acceptable level of risk.
- It defines expected environmental standards and outcomes.
- As an operational tool that guides the environmental management activities.
- It provides a baseline for environmental management activities.
- It defines how environmental risks will be managed.
- It is a mechanism to check and review environmental performance.
- It defines how to manage reviews and updates of the system and performance.

The purpose of LEMP is to provide conditions for implementing a range of environmental treatments relating to landfilling and site operations. LEMP is a working document that is periodically reviewed and amended to reflect changing environmental conditions and developments as the project progresses.

Objective

Pursuant to Section 30, Part 2 of Schedule 2 of the Waste Management and Pollution Control Act, WDRC is seeking approval for an Environmental Protection License (EPL) to operate a Municipal Solid Waste facility for the following purposes:

- Operate premises for the disposal of waste by burial that services, or are designed to service, the waste disposal requirements of more than 1,000 persons.
- Operate premises for collecting, transporting, storing, re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis.
- Collecting, transporting, storing, re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis.



The premises will accept municipal solid waste and may also receive inert waste.

Listed waste can only to be disposed of at facilities that are licensed to receive listed waste. The WMF may accept listed waste for temporary storage and transportation to a licensed facility. The method of storage and transportation is not yet defined.





Section 1
Environmental Concept

1.1 Site Location



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3km @ 316°
Wadeye
Port Keats
Airfield





1.2 Site Topography



West Daly Landfill Management Details	
Manager	West Daly Regional Council
Contact	Director of Service Delivery Tim Hema
Address	1/4 Albatross Street, Winnellie NT 0820 Wadeye address here www.westdalynt.gov.au
Phone	08 79226406

The Wadeye Waste Management Facility (WMF) is managed by West Daly Regional Council (WDRC). It is located 3km @ 139o southeast from the administration building. The area is collocated in proximity of the Wadeye power station. The Wadeye airport provides a buffer zone of approximately 2km from buildings and residence.

The site is gently sloping with a 5m fall from west to east.

Current infrastructure at the site is marginal and currently out of service. The gate house is 6 x 2.4 transportable building, alongside a nine (9) bay covered hardstand organised as drop off bays.

At this stage there is no monitoring of incoming waste and as such no estimations can be made about incoming volumes, category breakdowns and fill rates.

1.3 Section 19 Lease Agreement

A section 19 agreement may be in the form of a 'lease' or a 'license'. A lease includes the right to use that land for a term of years and to exclude people from entering that land. A license gives the proponent permission to use Aboriginal land for a particular purpose but not to exclude others from that land. A section 19 agreement details the specific rights and duties of each of the parties.
The section 19 Agreement for the WMF expires on XX/XX/202X.

The lease is currently being renegotiated, details of the lease will be provided separately.

1.4 Site Operations

The landfill services the waste disposal requirements of about 2000 people at Wadeye township. The WMF accepts mainly municipal waste but also commercial and building waste and limited amounts of listed waste.

At this stage there is a perimeter fence but no security to close or restrict entry. Any person is free to dump any waste at any place unsupervised because the site is unattended. No means to control over what is dumped, where it is dumped and by whom. This has resulted in a poor control and quality of the existing facility.

The intention of lodging the application for an EPL is to transform the site to a secure, fully monitored transfer and disposal premises for collecting, transporting, storing, re-cycling, treating or disposing of waste on a commercial or fee for service basis.

The landfill will operate under the area method that requires ongoing placement of cover soils and compaction. This method is best suited to the gently sloping terrain and high rainfall and ground water conditions on site.

Burning of waste is not permitted on site. Listed waste types will be stockpiled in a secure location for repatriation to a certified listed waste management operator.

1.5 Hours of operation

Days	Hours
Monday to Friday	7:00am to 4:00pm
Saturday	CLOSED
Sunday	CLOSED

1.6 Site Security

The site maintains adequate perimeter fencing to restrict unauthorised access to the WMF. At this stage the fence requires some minor maintenance in order to maximise public safety and to prevent pest entry. The perimeter fencing will preclude animals and persons from entering the drop off area when the facility is closed and prevent access to the authorized areas, including the tip face. The fence shall have a lockable gate the front entrance that will be closed and secured during non-operating times.

A long term goal is to monitor the site remotely full time in order to generate revenue from non-WRDC residents and businesses.

1.7 Signage

WDRC to provide an information sign located on the access road and at the front gate.

Site signage at needs to have the following information:

- ✓ Access restrictions
- ✓ Days and hours of operation
- ✓ Accepted waste Types
- ✓ Prohibited Waste Types
- ✓ Recycling; materials accepted
- ✓ Approval/Licence number under the WMPC Act
- ✓ Emergency contact number of the facility operator
- ✓ Name of the facility owner

It is proposed to have 3 separate signs to accommodate the required information:

Sign 1:

- Name of Facility,
- Owners / manager,
- Emergency contacts,
- Licence number

Sign 2:

- Hours of operation,
- Accepted waste types
- Prohibited waste types,
- Recycling.

Sign 3:

- Emergency evacuation procedure and muster point location

Other Signage within the facility:

- Directional signage to assist smooth traffic flow
- Unloading areas for specific waste types

Road works type black and yellow directional signs can be used within the facility.

All signs should give information in a concise, easy to read and attractive manner.

