Appendix I – Waste Management Plan

Arafura Resources Limited

Nolans Project
Non-mineralised Waste Management Plan

May 2016

Document Status

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Section	Details

Audit Summary

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Table of contents

Table index

Figure index

Appendices

Appendix A – Waste Management Guidelines for Small Communities

Appendix B – Risk Matrix

1.   Introduction

1.1   Purpose

Waste generation (waste) and management are considered to be a potential environmental risk at the Nolans Project. The Waste Management Plan (WMP) has been developed to provide a framework for waste management across the Project.

1.2   Objectives

The objective of this management plan is to prevent environmental impact from waste generation by:

- Identifying and characterising wastes and associated disposal options;

- Ensuring appropriate disposal is undertaken for waste materials;

- Ensuring appropriate maintenance of disposal areas; and

- Preventing increased environmental risk by the removal of hazardous substances from storage at the landfill prior known high rainfall months (i.e. November to May).

1.3   Legislation and Guidelines

A summary of waste management legislation and guidelines for the Nolans Project are provided in Table 1-1.

Table 1-1 Waste Management Legislation and Guidelines

Legislation and Guidelines	Relevance
Waste Management and Pollution Control Act and Regulations.	Provides for the protection of the environment by encouraging effective waste management and pollution prevention and control practices. The removal of hazardous wastes from the Project is managed under this Act. The subcontractor is required to hold an Environmental Protection Licence through the NT EPA. A summary of approved Listed Waste Handlers is provided as follows: http://www.ntepa.nt.gov.au/waste-pollution/approvals-licences/ep-licences. In addition, locations at the Project which have potential to cause pollution off the lease will be investigated and managed in accordance with the requirements of the contaminated land provisions of the Act.
Waste Management Guidelines for Small Communities in the Northern Territory (LGANT)	Guidelines for the management of waste in remote/small communities in the Northern Territory. The guidelines were developed in consultation with councils and municipals in the Northern Territory and various government agencies. Guidance on hazard reduction, environmental protection, service delivery and ongoing site management are provided. Due to the size and location of the Project it operates in general accordance with these guidelines.
Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA)	This guideline provides recommendations for visual amenity, nuisance control, fire prevention, water management, landfill gas, closure and monitoring. The siting of landfill will be in general accordance with the guidelines. However, management of the landfill will be undertaken in accordance with the Waste Management Guidelines for Small Communities in the Northern Territory.

1.4   Waste Categories

The majority of waste is managed onsite in landfill, but hazardous wastes and recyclables will be removed to appropriate licenced facilities. The WMP provides a strategy for the management of hazardous waste, non-hazardous waste and recyclables. These streams are further defined below.

1.4.1 Hazardous waste

Hazardous wastes are wastes that pose a threat or risk to public health, safety or the environment. They are listed under the Waste Management and Pollution Control Act. They include substances which may be toxic, infectious, mutagenic, carcinogenic, explosive, flammable, corrosive, oxidising or radioactive. Hazardous wastes can include medical waste, excess or spent chemicals, contaminated scrap metals or drums, oily rags and absorbents, solvents, batteries, fluorescent tubes, oily sludge, paints and paint drums, oil filters, sewage and contaminated soil.

1.4.2 Non-hazardous waste

Non-hazardous wastes are wastes composed of, or containing, materials which are not harmful to humans and which would not have a serious impact on the environment. Non-hazardous wastes can include putrescible solids and liquids, and inert solids, including paper, food waste, domestic waste, scrap metal, plastics, wood, glass, concrete and cardboard.

1.4.3 Recyclables

Recycle/recovery is the conversion of wastes into usable materials and/or extraction of energy or materials from wastes. Recyclable materials can include paper and cardboard, plastics, glass, metal, wood, tyres and vegetation and organic matter.

Specific Waste receptacles will be strategically located around the Project and temporary facilities as required.

1.5 Management Hierarchy

The management of waste will be undertaken in general accordance with the hierarchy of control. The hierarchy of control for wastes is as follows:

- Elimination and removal

    Eliminating either the substance or the activity which gives rise to the risk is the most effective form of risk reduction.

- Substitution

    Substituting high risk products or activities with alternative lower risk products or activities will reduce overall risk exposure.

- Isolation, enclosure or sealing

    Hazards may be isolated by distance or barriers or a combination of both.

- Engineering controls

    Engineering controls involve making engineering changes to a process or piece of equipment used to store or handle hazardous substances.

- Safe work practices (administrative controls)

    Administrative controls consist of properly designed and implemented work practices and procedures.

- Personal protective equipment (least preferred)

    PPE is considered the last line of defence against hazardous substances. Material Safety Data Sheets (MSDS) normally contain recommendations on the selection and use of PPE for the particular materials being used.

2. Existing Conditions

A landfill will be located at the Nolans site for the disposal of inert (clean waste) and municipal solid waste. Hazardous wastes and recyclables will be stored at the landfill site prior to removal to appropriate licenced facilities.

2.1 Landfill Design

No landfill design is available. The location, size and layout of the landfill will be determined during the construction phase. The siting will be in general accordance with the Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA).

The site will be operated in accordance with the Waste Management Guidelines for Small Communities in the Northern Territory (LGANT).

2.1.1 Title Details

TBC

2.1.2 Soils

TBC

2.1.3 Surface Water

TBC

2.1.4 Groundwater

TBC

To be determined during detailed design phase.

Figure 2-1   Landfill Location

3.   Waste Management

Waste management refers to non-hazardous, hazardous and recyclable waste at the Nolans site. Management of waste is structured as follows:

- **Key Activities, Risks and Impacts:** A summary of the key activities being undertaken during the management period. The potential environmental impacts and residual risk levels are identified for each environmental aspect.

- **Objective:** The guiding environmental management objective(s) and activities that apply to the element.

- **Mitigation Measures:** The procedures to be employed to ensure that the relevant objectives are met.

- **Responsibility:** Nominates the responsible position for implementing actions and monitoring.

- **Trigger, Action, Response Plan (TARP):** The actions to be implemented in the case of non-compliance. This includes strategies of remediation and the person(s) responsible for the actions.

3.1   Key Activities, Risks and Impacts

The key activities and potential environmental impacts have been identified for waste management are listed in Table 3-1. The risk matrix is provided in Appendix B.

Table 3-1 Key Activities, Risks and Impacts

Activity	Potential Environmental Impact	Residual Risk Level		
		Consequence	Likelihood	Risk
Transport of materials, vehicle movements and inappropriate waste management allows for introduction or spread of pest species impacting on populations of threatened species.	An increase in the incidence of pest species, such as cats, foxes and potentially dingos, resulting in increased predation of listed threatened species, particularly of more vulnerable juveniles, with impact to the long-term size of the population.	Moderate	Possible	Medium
Burning of landfill waste.	Loss of control leading to bushfire and subsequent loss of flora and fauna.	Minor	Unlikely	Low
Operation of a non-hazardous waste landfill.	Production of leachate leading to groundwater contamination.	Minor	Unlikely	Low
Storage, transport and disposal of non-hazardous waste at the onsite landfill.	Incorrect assessment/classification of a hazardous substance as a non-hazardous substance leading to: • Pollution of adjacent vegetation and/or groundwater; • Odours; • Increased fire risk; and • Reduced visual amenity.	Minor	Rare	Low

Activity	Potential Environmental Impact	Residual Risk Level		
Storage of hazardous wastes at the landfill.	Uncontrolled release of hazardous substance impacting: • Soil/sediment, surface water (fresh) or groundwater; • Flora and fauna; • Air quality; and • Aesthetical value.	Moderate	Rare	Low

3.1   Objective

The waste management objectives have been established and are detailed in Table 3-2.