1.8 Geology

The southwestern side of the WMF is located on high ground on siltstone conglomerate, dipping down across the site to the northeastern side. The bulk of the site is located on sand silt and colluvium soils and runoff to the northeast, outside of the WMF is to alluvium soils.



All coordinates and contours are WGS 84 Zone 52S

The following geology map, aerial picture, and overlain composite picture on the following page show the general geology and position of the site.

Western Side

Main WMF landfill area

Site Runoff to the east







Low information exists in the hydrogeological context. The closest groundwater measurement is at the southern end of the runway as shown here.

- Ground level at the bore is RL70m and the lower side of the WMF is also RL70. (WGS 84 Zone 52S)
- Sediments 0 -55m were reported to be clays and sandstone, usually this type of formations is reasonably impervious to influence from surface percolation.
- Drilling records show the closest aquifer to be -55m from ground level or at RL 15m (WGS 84 Zone 52S)

THE NORTHERN TERRITORY OF AUSTRALIA
APPROVED FORM 21 (25/01/2011)

STATEMENT OF BORE

As per Water Regulations (2009)

Name of Owner:
Location/Address: Wadeye Airstrip
Wadeye, NT
Intended Use: Monitoring

Registration No: 39613
BC Permit No:

GPS Location:	Zone:	GDA94	Other:	Specify:	Easting:	Northing:
	52L	☑	☐		557570	8423762

From	To (m)	Strata
0	0.5	Topsoil & Laterite
0.5	10.5	Red/Brown Sandstone & Clays
10.5	16.8	Yellow Sandstones & Sandy Clays
16.8	45.3	Multi - Coloured Sandstones & Sandy Clays
45.3	104.2	Multi - Coloured Sandstones & Sandy Clays & Quartz
104.2	104.6	Grey Clay
104.6	148.5	Orange/White Sandstones & Sandy Clays & Quartz
148.5	192.8	Grey Sandstones & Sandy Clays & Quartz
192.8		

Name of Drilling Company: Water Resources
Name of Driller: J McPhillips
Name of Supervising Driller G Stephens

Date Commenced: 4/06/2016
Date Completed: 7/06/2016

Depth Drilled: 192.8m
Completion Depth: 192.8m

METHOD OF DRILLING

Other	Auger	Rev. Circ.	Rotary Air	Rotary Mud
☐	☐	☐	☑	☐

Specify:

HOLE DIAMETER			DRILLING FLUID
From (m)	To (m)	Dia. (mm)	Type
0	5.7	275	Air
5.7	192.8	200	Air

PARTICULARS OF CASING

From	To (m)	Dia (ID)	Type
0	5.7	203mm	Steel
0	192.8	55mm	PVC

PARTICULARS OF PERFORATIONS OR SCREEN STRINGS

From	To (m)	Dia (ID)	Aperture	Type
156.8	162.8	55mm	1mm	Slotted PVC

Casing Suspended: Yes ☐ No ☑
Method:
Height of Casing above GL: 0.18m

Top of Packer Set at:
Length of Packer:
Method of Packer Connection:

CEMENTING/GRAVEL PACKING

From	To (m)	Type
0	5.7	Cement Grout

WATER BEARING BEDS

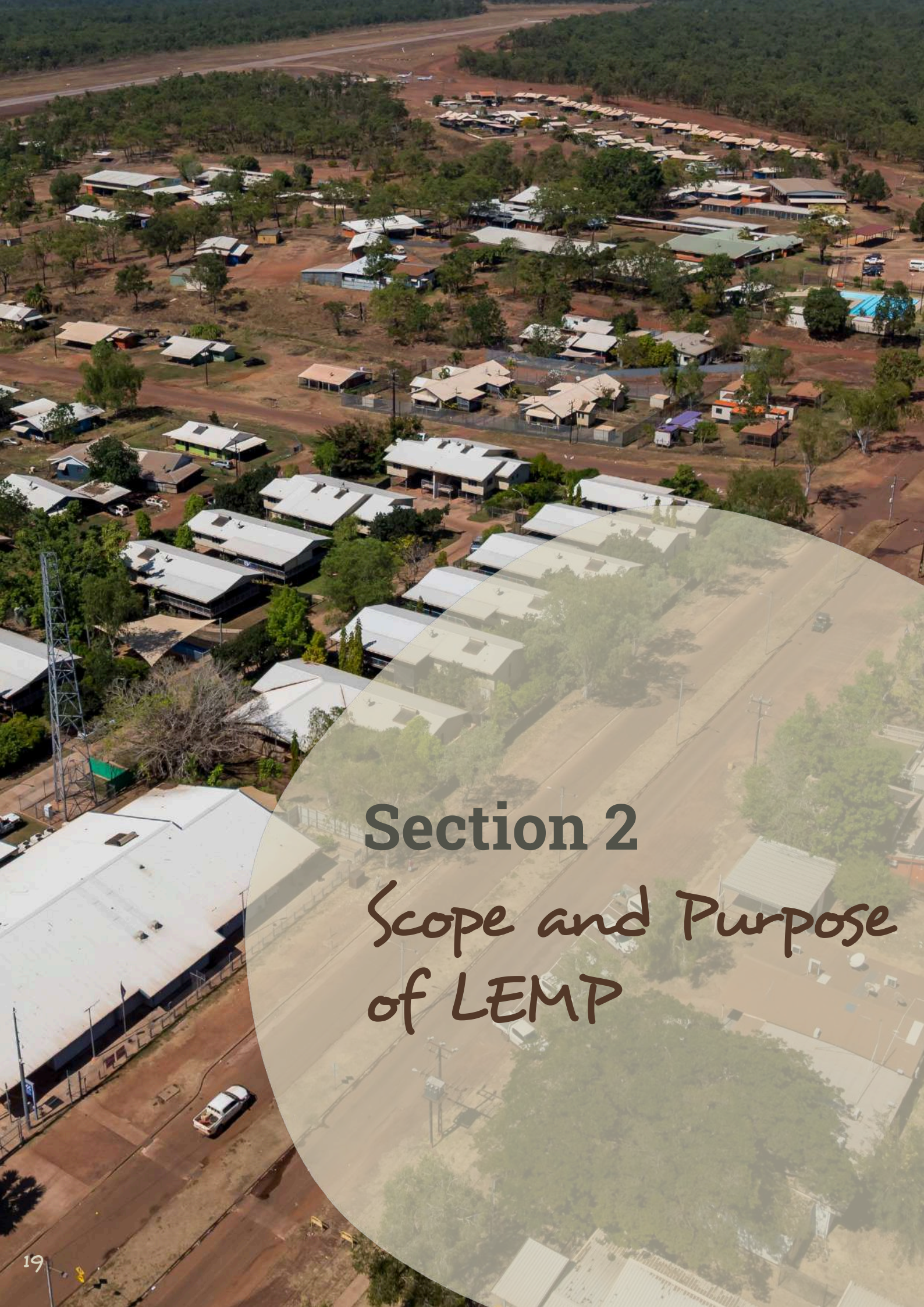
Depth (m) From	Depth (m) To	Yield (L/s)	SWL (m)	Duration (hr)	Quality	EC	pH	Bottle No.
0	54.8	3		Drilling				
54.8	62	5		Drilling	Good	31uS	7.1	
62	71	10		Drilling				
71	148.5	20		Drilling				
148.5	192.8	30		Drilling				