Table 3-2 Waste Management Objectives

Objective	Target	Indicator
Prevent environmental impact from waste generation.	Zero environmental incidents associated with the landfill and waste collection sites.	Number of incidents which occur in relation to the landfill and waste generation sites.

3.2   Mitigation Measures

The waste hierarchy is utilised to guide onsite management of wastes. In addition, mitigation measures have been developed to minimise potential impacts associated with any waste related incidents. The mitigation measures, timing and responsibilities are provided in Table 3-3.

Table 3-3 Mitigation Measures

ID	Mitigation Measure	Timing	Responsibility
Site Induction			
W01	Site inductions will include the following specific waste management components: • Waste hierarchy; • Identification of waste types and associated disposal requirements; • Handling requirements in accordance with SDS; • Waste burning health implications; and • All waste/items brought to Mine Landfill for appropriate disposal.	Site Induction	All personnel
Waste Hierarchy			
W02	A waste hierarchy will be implemented on site including: • Elimination and removal; • Substitution; • Isolation, enclosure or sealing; • Engineering controls; and • Safe work practices (administrative controls).	At all times	All personnel
Hazardous Wastes			
W03	Old waste oils are to be stored in Intermediate Bulk Container (IBC) to be removed from site by a suitably licenced contractor monthly and as required.	Quarterly and as required.	Environmental Officer Supply Officer
W04	Intermediate bulk container (IBC) used to store waste oil and other hydrocarbon waste in designated areas. IBCs are determined as small containers, drums (up to 205 litres) and storage up to 1,000 L. All IBCs to be labelled and hazard it poses listed on container.	At all times	All personnel
W05	Hazardous substances stored minimum of 10 m from drainage lines	At all times	HSEC Manager
W06	Spill kits are located at all hazardous substance storage locations. In addition, spill kits are available to be relocated to specific areas in accordance with scopes of work.	At all times	Area Managers

ID	Mitigation Measure	Timing	Responsibility
W07	Monthly inspections of hazardous substance storage location to ensure spill kits are present/contain sufficient materials for potential spillages along with general housekeeping and general compliance of storage areas with HSE requirements. The monthly inspection is to update the hazardous substances inventory (within the Hazardous Substances Management Plan).	Monthly	Safety and Environmental Officers
W08	In the event of a spill follow the spill management procedure within the Emergency Response Management Plan	At all times	All personnel
General			
W09	Recyclable materials are to be stored at the landfill and/or waste collection points and removed from site as required.	As required	Environmental Officer Supply Officer
W10	Cleared vegetation will be stockpiled and/or used for rehabilitation.	At all times	All personnel
W11	Litter sweep of the Landfill on monthly intervals required to collect any windblown waste.	Monthly	Environmental Technician
W12	Regular inspection of landfill.	As required	Environmental Officer
W13	Project waste is to be disposed of at the Landfill or suitable licenced offsite facility, currently determined to be the Alice Springs Landfill authorised under Environmental Protection Licence (EPL) 11-06.	At all times	All personnel
W14	The landfill will be fenced with a single entry / exit gate which will be kept closed.	At all times	All personnel
Waste Burning			
W15	Controlled burns will be held at the landfill site as necessary to control the amount of putrescible and windblown waste. The impacts of burning wastes are reduced by: • Transferring recyclable products to an appropriate licenced facility for recycling offsite. • Transferring hazardous wastes to an appropriately licenced offsite facility for disposal, currently determined to be the Alice Springs Landfill authorised under Environmental Protection Licence (EPL) 11-06. • Storage of tyres onsite in a stable form and outside of potential impact from bushfires. • Burning waste within the designated fire pit along with maintaining firebreaks to control potential spread of fire to the surrounding area.	At all times	Environmental Technician
W16	Controlled burns on low wind days at the landfill as necessary to control the amount of putrescible and windblown wastes.	At all times	Environmental Technician
W17	Inform Emergency Response Team Coordinator prior to conducting controlled burn and monitor the controlled burn to ensure fire is contained.	At all times	Environmental Technician
W18	Close landfill during the burning of wastes to reduce impact to human health (related to dioxins, sulphur dioxide, lead and mercury).	At all times	Environmental Technician
Uncontrolled Burn			
W19	In the event of an uncontrolled burn follow the fire response procedure within the Emergency Response Management Plan.	At all times	All personnel
Hazardous Waste Transport			
W20	Hazardous waste transported from site will be undertaken by licenced contractor who holds an Environmental Protection Licence through the NT EPA for Listed Waste Handlers (http://www.ntepa.nt.gov.au/waste-pollution/approvals-licences/ep-licences).	At all times	Environmental Officer Supply Officer
W21	Certificates of disposal will be stored by the Environmental Officer.	At all times	Environmental Officer
Inspection and Monitoring			
W22	Weekly landfill inspection and litter sweep as required.	Weekly	Environmental Technician
W23	Annual Waste Management Plan performance review (Section 4).	Annually	HSEC Manager

3.3   Trigger, Action and Response Plan

The Trigger, Action and Response Plan (TARP) outlines remedial actions and responses to the situation. The TARP is provided in Table 3-4.

Table 3-4 Trigger, Action and Response Plan

Responsibility	Situation		
	Standard	Level 1	Level 2
	Landfill and waste collection sites containing wastes with limited interaction with vermin/pests.	**Trigger:** Waste incorrectly disposed of resulting in potential cross contamination of other wastes within the burn pit.	**Trigger:** Spill of Hazardous waste causing environmental harm.
HSEC Manager	• Conduct weekly inspections of landfill and litter sweep as required. • Removal of recyclables as required. • Monthly inspections of hazardous substance storage areas to ensure compliance with HSE requirements and spill kits are present/contain sufficient materials for potential spillages.	• Remove and segregate hazardous waste, recyclable waste and tyres from the landfill.	• Isolate and contain the spill utilising the spill kit; • Evacuate from the area if potential danger; • Notify Emergency Response Team Coordinator. • Monitor and determine if spill kit response has been effective in containing and managing spill. • Undertake remediation recommendations as required.
HSEC Manager	• Ensure Project compliance with the WMP.		• Assist in the investigation of the spill.
	Controlled burn to reduce amount of putrescible and windblown waste	**Trigger:** Uncontrolled burn within the landfill.	**Trigger:** Uncontrolled burn outside the landfill.
Environmental Officer	• Transferring of recyclable products to an appropriate licenced facility for recycling offsite. • Transfer of hazardous wastes to an appropriately licenced offsite facility for disposal. • Storage of tyres onsite in a stable form and outside of potential impact from bushfires. • Burning waste within the landfill along with maintaining firebreaks to control potential spread of fire to the surrounding area. • Controlled burns on low wind days at the landfill as necessary to control the amount of putrescible	Management of an uncontrolled burn at the landfill will be managed by following the fire response procedure within the Emergency Response Management Plan.	

Responsibility	Situation		
	Standard	**Level 1**	**Level 2**
	and windblown wastes. Hazardous waste and recyclables are kept out of the landfill. • Inform Emergency Response Team Coordinator prior to conducting controlled burn and monitor the controlled burn to ensure fire is contained. Close landfill during the burning of wastes to reduce impact to human health (related to dioxins, sulphur dioxide, lead and mercury).		
HSEC Manager	• Ensure Project compliance with the WMP.		

4. Previous Period Performance

No data available for the previous period.

Appendices

Appendix A – Waste Management Guidelines for Small Communities

Waste Management Guidelines for Small Communities

Waste Management Guidelines for Small Communities in the Northern Territory

Working Towards Best Practice
2009

Executive Summary

These Guidelines were developed as part of the Northern Territory Government Program 'Re-Thinking Waste' – Waste Management Standards for Local Government in the Northern Territory. The project was made possible due to financial support provided by the Packaging Stewardship Forum.

Under the Northern Territory *Waste Management and Pollution Control Act,* communities with populations over 1,000 are required to have a licensed landfill and an Environmental Management Plan for the operation of the site. The Department of Natural Resources, Environment, The Arts and Sport (NRETAS) and the NT Environment Protection Authority (EPA) have developed Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory.

The guidelines included in this document are focused on improving the delivery of waste management services to communities with less than 1,000 people. Waste management in small and remote communities has very specific challenges for community managers, and it is important that these challenges are met and waste management services are not at a lower standard than would be expected in more populated areas. These guidelines are intended to provide support to community managers and technical service operators in working towards best practice and ensuring that waste management in small and remote communities is safe for staff, the community and the environment. Given this, these guidelines focus on:

- Reducing the hazards associated with waste in small communities
- Working towards improved environmental management of waste
- Allowing communities to assess their current situation and provide some initial steps in how to improve waste management in their community
- Providing guidance on the service delivery standards that should be aspired towards under the new council structure.

While these guidelines have been developed for waste management services and landfill site management, they only provide broad advice and should not be considered as a technical manual, but rather as an operational guide to be used on a daily basis. Each community's needs and circumstances are unique and site-specific investigation, design, operation and management plans will be required in each case to achieve the best outcomes. Working with your council, LGANT and Government Agencies will help you to develop more strategic plans to guide the future direction of your community waste management plan.

Table of Contents

INTRODUCTION: Why Use These Guidelines

These guidelines aim to address the most immediate issues of waste management first – hazard reduction. It is not intended that any one section has priority over the others, however many small communities have hazardous waste management processes, and addressing theses issues is generally the first challenge. The key waste management performance areas addressed in these guidelines are:

1. Hazard Reduction
2. Environmental Protection
3. Service Delivery
4. Ongoing Site Management

The management of waste is an important role for local government. It has benefits for community health, preventing environmental harm, amenity management, and community morale. Waste management can be a difficult and complex task for remote communities, so a planned strategy of management is a useful tool in assisting councils.

The most important consideration in waste management is community health. Poorly managed waste services can have significant impacts on community health and so planned management is essential.

The challenge for solid waste management is to adopt an integrated approach, including avoidance, recycling, minimisation, treatment and disposal. Under this integrated management approach, councils and the community should determine what options will best fit the community. This may mean that a landfill is not actually needed, and a transfer facility system is preferable. Transfer of some or all waste to a landfill serving other communities may be a more economically viable option than developing a new landfill. Transferring waste also minimises environmental impact by reducing the number of waste disposal sites across a region. Under such a system, waste is either transported directly to the landfill serving the area's communities or deposited in a transfer station before being taken to the landfill. Use of transfer stations and sharing landfill facilities in this manner can help reduce costs for all the communities involved.

While these guidelines are given as expected best practice, they are not legally binding or statutory in nature. They have been developed in consultation with the councils and municipals in the NT, as well as various government agencies (such as the Departments of Health and Families, Local Government and Housing and NRETAS) and non government stakeholders.

Definitions and Abbreviations

Abbreviation	Definition
BIITE	Batchelor Institute of Indigenous Tertiary Education
CDU	Charles Darwin University
Clinical waste	Such wastes include, but are not restricted to, wastes arising from medical, nursing, dental, veterinary, laboratories, pharmaceutical, podiatry, tattooing, body piercing, emergency services, blood banks, mortuary practices and other similar practices, and wastes generated in health care facilities or other facilities during the investigation or treatment of patients or in research projects
DHF	Northern Territory Department of Health and Families
FAHCSIA	Australian Government Department of Families, Housing, Community Services and Indigenous Affairs
Hazardous waste	Any waste that has significant quantities of a substance that might present a danger to the life or health of people or the environment. This includes clinical and radioactive wastes.
HAZMAT	Hazardous Material
Health Care Facility	Includes a health centre, health clinic, or mobile surgery, e.g. dental or eye
HR Licence	Heavy Rigid Vehicle Licence (A rigid motor vehicle or an articulated motor omnibus that has 3 or more axles and a gross vehicle mass (GVM) greater than 8 tonnes)
KABC	Keep Australia Beautiful Council
Landfill	Site where waste is disposed of. A licensed landfill has been checked by the Department of Natural Resources, Environment, The Arts and Sport.
LGANT	The Local Government Association of the Northern Territory
MGB	Mobile Garbage Bin
MSDS	Materials Safety Data Sheet
NRETAS	Northern Territory Department of Natural Resources, Environment, The Arts and Sport
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
RTO	Registered Training Organisation
Small communities	For the purpose of this document, a 'small community' is that which has less than 1,000 permanent residents
SWMS	Safe Work Method Statement

Applicable Legislation

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 1 below lists these documents and they should also be consulted to ensure compliance.

Table 1   Related legislation and guidelines and the relevant agency, as it relates to Waste Management in the Northern Territory

Related Legislation and Guidelines	Enforcement Agency
• *Waste Management and Pollution Control Act 2007* • *Waste Management and Pollution Control (Administration) Regulations 2004* • *Water Act 2004*	Department of Natural Resources, Environment, The Arts and Sport (NRETAS) (www.nt.gov.au/nreta).
• *Public Health (Nightsoil, Garbage, Cesspits, Wells and Water) Regulations* • *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 and Families (DHF) (www.nt.gov.au/health/envirohealth)
• *Local Government Act 2007*	Department of Local Government and Housing (www.dlgh.nt.gov.au)
• *Workplace Health and Safety Act 2007* • *Workplace Health and Safety Regulations 2008*	NT WorkSafe (www.worksafe.nt.gov.au)

How to use these Guidelines

These guidelines have been divided into four "Key Performance Areas" that are based on the main aspects of waste management in small communities. Within each performance area, there are a number of "focus" points that break down the main waste management activities within that area.

Each focus point has a best practice statement. This best practice statement may not be achievable in your community; however it is a goal that you can work towards. The most important thing about these waste management guidelines is continual improvement. Small steps can make big changes.

Each focus point also describes three scenarios, which you can use as an assessment of where your community is in terms of waste management. The box below explains the format.

These scenarios include an 'unacceptable' scenario or standard that should be addressed as a point of urgency. If you think this is where your community is at, you should address it immediately.