STRATA / WATER SAMPLES
Have been ☑ Will be ☐
Left at: Tannadice St Depot

Completion Yield: (L/s) Method: Duration:
Completion SWL from GL: 15.24m Depth of Lift:

NOTE: No company advertising is to be imprinted on this certificate apart from where requested.

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Section 2

Scope and Purpose of LEMP

Regulatory Framework

Landfills are subject to environment protection legislation in two stages, planning and operation.

Section 30, Part 1 of Schedule 2 of the Waste Management and Pollution Control Act.

Regulation at the planning stage involves gaining an Environmental Protection Approval to construct a new landfill or for a significant extension or change in operational scope to an existing landfill.

1. **Section 30, Part 2 of Schedule 2 of the Waste Management and Pollution Control Act**
   Regulation at the operational stage involves gaining an Environmental Protection License for waste disposal requirements for more than 1000 persons cannot be operated without a license.

In accordance with the requirements of Part 5 of the Waste Management and Pollution Control Act, a person must not conduct an activity specified in Schedule 2 of the Waste Management and Pollution Control except under an environment protection approval or environment protection license.

Schedule 2 Activities that require an environmental protection permit:

- Constructing, installing or carrying out works in relation to premises, for the storage, re-cycling, treatment or disposal of listed wastes on a commercial or fee for service basis.

Schedule 2 Activities that require an environmental protection license:

- Operating premises for the disposal of waste by burial that services, or are designed to service, the waste disposal requirements of more than 1,000 persons.
- Collecting, transporting, storing, re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis,
- Operating premises, associated with collecting, transporting, storing, re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis.

2.1 Objectives and Targets

2.1.1 Immediate

Environmental Protection License to operate a Municipal Solid Waste facility for the following purposes:

- Operate premises for the disposal of waste by burial that services, or are designed to service, the waste disposal requirements of more than 1,000 persons.
- Operate premises for collecting, transporting, storing, re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis.
- Collecting, transporting, storing, re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis.

2.1.2 Short Term

- 1 year time frame (2026)
- Build a transfer and waste processing station.
- Plan and develop storage capacity for putrescible waste.
- Develop recycling and transfer capacity.
- Develop safe storage capacity for listed waste.

2.1.3 Medium Term

- 3 Year Timeframe (2029)
- Upgrade waste handling to minimise local impact.
- Maximise recycling and circular economy participation.
- Develop Listed waste storage and transportation to licenced disposal facility.
- Develop system to monitor operations and provide operational data.
- Develop a cost recovery system to offset the cost of waste management.

2.1.4 Long Term

- 5 year Timeframe (2031)
- Set an example for environmentally sensitive waste management.
- Create community wide behavioural change in waste management.
- Plan to deal with the legacy waste burden.

2.2 Program

This project is the first phase of an overall remodelling of the WDRC waste management system. Although this project is the start of a new management process in terms of how the waste is sorted and dealt with, the facility is still undertaking the same business as usual activities, just in a more organised way than previously done. This will form the baseline for the facility to support a modern and holistic waste management practice. This will become the long term operating position for the WMF and will provide a much better and more compliant mode of operation in line with the legislative requirements.

2.2.1 Stage 1

Construction and operation of a manned waste transfer station for delivery and sorting, of incoming waste.