The next is a 'manageable' scenario – where it is not as urgent, and you have some systems and infrastructure in place to work with. The final scenario is 'better practice', where it is not quite BEST practice, but very close. If you are at this stage, you probably don't need to change anything at this stage, and could focus attention on other aspects.

There is a photo to help illustrate the practice, and a section for taking notes. It is highly recommended that users of the manual actively record comments and notes in this section, that can be used to improve the guidelines and to feed into council record keeping.

⭐	***Best Practice Statement:* "This is an aspirational goal statement. It is not always going to be achievable in every community, however it does set a position that is considered to be the most ideal across the broadest range of communities"**
🛑	***Unacceptable Scenario***: This describes a situation that is considered unacceptable in any situation. If any aspects of your waste management fall within this scenario, it is recommended that it be given urgent attention. A key goal would be to ensure that all aspects of waste management do not fall within this scenario.
⚠️	***Manageable Scenario***: This situation is considered standard. It is by no means ideal, but doesn't require urgent attention. Once you reach this level of waste management, you should have a reasonably good situation for waste, and be able to work on improving specific aspects of waste management as opportunities arise.
✅	***Better Practice Scenario***: This is the situation that is considered achievable by pretty much all communities. It is a goal to have all aspects of your waste management fall within this scenario.

1. Hazard Reduction

The first priority when looking at waste management in your community is to reduce the risk of harm to your community and your staff. To do this, you need to consider dangerous practices and dangerous materials.

There is legislation that relates to the management of dangerous or hazardous materials (like asbestos), and also to dangerous or hazardous practices (like burning waste). Due to the remoteness and lack of resources in smaller communities, it might not be possible to comply with the legislation best practice; however there are good practices that can help reduce the amount of harm when dealing with these materials or practices.

Generally, hazardous waste can be described as any waste that has significant quantities of a substance that might present a danger to the life or health of people or the environment. This includes clinical and radioactive wastes.

Some hazardous wastes that you probably have in your community are:
- Car batteries;
- Waste oil;
- Clinical waste;
- Chemical waste;
- Paints and solvents;
- Building materials;
- Car tyres (water holding waste);
- Fridges and freezers;
- Lockable boxes;
- Gas bottles; and
- Animal carcasses.

Best practice when dealing with hazardous waste is to ensure that they are not included in the general waste disposal. Hazardous wastes should be stored under controlled conditions for recycling or removal from the community, and with liquid wastes (such as paints and oil) they should be removed by a contractor.

The number one hazardous practice that is most common in communities is the burning of waste. People burn waste for many reasons, including reducing the amount of litter, odour, and chance of pests getting into the waste. These factors can usually be dealt with in a safer manner, and the burning of waste is dealt with in more detail in the Section 1.05 - Burning of Waste.

Key Performance Area: **1. HAZARD REDUCTION**

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Key Performance Area: **1. HAZARD REDUCTION**

Focus: *1.01 Hazardous Waste*

Hazardous waste can generally be defined as any of the following:

Materials that have ANY of these characteristics:

- Explosive
- Flammable Liquids/Solids
- Poisonous
- Toxic
- Ecotoxic
- Infectious Substances.

ANY waste materials that include:

- Clinical wastes
- Waste oils/water, hydrocarbons/water mixtures, emulsions
- Wastes which contain certain compounds such as: copper, zinc, cadmium, mercury, lead.

Best Practice Statement: **"Hazardous wastes are not sent to landfill. They are dealt with according to Australian Government Standards. Storage areas for Hazardous Waste have appropriate HAZMAT signage Those responsible for the generation of hazardous wastes are held accountable for the safe disposal."**

Unacceptable Scenario: Hazardous waste is not identified by council staff or community members. Hazardous wastes are mixed in amongst other household wastes or present within the community, in yards and houses.

Manageable Scenario: Hazardous wastes are identified by council staff and sometimes community members. Hazardous wastes are generally not mixed in with household waste, but may be present within the community.

Better Practice Scenario: Hazardous wastes are collected separately from households or dropped off at the council depot, where there is a designated storage place. Contractors carrying out work in the community are aware of the drop off point, and use it or take their wastes out of the community. Period collections from the council depot have been arranged to remove hazardous wastes from community.

Steps for Achieving Best Practice
1. Educate staff on what hazardous wastes are, and the dangers of dealing with hazardous wastes.
2. Ensure infrastructure to deal with hazardous wastes is in place – especially a storage site for hazardous materials.
3. Educate community on the importance of dealing with hazardous wastes separately.
4. Arrange for a separate collection or clean out of hazardous wastes from community and households.
5. Ensure all contractors working in the community are aware of separate drop off point for hazardous wastes, and advise them they should be removing wastes from the community.

Key Performance Area: 1. HAZARD REDUCTION

An example of appropriate labelling of hazardous materials. Items in your community may not be clearly labelled.

Common household items can become hazardous when they are disposed of. For example, gas cylinders, fluorescent tube lights, car batteries, cleaning products, paint and thinners

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Focus:	*1.02 Chemical Wastes*

When some chemicals are mixed with others, they can catch fire or explode. Be especially careful with swimming pool chlorine which is an oxidising agent and may cause a fire when mixed with petrol, diesel or oil. Set up a chemical storage area in a way so people do not mix different chemicals together. Educate staff and the community on the dangers of chemical disposal and what they can do to protect themselves.

Most chemicals and compounds have what is called a Material Safety Data Sheet. An MSDS is a document containing important information about a hazardous substance and must state:
- A hazardous substance's product name
- The chemical and generic name of certain ingredients
- The chemical and physical properties of the hazardous substance
- Health hazard information
- Precautions for safe use and handling
- The manufacturer's or importer's name, Australian address and telephone number
- The MSDS provides employers, self-employed persons, workers and other health and safety representatives with the necessary information to safely manage the risk from hazardous substance exposure.

It is important that staff working with chemicals know how to read and interpret a MSDS. You can generally access MSDS for chemicals online, or your council should be able to provide this information.

Best Practice Statement: "Chemical wastes are clearly labelled and stored separately to other materials in a secured, controlled area. Each chemical has a Material Safety Data Sheet (MSDS) present onsite. Council staff is trained in the safe handling of chemicals. Chemical clean out happens monthly where they are taken out of the community to the nearest licensed facility for disposal"

Unacceptable Scenario: Labels on containers known to hold chemicals are faded and illegible. Liquid wastes are mixed together into one large drum. No separate collection of chemicals means they go into general waste stream (and landfill) or are tipped down the drain. Council staff is not trained in the handling of chemicals

Manageable Scenario: Trained council staff aims to identify chemicals as part of community chemical clean up. At least one chemical clean up has been held to educate community. Not all MSDS are present, but in the process of acquiring MSDS for chemicals onsite. MSDS storage and disposal guidelines are generally followed. Chemicals are stored in secured area and the empty containers are punctured so that they can't be used as water container.

Better Practice Scenario: Have most relevant MSDS for chemicals onsite, and staff follow MSDS storage and disposal guidelines for all chemicals. Chemical containers removed from community (ie contractors). Any service providers in the community (contractors) have clause included in contract specifying the removal from chemicals and containers from community

Steps for Achieving Best Practice
1. Train council staff in the management of chemicals, and also the identification of chemical wastes. Introduce the concept of MSDS for chemicals. You can view MSDS online at www.msds.com.au and other websites.
2. Contact NT WorkSafe about the safe storage of chemicals.
3. Designate specific chemical storage area, either at waste disposal site or at central place at the depot etc. Disposal site should be clearly signed with instructions on how to dispose of chemicals.
4. Identify existing chemicals in the community. For those that aren't identified, treat as hazardous waste.
5. Gather MSDS information for all known and potential chemicals in the community.
6. Hold a chemical clean out with the community to educate community and staff on importance of disposing of chemicals in a safe manner. Ideally clean outs should be held regularly to reduce the build up of chemicals in the community.
7. Any old containers that have been used to store chemicals that will no longer be used for chemicals should be punctured to ensure they aren't used for gathering or storing water.
8. Contractors to notify council before entering communities with chemicals.
9. Contracts to include container removal clauses.
10. Community managers to inspect dump sites on a regular basis.

Key Performance Area: 1. HAZARD REDUCTION

Storage of Chemicals:

The following measures need to be in place where dangerous goods are stored in sheds.

- The shed should be lockable and weatherproof.
- The shed should not be near houses or other buildings.
- Do not store different types of dangerous goods in the same container. Have separate containers for motor oil, brake fluid, car batteries, etc.
- Keep the area around the shed clean. Keep the grass short and don't allow rubbish to build up as this can be fuel for an accidental fire.
- Prevent flames, sparks and other sources of heat in the shed as these can start fires and explosions (e.g. cigarette lighters, matches, motor mowers, generators).
- No smoking in or near the shed.
- Keep a fire extinguisher near the shed.
- Ensure the shed has enough ventilation to allow any fumes to clear.
- Keep all drums closed when they are not being used.
- Clean up all spills straight away.
- Have an emergency response plan (in case of a spill, fire, or explosion).
- Signage to warn staff and community of possible dangers in entering storage facility (sheds)

Once you have accumulated a number of chemicals in your community, it is a good idea to have them removed to a safe disposal area

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Focus:	*1.03 Medical and Clinical Wastes*

Clinical waste has the potential to cause injury, infection or public offence, and includes sharps, human tissue waste, laboratory waste, animal waste resulting from medical, dental or veterinary research or treatment that has the potential to cause disease. Clinical waste includes the following:

- Discarded sharps
- Human tissue, bone, organ, body part or foetus
- A vessel, bag or tube containing a liquid body substance
- An animal carcass discarded in the course of veterinary research or medical practice or research
- A specimen or culture discarded in the course of medical, dental or veterinary practice or research and any material that has come into contact with such a specimen or culture
- Heavily bloodstained bandages and dressings and those from infectious sources
- Cytotoxic waste
- Pharmaceuticals
- Any other article or matter that is discarded in the course of medical, dental or veterinary practice or research and that poses a significant risk to the health of a person who comes into contact with it.

Best Practice Statement: **"Clinical waste is not disposed of in landfills or burnt in drums at health care facility. Clinical waste is managed by the health care facility, and is either removed from the community as part of a registered disposal program or incinerated onsite with appropriate incinerator facilities."**

Unacceptable Scenario: Health care facility staff is unaware of correct disposal procedures and often clinical waste is being disposed with general household waste, or being incinerated at the health care facility in 44 gallon drums or improvised incinerator. Sharps are disposed in landfill, not necessarily in a sharps container, often just loose.

Manageable Scenario: Clinical waste is stored in yellow wheelie bins and incinerated onsite using an incinerator endorsed by the Department of Health and Families.

Better Practice Scenario: Clinical waste is stored onsite in yellow wheelie bins and removed by health care facility via a contracted service. All sharps containers are removed from health care facility to regional centres for disposal.

Steps for Achieving Best Practice
1. Meet with health care facility to discuss current disposal practices.
2. Ensure health care facility has contracts in place to remove clinical wastes.
3. Train council staff on the identification and handling of clinical wastes.
4. Ensure council staff has received necessary vaccinations.
5. Ensure health facility staff understands best practice for disposal of clinical wastes.
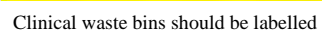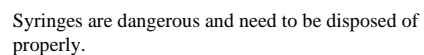
Syringes are dangerous and need to be disposed of properly.

Clinical waste bins should be labelled

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Focus: *1.04 Prohibited and Other Special Wastes*

The following should be prohibited from disposal in small communities :

- Pesticides and pesticide containers which have not been cleaned in accordance with the *Agsafe Standard for Effective Rinsing of Farm Chemical Containers* (http://www.drummuster.com.au/category.php?id=28);
- Commercial quantities of hazardous wastes including :
  o "dangerous goods" under the provisions of the *Dangerous Goods Act* (http://www.nt.gov.au/lant/hansard/hansard.shtml); and
  o any material scheduled as a "listed waste" under the *Waste Management and Pollution Control (Administration) Regulations* (http://www.nt.gov.au/lant/hansard/hansard.shtml)
  o Radioactive waste under the provisions of the *Radiation Protection Act.*

Best Practice Statement: **"Prohibited materials are not brought into the community without prior notification to shire service manager. Any prohibited materials are dealt with solely by licensed contractor and wastes are removed from the community, without exception. No prohibited wastes are left in community for disposal. "**

Unacceptable Scenario: No wastes have been identified as prohibited, or there is no communication on standard prohibited wastes to council staff or the community, resulting in all sorts of wastes being disposed of in and near the landfill.

Manageable Scenario: Some materials are generally understood to be prohibited from the landfill, but many still end up being disposed of with general waste. There is no documentation or signage to explaining what is prohibited. Council staff has not been trained about identifying prohibited waste.

Better Practice Scenario: A list of prohibited wastes is defined and made available within the community. Council staff is aware of what is prohibited waste and there are procedures in place to separate out prohibited wastes so they don't get into the landfill.

Steps for Achieving Best Practice
1. Create a list of prohibited wastes.
2. Make this list available within the community and make sure all council staff is aware of these wastes.
3. Designate an area for the removal of identified prohibited wastes (for example 'special wastes 'drop off' point').
4. Any contractors working in the community should be made aware of prohibited wastes and their responsibility to remove from the community any prohibited waste that they generate.

Key Performance Area: ***1. HAZARD REDUCTION***

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1. HAZARD REDUCTION

Key Performance Area: 1. HAZARD REDUCTION

Focus: *1.05 Burning of Waste*

Burning wastes changes otherwise safe materials (such as plastic) into dangerous toxic emissions and ash, including: dioxins; sulphur dioxide; lead; and mercury which may adversely impact on public health and the environment. Toxic emissions can cause immediate and long-term damage to the lungs, kidneys, liver, nervous system, and reproductive or developmental disorders. The damage is especially a problem for children, the elderly, and those with pre-existing respiratory conditions. Children can also accidentally swallow contaminated dirt on their hands while playing near discarded ash.

Open burning of household waste creates significant amounts of dioxins due to the low combustion temperatures, poor air distribution, and the presence of chlorine, which is found in almost all household waste components. The products of incomplete combustion will include dioxins, furans and other potentially carcinogenic (cancer-causing) organic compounds. Although some of these compounds will be carried off into the atmosphere with the smoke plume, some will remain in the ash left behind after the fire has gone out.