The transfer station will separate waste into 2 categories:

1. Waste to be temporarily stored and transported off site.
2. Waste to be buried on site.



2.2.2 Stage 2

While not addressed directly in this LEMP, this next phase of landfill activity is planned to design document and construct an above ground encapsulation facility to hold general domestic waste for disposal on site.



The concept is to build a waste cell with surface height of RL 71m and progress the face at 30m intervals to the southeast as required over time. Stage 2 will be documented separately in a new Environmental Protection Approval application.

2.3 Roles, responsibilities and resources

The management structure - roles, resources and responsibilities are to be defined in order to demonstrate the effective implementation and operation of the LEMP. The following table outlines the various roles and their responsibilities relating to onsite operations.

Role	Responsibility
WMF Director	Oversee implementation of the LEMP Review compliance records and reporting. Coordinate reviews and update of the LEMP Manage internal and external reporting and distribution
WMF Supervisor	Ensure personnel understand their obligations under the LEMP Maintain compliance records and reporting. Site maintenance and inspections related to LEMP. Report non-compliances within 24 hours to WMF Director
WMF Staff	Understand and comply with the LEMP Undergo a site induction. Be aware of emergency response procedures. Report any incidents or breaches to the WMF supervisor.
Delegate	Site Planning and development Guide LEMP implementation. Yearly Audit NT EPA Compliance Management Liase with NT EPA on behalf of WDRC



2.4 Training

This is a note about the future intention to undertake a training program. As the overall system plan is not yet defined in detail. The training response detailed here is expressed as an objective to be achieved as the detail becomes clear. This information will be updated in future reversions of the LEMP document.

Objective: Ensure Staff Training

WDRC is committed to continuous improvement of its Environmental Management System to effectively manage our environmental footprint and prevent pollution throughout all operations. This is reinforced by an Environmental Policy that is designed to achieve a culture of environmental awareness and management across the organisation. All staff should have an awareness of the EMP and its principles. All personnel engaged in waste management to undergo inductions and be trained in and understand the following:

- ✓ Comply with the requirements of the EMP
- ✓ Staff are to be aware of Emergency Response Management Plan
- ✓ Staff to be trained in the management and storage of hazardous waste.
- ✓ To guarantee that all relevant facility staff are trained on the procedures, emergency response protocols, and the proper inspection and operation of the drainage retention system.

Objective: Safe Work Practice Site Induction

All staff and contractors entering the waste management facilities but excluding the general public should be inducted on arrival to site. The induction should cover the following items as a minimum:

- ✓ Site layout
- ✓ Administrative procedures
- ✓ Access and exits.
- ✓ Emergency procedures
- ✓ Bush-fire Management Plan
- ✓ Environmental protocols
- ✓ Evacuation procedures

In addition to the general items above, if required, all inductees should be informed of any specific daily items, events or notices.



Section 3
Compliance

3.1 Monitoring and measurement

As this document is to engage a licence to operate, the facility has not yet been built. **This is a note about the intention to define and undertake an environmental monitoring program in the future expansion of the WMF design.**

As the overall project plan is not yet defined in detail. The compliance detailed here is expressed as an objective to be achieved as the project detail becomes clear. This information will be updated in future versions of this document.

3.2 Operational and Compliance Objectives

These objectives ensure the plan is practical, maintainable, and verifiable.

Objective: Establish Routine Monitoring

Specify sampling frequency, parameters, and action triggers for when discharge limits are exceeded.

Objective: Define Inspection and Maintenance Program

Ensure all stormwater control structures (bunds, sumps, ponds, swales) are regularly inspected and maintained in good working order. Document clear responsibilities and schedules for the removal of accumulated sediment and debris from drains and traps.

3.3 Emergency preparedness and response

- EMP is attached as a separate document

3.4 Compliance evaluation

- Audit Inspection at yearly intervals once the facility is operational.

3.5 Nonconformity corrective actions

- Procedure for nonconformance and rectification.

3.6 Management review

- Management to review and comment on the audit findings.



Section 4
Site management



The following items are presented in order of importance and implementation.

The previous item minimises the impact of the following item.

4.1 Storm Water Management

The objective is to minimise the volume of leachate generated by preventing water from entering areas that contain waste. Any water that has come into contact with waste or a waste area is deemed leachate and must be treated separately.

This management process is frequently referred to as “isolation and source control”. Isolate the area that generates leachate from the source of the incoming water, this controls the volume of leachate generated.

Issue

If left unmanaged there is the potential for rain events to produce large amounts of leachate when stormwater flows through landfilled areas.

Objective

To ensure that uncontaminated stormwater does not become leachate.

Management Measures

- ✓ Divert Clean water away from the site.
- ✓ Minimise infiltration to the waste cells.
- ✓ Contain contaminated runoff.

Divert Clean Water:

- ✓ To divert all clean, uncontaminated runoff away from the waste handling and disposal areas by implementing upslope diversions, berms, and separate drainage networks for the "clean" side of the facility.

Minimise Infiltration:

- ✓ To minimise the amount of stormwater that infiltrates into the underlying waste mass.
- ✓ Do not allow any (zero) ponding of water anywhere on top of the completed landfill cells or in progress landfill operation or face. Implement final capping layers and low-permeability liners over closed landfill cells to reduce percolation and minimise leachate generation.

Contain Contaminated Runoff:

- ✓ To fully capture and contain all stormwater that comes into contact with active waste, process equipment, or leachate. Design the internal drainage system (sumps, bunds, lined drains) to direct all potentially contaminated water to the dedicated Leachate Management Area

Performance Criteria

- ✓ No incidents of bund or swale failure.
- ✓ No incidents of stormwater entering landfill or separation bays.
- ✓ No incidents of water ponding on cells or transfer station.

4.2 Leachate Management

Issue

Leachate is formed when water percolates through waste extracting soluble and suspended solids. The resulting liquid can be harmful if it ends up in surface or groundwater systems.

Objective

The aim of leachate management on site will be to minimise generation and dispose of it safely. Due to the isolation of the facility and the cost of implementation, leachate collection and treatment options are limited.

Management Measures

- ✓ Regular application of cover to waste.
- ✓ Only operating a single active face.
- ✓ Minimise the size of the active face.
- ✓ Cap and slope completed landfill cells to encourage water to flow.
- ✓ Zero ponding on the surface of landfill cells.
- ✓ Divert stormwater from the active face via bunds and swales.
- ✓ Divert leachate to evaporation pond.

Performance Criteria

- ✓ Records of compaction and covering of the tip face.
- ✓ No incidents of water ponding on landfill area.
- ✓ No incidents of leachate flowing out of facility.

4.3 Vegetation Management

Issue

As the site has been an established landfill for a number of years it is mostly devoid of native vegetation due to previous clearing. Clearing of native vegetation will also be required as part of the construction and maintenance of firebreaks.

Objective

The objective is to minimise further damage to the surrounding native vegetation and ensure high quality revegetated areas are established.

Management Measures

- ✓ Pests and weeds are controlled to reduce damage and competition with native species.
- ✓ Quality firebreaks are maintained.
- ✓ Rehabilitate and revegetate landfill areas as soon as practicable.

Performance Criteria

- ✓ Nil observed degradation to the surrounding native vegetation.
- ✓ Records of firebreak maintenance as per operational procedures.
- ✓ Rehabilitation of the site is in accordance with the Closure Plan.

4.4 Pest and Vector Control

Issue

Due to a lack of competition, weed species can quickly become established within a WMF and become a breeding ground which spreads into the adjacent native bushland. Pests such as wild dogs, pigs, rats and other feral animals are often attracted to landfills as an easy source of food.

Objective

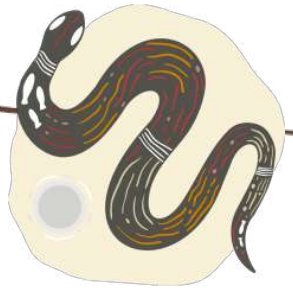
Birds, Vermin, Pests and Weeds are not permitted to establish within the WMF boundary.

Management Measures

- ✓ A 1.8m high cyclone fence will be constructed and maintained around the perimeter.
- ✓ Operate only one tip face at a time.
- ✓ Minimise the surface area of the tipping face.
- ✓ Ensure tipping face is regularly compacted and covered.
- ✓ Conduct regular monitoring for evidence of Birds, Vermin, Pests and Weeds.
- ✓ Implement baiting and trapping programs if pests become established.
- ✓ Spraying for weeds is to occur as frequently as deemed necessary to sufficiently control growth.

Performance Criteria

- ✓ Records of compaction and covering of the tip face as per operational procedures. Records of monitoring carried out as per operational procedures.
- ✓ Records of spraying, baiting and trapping activities are kept as per operational procedures.
- ✓ Zero complaints recorded for litter in the area surrounding the WMF.



4.5 Litter Management

Issue

Litter control is important, even within the confines of a waste facility. Proper litter control helps to reduce the spread of disease, reduce pests, protect native wildlife, reduce illegal dumping and improve the visual amenity of the site.

Objective

To minimise the presence of windblown litter within and outside the WWMF boundary.

Management Measures

- ✓ A 1.8m high cyclone fence will be constructed and maintained around the perimeter.
- ✓ If available, temporary litter fencing will be erected in the direction of prevailing winds along the current landfill bay with litter removed as needed.
- ✓ Operate only one tip face at a time.
- ✓ Minimise the surface area of the tipping face.
- ✓ Ensure tipping face is regularly compacted and covered.
- ✓ Conduct regular litter patrols of boundary fence and site in general.

Performance Criteria

- ✓ Records of compaction and covering of the tip face as per operational procedures.
- ✓ Records of litter patrols as per monitoring schedule.
- ✓ Zero complaints recorded for litter in the area surrounding the WMF.

4.6 Air Quality and Noise Management

Issue

Dust, odour and noise can be a nuisance and hazard to the health of the environment and the public. The daily operations of a WMF have the potential to generate these hazards and as such management actions are required to reduce the risk of these hazards.

Objective

The WMF will be managed in a way to minimise the impact of dust, odours and noise on the users of the site, the surrounding environment and the local community.

Management Measures

Dust

- ✓ Restricting vehicles to low speeds within the site.
- ✓ Restricting or halting heavy vehicle usage when winds are blowing strongly towards the community.
- ✓ Rehabilitating and revegetating landfill areas as soon as practicable.

Odour

- ✓ Operate one tipping face at a time.
- ✓ Minimise the surface area of the tipping face.
- ✓ Ensure tipping face is regularly compacted and covered.

Noise

- ✓ Machinery to be operated at the site only during daylight hours.

Performance Criteria

- ✓ Zero complaints recorded for dust, odour and noise from the local community.
- ✓ Records of compaction and covering of the tip face as per operational procedures.