It is important to educate the community these dangers of backyard burning. It is also important to provide alternatives to rubbish burning by establishing solid waste collection programs and encouraging community members to compost and reduce, reuse, and recycle.

⭐   *Best Practice Statement:* **"Waste is not burnt in communities"**

🛑   *Unacceptable Scenario*: Individual households burn waste in barrels or drums, with no control or monitoring from council or community mangers

⚠️   *Manageable Scenario*: Waste is burned at the landfill site, although lack of separation of materials from the tip face means all sorts of materials are being burned.

✅   *Better Practice Scenario*: Controlled burns are held at the landfill site as necessary to control amount of putrescible and windblown waste. Plastics, construction materials, whitegoods etc are all kept out of the controlled burn site.

Steps for Achieving Best Practice

1. Ban the burning of waste in the community and develop a communication plan to ensure your community understands why burning waste is banned.
2. Schedule the removal of burn barrels from community and provide wheelie bins and regular waste service.
3. Extend the communication plan to include labelling on bins and around the community indicating "no burning."
4. If it is necessary in your community, develop waste burn plan for scheduled burns on low wind days to reduce the amount and volume of putrescibles waste.

If burning has been chosen as an operational technique, you need to consider the following:

- *How human health and safety and the environment will be protected during burning operations*
- *The frequency of burning*
- *Measures to be taken to meet the requirements of the local fire authority*
- *Steps to be taken to ensure refuse is all burnt or extinguished before personal conducting the burning leave the site*
- *The training to be undertaken by staff conducting the burning operations.*

Key Performance Area: 1. HAZARD REDUCTION

Safe Burn Plan:
- as short, clean and smoke-free burns as possible;
- protection of your community;
- prevention of the spread of fire from the burn to areas outside the landfill;
- ensuring that the personnel who carry out the burns are well trained;
- integral involvement of the local fire authority with planning and approving burns;
- minimise the burning of plastics (especially PVC) which reduces smoke toxicity;
- to only burn wastes only downwind of homes; and
- prevent people from entering waste disposal site during burn days.

Burning waste even at the landfill site is not ideal, as it can alter the chemical make up of otherwise safe items, and leave toxic residue. If you must burn waste, follow the safe burn plan guidance given here.

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Key Performance Area: 1. HAZARD REDUCTION

Improper disposal of dead animals (such as feral animals, domestic pets and livestock) can lead to infection of other animals and humans. Animal carcasses should not be disposed of at the landfill without approval from the shire service manager.

Animal carcasses should be disposed of in an area separate from the working face of the landfill. They should not be burnt with other waste. Disposal should be carried out under supervision and immediate burial with protection from animal scavengers.

The use of lime or composting techniques to hasten the decomposition of carcasses is recommended.

Best Practice Statement: "All animal carcasses are buried at a separate pit at the landfill site at a minimum depth of 1m using hydrated lime or similar to expedite decomposition. This separate pit is fenced to prevent other animals scavenging"

Unacceptable Scenario: Animal carcasses are left to decompose at landfill site or within community causing public health risk.

Manageable Scenario: Carcasses are removed from the community, but still disposed of in general pit at landfill. Other animal scavengers are often present in the area and could be accessing carcasses.

Better Practice Scenario: Carcasses are buried in a separate pit, but there are no supplies of lime to help the breakdown process.

Steps for Achieving Best Practice
1. Develop a dedicated pit at landfill for burial of animal carcasses. Fence and sign the area to reduce chance of pit being used for other wastes. Ensure that pit is deep enough to prevent other animals digging it up.
2. Council staff conducts regular monitoring within and around community to identify and collect carcasses.
3. Council staff has been trained in the appropriate handling of carcasses.
4. Set a defined timeline from detection to burial in dedicated pit. Aim for 24 hours, but 3 days is acceptable (depending on climate).
5. Make contact details for immediate collection of carcasses known within community.
6. Investigate supplies of lime to hasten the breakdown of carcasses.
7. You may like to try some innovative ways to deal with animal carcasses on a longer term basis, some suggestions include:
   - Plant a tree on the grave site, to mark it so that the site isn't dug up again.
   - Cut the bottom out of a cement (water) tank, and bury it into the ground. Carcasses can be disposed of into the tank, and the top of it covered with a steel plate – making it inaccessible to other pests and reducing harm to the community.

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Key Performance Area: ***1. HAZARD REDUCTION***

Animal carcasses should never be left to decompose on the surface – they can attract vermin and risk the spread of disease to other animals and humans

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Focus: *1.07 Car Batteries*

Acid from car batteries easily leak out and potentially:
- Burn skin;
- Injure eyes;
- Corrode metals;
- Contaminate soil; and
- Pollute waterways.

It is important to dispose of car batteries properly, and make sure they aren't left around the community where children may come into contact. Car batteries need to be stored in leak-proof containers that are preferably made of corrosion resistant material (e.g. heavy duty plastic, not metal).

Best Practice Statement: **"All car batteries are stored separately at the depot or designated place at the landfill. A separate collection for batteries is in place, as well as community members being able to drop batteries off at facility. Processes are in place for car batteries to be taken off the community as part of a buy-back scheme. Money from the buy back process goes into a shared community fund."**

Unacceptable Scenario: The storage of car batteries is uncontrolled as they are present throughout the community, around houses, play grounds and stores. Some car batteries are visibly leaking acid. Car batteries that are disposed end up in general waste and are often burnt at the landfill.

Manageable Scenario: Car batteries are generally not left around the community. They often end up in with household waste, but council staff knows to look for them and will keep them separate. If burning is taking place, council staff looks out for car batteries and remove them before burning.

Better Practice Scenario: A specific area is designated for car batteries, where they are stored until such time that they can be removed from the community. Storage place is not well signposted, and overloaded with car batteries because no removal collection has been arranged. Community know to bring their car batteries to this site, and council staff rapidly removes any car batteries from the community.

Steps for Achieving Best Practice
1. Designate separate area for storage of car batteries, preferably on a plastic or wooden pallet and fenced off on three sides to prevent knocking over. Site should be well sign posted.
2. Train staff in the importance of separating out and safe handling car batteries.
3. Educate community on process for disposal of car batteries, and importance of keeping them separate from household waste.
4. Conduct regular collection / clean up of car batteries in community.
5. Engage contractor for regular removal / recycling of car batteries.

Car batteries should never be burned!

Store car batteries on a non-corrodible pallet for removal from the community

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Key Performance Area: **1. HAZARD REDUCTION**

Focus: *1.08 Asbestos*

Asbestos is a hazardous waste that can be extremely dangerous to human health if it is not properly managed. Breathing in the loose fibres can cause serious or fatal lung disease. In any situation where there is asbestos identified, or where maintenance involves one metre of friable asbestos, a licensed asbestos removalist must be employed to remove it. Asbestos waste should be buried at an approved licensed asbestos disposal site. This ensures that its location is recorded and it does not create contamination issues in the future.

If asbestos is identified in your community, the most important action you can take is to secure the site and prevent anyone from accessing it – particularly children, who are unlikely to understand the risk this material poses.

For further information about asbestos go to the NT Government's Asbestos Alert website: http://www.asbestos.nt.gov.au/ and for up-to-date information contact NT WorkSafe on 1800 019 115.