4.7 Landfill Gas Management

Issue

As putrescible waste decomposes landfills can emit landfill gasses.

Objective

Due to the low amount of waste disposed at the facility, the objective of landfill gas management at the facility will be to minimise generation.

Management Measures

- ✓ Compacting waste on the active landfill face.
- ✓ Applying cover material regularly to active face.
- ✓ Progressively capping and rehabilitating landfill cells.
- ✓ Ensuring that only accepted inert and putrescible wastes are disposed of by landfill.

Performance Criteria

- ✓ Records of compaction and covering of the tip face as per operational procedures
- ✓ Records of separation bay management as per operational procedures.

4.8 Groundwater Management

Issue

Groundwater can become polluted if it comes into contact with hazardous substances or leachate produced from a landfill. This can impact on the water quality of bores and rivers downgradient of the contamination site.

Objective

To minimise the risk of groundwater contamination emanating from the facility.

Management Measures

- ✓ Manage the facility as per operating procedures.
- ✓ Ensure leachate and hazardous substances are managed appropriately.

Performance Criteria

- ✓ Records of facility management as per operational procedures.
- ✓ No hazardous liquid spills.
- ✓ All hazardous liquid spills are managed as per Emergency Management Plan.

4.9 Rehabilitation

Rehabilitation and closure of the site will involve re-establishing a native vegetative cover over the site. This will require management and monitoring to ensure optimal rehabilitation.

A Site Rehabilitation Plan should describe the methodology and sequence of rehabilitation and should address the following matters:

- ✓ Final land-form contour
- ✓ Site drainage
- ✓ Species of vegetation to be planted
- ✓ Site security following closure
- ✓ Proposed future uses



Section 5
Waste Management

5.1 Waste classification

According to the NT EPA Guidelines, waste can be classified into four general categories:

- Inert waste
- Municipal solid waste
- Listed waste
- Industrial waste

5.1.1 Inert Waste

Inert wastes are generally clean fill type materials; non-biodegradable, non-flammable, non-chemically reactive and have no potentially hazardous content once landfilled. Inert waste must not be contaminated or mixed with any other material. The NT EPA considers inert waste to be natural materials such as clay, soil and rock, concrete, brick or demolition product that are free of:

- Combustible, putrescibles, degradable or leachable components.
- Hazardous substances or materials such as municipal solid waste, likely to generate leachate via biological breakdown.
- Any products or materials derived from hazardous waste treatment, stabilisation or disposal practices.
- Materials such as clinical and listed waste that present a risk to human health if excavated.
- Contaminated soil and other contaminated materials.

Reuse and recycling options should be closely considered for inert wastes.

Inert Waste brought to WMF will be stockpiled for cover.

5.1.2 Municipal waste

5.1.2 Municipal Waste

Any non-hazardous, solid waste from a combination of domestic, commercial and industrial sources. It includes putrescible waste, garden waste and uncontaminated biosolids.

- This is the bulk of material received at WMF.

5.1.3 Listed Waste



Listed waste poses a threat or risk to public health, safety or the environment and include substances which are toxic, infectious, mutagenic, carcinogenic, teratogenic, explosive, flammable, corrosive, oxidising and radioactive. Listed wastes are ONLY to be disposed of at facilities that are licensed to receive listed waste. For details of what constitutes listed waste refer to the Waste Management and Pollution Control (Administration) Regulations 1998, Schedule 1 Listed wastes.

- The bulk of listed waste to be handled at WMF will be batteries, tyres, waste oils.
- Waste of this type will be stored, transported and transferred to a certified listed waste practitioner.

5.1.4 Industrial Waste

Industrial waste is that waste specific to a particular industry or industrial process. It may contain somewhat higher levels of contaminants, such as heavy metals and human-made chemicals, than municipal solid waste and needs to be managed with environmental controls appropriate to the specific waste(s) being landfilled.



- WMF does not intend to handle this kind of waste.