When removing asbestos materials, be sure to wet the material with water to stop the fibres coming loose. Material should be wrapped in thick plastic and taken to authorised disposal area for burying straight away.

Best Practice Statement: "No asbestos is disposed outside of a licensed landfill site; all is removed by licensed contractors. Asbestos is identified before moving from any sites. Council staff is trained in the identification and associated hazards of asbestos. The council maintains an asbestos register and known asbestos sites are clearly marked, signposted and fenced off. Contractors undertaking demolition in the community remove asbestos as part of their contract."

Unacceptable Scenario: Asbestos is dumped in general waste stream or left as rubble at site; Dumping on site, staff dealing with asbestos. The location and extent of asbestos disposed of at site is unknown

Manageable Scenario: Locations of asbestos dump sites in the community are known, however there is uncertainty on the extent / amount of asbestos. Signage is old and faded, or non-existent. Some containment and isolation of asbestos happens at the site.

Better Practice Scenario: Location and extent of asbestos at site is known. Signage is old and faded and needs repairing. GPS coordinates need confirming. Council Asbestos Register is out of date. New demolition work will ensure that future asbestos is taken off site by contractor

Steps for Achieving Best Practice
1. Ensure all staff working at the site is trained in the identification and safe handling of asbestos.
2. Assess existing visible wastes to determine if asbestos is present in your landfill.
3. Review any records of previous housing to estimate extent of construction wastes disposed of at site, and if asbestos likely to be present.
4. Record GPS coordinates of any known asbestos dump sites – inform your council of these coordinates.
5. Fence off any known asbestos disposal sites and ensure coverage is at least 1m deep over these areas.
6. The area should be clearly signposted with "Danger Asbestos" and the GPS coordinates.
7. If you come across exposed and potentially dangerous asbestos in your community, you need to restrict access to the area, cover the material if possible and contact your council for more information on how to get it disposed of safely.
8. Any newly identified asbestos material is to be removed by a licensed contractor and transported by a licensed waste contractor. This is likely to be quite expensive, and it is important you talk to your council before taking this action – they may need to identify the responsible body for the asbestos and coordinate with government agencies for the removal of the asbestos.
9. Before dealing with asbestos always consult with your council, NT WorkSafe, DHF, FaHCSIA (prescribed communities only) and NRETAS.

Key Performance Area: ***1. HAZARD REDUCTION***

Some examples of asbestos in housing – before being broken up. If you aren't sure if you have asbestos in old houses, treat it as if it is asbestos until you can have someone assess the risk

Asbestos should be buried, signposted and the GPS coordinates recorded

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Key Performance Area: *1. HAZARD REDUCTION*

Focus: *1.09 Tyres*

Tyres are dangerous when burned or if water pools inside them mosquitoes are likely to breed rapidly. However, if separated out from general waste, tyres can be quite useful for reuse within the landfill or in your community.

Best Practice Statement: "Tyres are separated from general waste and stockpiled in signposted areas, not disposed of in the landfill. Tyres are punctured to prevent water pooling, and where possible are reused at the landfill site or in the community for traffic control, landscaping etc. Tyre shredding equipment and recycling initiatives are being investigated."

Unacceptable Scenario: Tyres are mixed in with general waste and disposed of at landfill, occasionally burnt at landfill or in the community.

Manageable Scenario: Tyres are separated from general waste, and not put into landfill or burnt. No reuse program is in place, and tyres tend to pool water and breed mosquitoes.

Better Practice Scenario: Tyres are stockpiled in a dedicated area and punctured to prevent water gathering. Reuse at the landfill and the community deals with some of the tyres, but really need a recycling service to deal with large stockpile.

Steps for Achieving Best Practice.
1. Designate a specific area at the landfill site for the separation of tyres.
2. Train council staff in correct storage procedure for tyres (puncture tyres).
3. Educate community in importance of separating and storing tyres carefully.
4. Conduct a clean up in the community to collect old tyres and remove them to the landfill.
5. Assess and monitor numbers of tyres generated per month, quarter, and year.
6. Investigate opportunities for reuse of tyres at the landfill and in the community
7. Investigate opportunities for recycling by external contractors etc, using estimated numbers of tyres generated in community.

Tyres should not be dumped in the landfill as shown above left. They should be separated out (above right) for potential reuse in the community or on council property (bottom centre)

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2. Environmental Protection

If planning new landfill or trench sites, you should contact your council Director of Infrastructure to make sure that any new construction is approved. A new landfill site requires environmental approval under the *NT Waste Management and Pollution Control (WMPC) Act,* but may also require EA as well, and so it is important that you let the council know if you need to make these big changes.

Poor practices such as contractors dumping large volumes of materials into pits, not separating out furniture and whitegoods and lack of compaction will all reduce the life of your trench or landfill. Through improved management, the lifetime of each trench and your whole landfill can be extended considerably.

Particularly when there is a large amount of construction, renovation or clean up happening in your community, you should be aware of where the materials are being disposed. Your council might have by laws or a policy on the disposal of contractors' waste. Contractors and visitors to the community must dispose of materials appropriately.

Although you don't require a licensed landfill if your community is smaller than 1,000 people, the Department of Natural Resources, Environment, The Arts and Sport (NRETAS) has environmental guidelines on tip management that may be useful for planning your landfill.

This section is focused on reducing the damage to the environment from waste management. This includes things like groundwater contamination, littering, pest and weed control and options for waste minimisation and recycling.

Included in this section:

    2.01 Waste Minimisation, Reuse and Recycling

    2.02 Groundwater and Leachate

    2.03 Litter Control

    2.04 Pest Control

    2.05 Weed Control

Key Performance Area: 2 ENVIRONMENTAL PROTECTION

Before

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Focus: *2.01 Waste Minimisation, Reuse and Recycling*

Reducing the waste you send to your landfill by reuse and recycling. Waste minimisation through reuse and recycling can save money, make your landfill last longer, reduce pollution and save wear and tear on your equipment.

Some simple first steps that can be taken are the separation and storage of large items - such as cars, whitegoods tyres; and making available containers for depositing smaller items - such as glass, aluminium, car batteries, paper, plastics and waste oil. Green (vegetation) waste can also be a major component of the wastes going to landfill. Where this is the case, you should consider recycling vegetation, possibly by mulching or storing it for use as firewood.

It is important to have a further use for materials that are separated for reuse and recycling, because excessive storage of materials may soon become a health hazard unless materials are kept dry and crushed to prevent the breeding of mosquitoes, cockroaches and similar insects.

Some features of a small recover and recycling facility are:
- A defined area for the unloading and loading of items
- An open fronted roofed area
- Colour coded bins, crates or defined bays where selected items can be placed
- A small hand operated crushing device for cans, or a baling machine for paper/cardboard.

Best Practice Statement: **"Materials are reused or recycled as much as possible before disposal to landfill. Recycling programs are designed to target materials such as steel, aluminium, plastics, paper and construction materials. Household items, such as whitegoods and furniture are kept separate at the landfill site for repair and reuse within the community. The sale of these goods provides a small source of income for the maintenance of the reuse storage facility."**

Unacceptable Scenario: All materials go to landfill without any option for reuse or recycling.

Manageable Scenario: Bulky household items and some green wastes are separated from the landfill site for potential reuse. There is no real system in place yet to actually get reused items repaired or suitable for sale etc. Green wastes are collected either for use in gardens or for firewood.