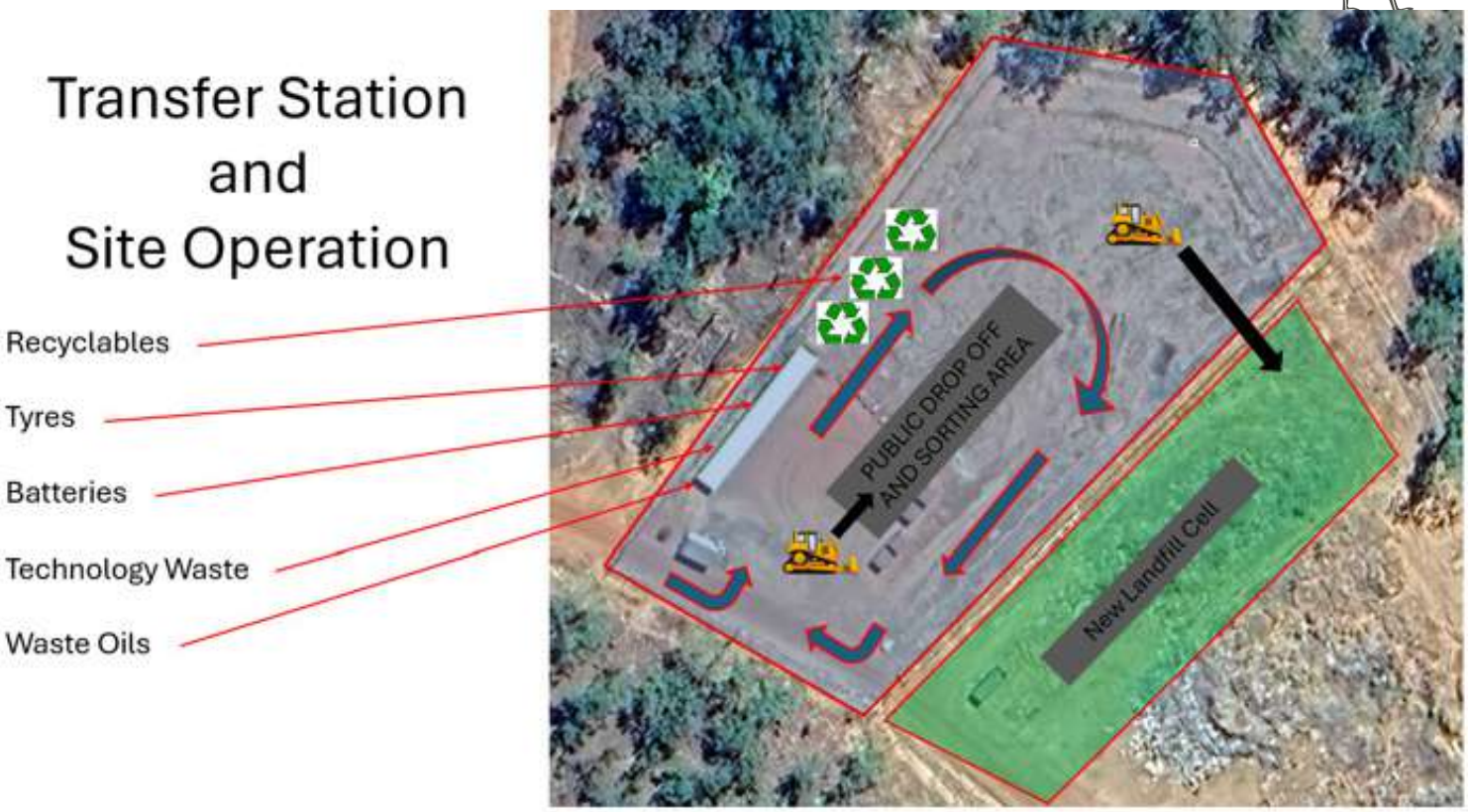
As the project progresses, an objective would be to monitor the inflow and out flow of materials from the site. Given an initial quantum of baseline data the intent would be to quantify and measure the change in waste types and their final destination with the goal to minimise landfill and redirect the resources into various facets of the circular economy.

5.2 Description of method

All incoming waste is to be dropped off in the sorting area. Staff will separate out listed waste to be stored for repatriation and move it to a designated safe storge location.

Recyclables will be separated and stored safely for repatriation.

The remaining putrescible and domestic waste will be moved by loader from the drop point to the current operating landfill cell for compaction and covering.





5.2.1 Provision for recycling

Procedures to be developed for separation and diversion of recyclable and reusable materials.

The proceedure should include:

- ✓ Type of wastes to be recovered
- ✓ Location and origin of recovery streams
- ✓ Any on-site treatment processes required
- ✓ Proposed promotion of recycling and re-use opportunities

All other listed waste types like tyres batteries and hydrocarbons are to be stockpiled in a secure bunded location for repatriation to a licenced facility.

5.2.2 Waste to be disposed on site.

Municipal waste will be disposed on site, generally putrescible waste, packaging and plastics. This waste will be placed as landfill.

5.2.3 Waste Compaction

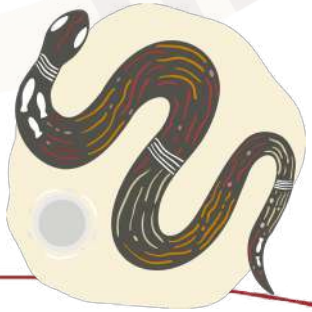
The amount of landfill space and land used to dispose of waste can be minimised by proper compaction. Compaction also improves the stability of landfills, and minimises the voids that would encourage vermin, fires or excess generation of leachate. Refuse should be placed against a clay starter embankment or the previous day‘s refuse. As soon as it is unloaded, the refuse should be spread out in thin layers to form individual lifts. The layers should be sloped away from the sides and final surfaces of the landfill, so as to minimise the chance of leachate tracking to the edge of the fill and breaking out on the surface.

Each progressive layer should be 300 mm to 600 mm thick. The number of passes by a machine over the waste to achieve optimum compaction will depend on a number of factors, including the type of machine, its ground pressure, the type of waste and the slope. Obviously, the more passes made over the waste, the better its compaction, but operational considerations generally limit the number to between three and five passes.

5.2.4 Cover

Cells should be covered periodically to stop odours, wind blown waste, fly breeding, vermin and spread of fires. Use of soil cover material limits run-on and infiltration of water, controls and minimises the risk of fire, minimises emissions of landfill gas, suppresses site odour, reduces fly propagation and rodent attraction, and decreases litter generation.

Cover material is usually classified as daily, intermediate and final. For the purposes of this LEMP we will discuss daily cover as Intermediate and final will be the domain of the later stage of design.



5.2.5 Daily Cover

At least 150 mm of soil should be spread over the waste deposited at the landfill tipping face so that no waste is left exposed. The frequency of covering wastes is dependent on the volume of waste being accepted at the landfill.

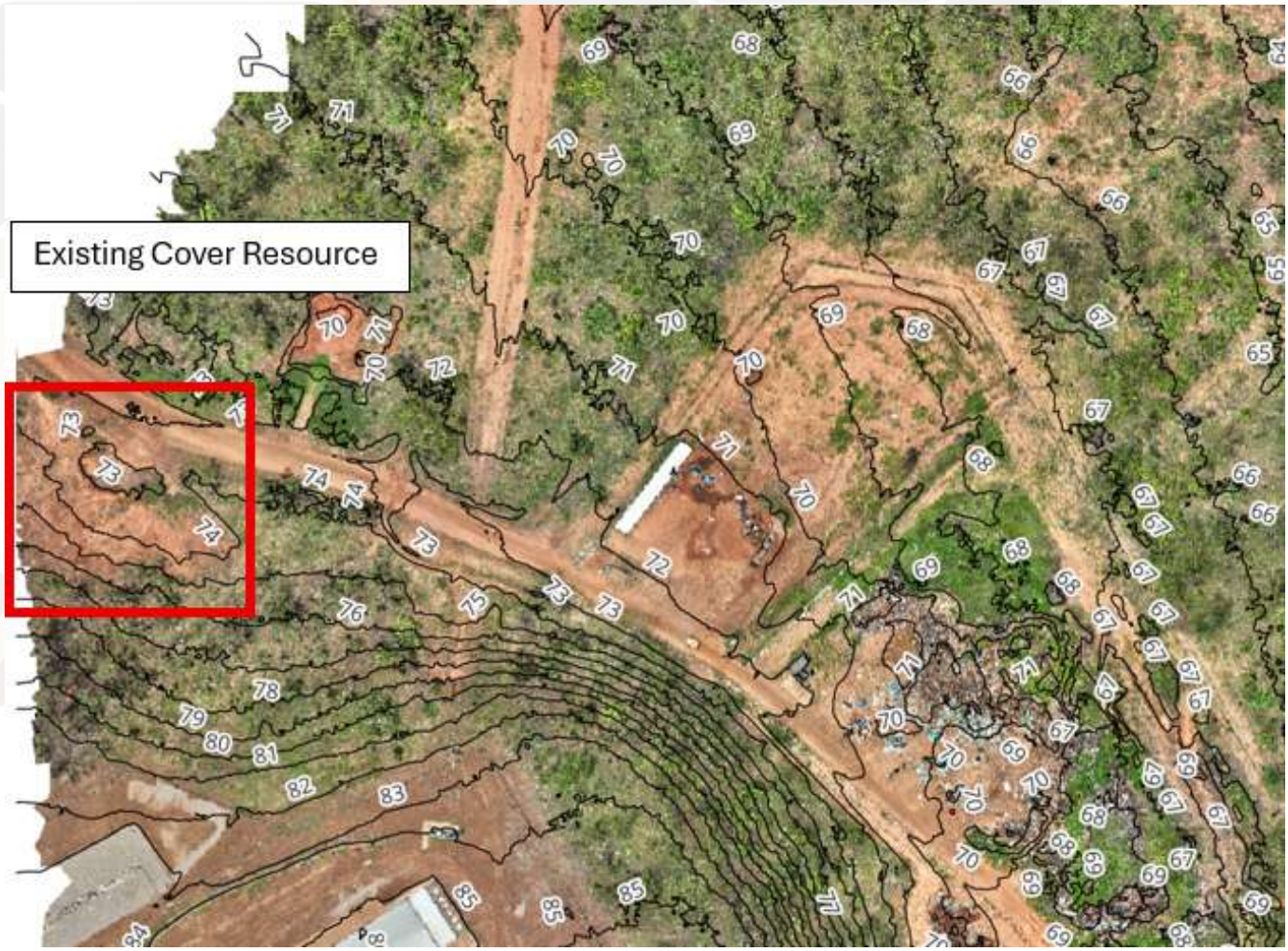
The frequency and depth of the soil cover on the waste are important factors in achieving the following objectives:

- ✓ Reducing fire risk
- ✓ Minimising water infiltration into the waste
- ✓ Reducing access by pests to the waste
- ✓ Minimising odours and wind blown litter
- ✓ Controlling fly breeding

When collected waste is delivered to the site, cover should be applied on the day of delivery or within 24 hours of the delivery. WMF Operator should endeavour to coordinate tipping times and the availability of plant to achieve this result.

5.2.6 Existing Cover Resource

The existing cover resource is located 150m outside the gate on the inbound road.



It is important that cover material is readily available on site at all times. This applies particularly to above ground sites where no excavation has taken place. All landfills should maintain a minimum of two week's cover reserve on-site. As a guide, this is estimated to be one cubic metre of soil for every six tonnes of waste received.

Soil used as landfill cover should preferably have the following qualities:

- ✓ Good compaction characteristics
- ✓ Good trafficability under all weather conditions
- ✓ Resistance to swelling and cracking when wet and dry
- ✓ Resistance to wind erosion
- ✓ Good resistance to slumping under all conditions; and
- ✓ Ability to support plant growth

Loam, clay loam and some clay soils have these preferred characteristics, however where these are not available the best of the soils which are readily available should be used.



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