Better Practice Scenario: Bulky items, including household and construction materials and green waste are separated out from the landfill, and separate drop off facilities are used by the community to place their materials in the appropriate place. Some container, paper and metal recycling is also taking place through a deposit scheme. The ability to have these things recycled is still a bit unsure because it is still costly to have these things transported into town.

Steps for Achieving Best Practice
1. Conduct a waste audit or a visual assessment to determine which materials in the landfill could be recovered, and which materials are taking up the most room in the landfill.
2. Work with the local businesses to see if you can limit the amount of packaging wastes
3. Designate separate areas for bulkier items for reuse, green waste, and construction materials.
4. Educate staff on the potential for reuse, and identify some areas or projects in the community that might benefit from this (e.g. using furniture in a community centre, construction materials to create an outdoor meeting place etc.)
5. Discuss with community members what priorities exist for a community based recycling program – such as a local container deposit scheme, drop off facilities, providing recycling bins, creating fuel 'briquettes' from recycled paper, use of green waste for composting and mulch.
6. Investigate options to work with nearby communities and the council to share resources, and nominate a shared drop off facility to accumulate a greater volume of recyclables for collection by a contractor or other. Discuss these options with the council.
7. Large items, like cars, whitegoods and tyres, can be grouped neatly by type to save space and help recovery. Areas for smaller recycled materials like glass, paper, plastic and waste oil should be checked and serviced regularly to ensure that they remain neat and tidy, and that bins and storage tanks do not

overflow.
8. Make arrangements with a scrap dealer for collection of materials for recycling. If several communities band together to have their materials collected at the same time it may be more financially attractive for the scrap dealer and make it easier to set up the collection.
9. Items such as cardboard and paper may have a use within the community for the lighting of fires, mulching of gardens or for tree planting.
10. If vegetation is to be stored prior to recycling, the area used for storage should be large enough to contain the volumes expected to accumulate between processing periods; isolated from the general waste disposal area; and surrounded by firebreaks of at least 5 m.

Recyclable materials being disposed of at landfill, where they are bunt and are now useless

Simple bales used to collect containers for recycling. As each bale is filled up, it can be removed and stored for collection

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Key Performance Area: **2. ENVIRONMENTAL PROTECTION**

The pollution of surface and groundwater by leachate is a big concern for existing and new landfills. If any of the following are near or within your landfill site, you need to take extra care or even consider relocating:

- Water supply catchments or ground water recharge areas
- Wetlands or coastal and estuarine areas subject to tidal inundation or storm surge
- Areas which may be seasonally inundated, or are likely to be flooded in a major rain event
- Water bodies, watercourses or open drains.

Depending on the circumstances, high water table conditions may make your site unsuitable for use as a landfill. Relocating your landfill is incredibly costly, so careful management of what is disposed there and generally minimising the amount of waste can help to reduce the risk of contamination of groundwater by leachate.

To help achieve these goals the landfill site design should specify that the site be:

- Graded to drain water away from the waste disposal area or provided with a system of drains or diversion bunds to achieve the same effect
- Graded or drained to prevent water from ponding
- Provided with a final cover of low permeability soil that is compacted and graded to shed water.

For larger landfill sites groundwater protection, such as a layer of compacted clay or a synthetic liner, may also be required to prevent leachate from contaminating the groundwater.

In general, drains and diversion bunds should be capable of withstanding a 1 in 20 year rainfall event. Further advice on water management system design and on construction and maintenance of bunds, drains and leachate control works is available from NRETAS (contact details at the back of these guidelines).

Best Practice Statement: "Groundwater courses are known and waste run off is contained and well separated from groundwater sources. Landfill has been sited correctly. Not on high ground or on groundwater recharge area. Monitoring processes are in place to ensure any contamination can be detected early. Landfill is designed to the NRETAS specifications to reduce leachate and groundwater contamination."

Unacceptable Scenario: Extent of leachate and relationship to underground water courses is unknown, or landfill is known to be sited on a groundwater recharge area. Run off during wet periods is visibly going into creeks and waterways, and most likely into the groundwater. Trenches often fill with water as they are dug down.

Manageable Scenario: Groundwater courses are known, but the degree to which waste run off is contaminating them is unknown and leachate is probably still getting in there during high rain periods. No monitoring is in place to check run off and contamination.

Better Practice Scenario: Groundwater courses are known. Run off and leachate from the waste site are believed to be contained and managed through bunding and settling ponds; however no monitoring is in place at this time. A hydrologist or other 'expert' has given advice on location of landfill site.

Steps for Achieving Best Practice
1. Assess landfill site for run off and leachate. Try to map out where run off starts and ends up.
2. If trenches constantly fill up with water when dug, reconsider if this method is the best for your situation – could be better to use a cell method above ground
3. Channel water to control run off and direct it away from nearby water courses. This could be by digging channels down, or creating watercourses with clean materials to create an above ground 'bund'
4. Contact the council and investigate the options of engaging an 'expert' on siting of new landfills
5. Investigate long term monitoring around the landfill site (there are devices that can detect leachate before it gets to the groundwater.

If water flow is not taken into consideration, trenches can fill up with water and overflow into nearby watercourses, creating contamination and pollution problems

Even in dry areas, trenches should be placed carefully so that they do not fill up with water or interfere with existing water courses. This trench (above) frequently fills up with water and silt as it has been dug in a creek bed.

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Key Performance Area: **2. ENVIRONMENTAL PROTECTION**

Focus: **2.03 Litter Control**

Litter is a problem because it can attract pests and encourage fly borne disease and it pollutes the environment. Littering in communities is related to a number of factors, and one key thing is having bins that are put in the right place and are emptied often enough. You can conduct a litter survey and should work with your community to develop an education campaign. Keep Australia Beautiful Council (KABC) has a number of resources that might help with managing litter. Contact details are included at the back of this guide.

Litter is also a problem at all landfills; it is ugly and pollutes surrounding areas. Mesh fencing at the site perimeter and moveable fencing at the disposal area can be used to catch and reduce blowing litter. Litter fences should be maintained in good repair and the moveable fences should be checked periodically to ascertain whether they are working effectively, since changes in the orientation of the disposal area or in the direction of prevailing winds may significantly change the situation. This primary control should be followed up by regular patrols of the site, access road and adjacent properties to remove accumulated litter and return it to the disposal area.

Fencing around stores and households can also help to reduce litter and stop it blowing around the community. It also indicates which material the council is responsible for, and what the householders are responsible for.

Best Practice Statement: **"Adequate bins are well placed in public areas as well as at households. Bins are emptied regularly and council staff maintains litter collection in public areas. Waterways and creeks are regularly cleaned up to remove any incidental litter, and as part of frequent community awareness campaigns. Supporting measures are in place to reduce the likelihood of litter."**

Unacceptable Scenario: There are no litter bins in the community; even household bins are inadequate – with no lids on those that exist. There's no fencing at the landfill site nor any dedicated dump sites. Litter blows all around the community and gets stuck in trees and waterways.

Manageable Scenario: Some bins are in public areas but their collection is irregular and the bins have no lid, which means litter blows out all the time. There is a large perimeter fence at the landfill but it is poorly maintained and not high enough to capture litter.

Better Practice Scenario: Public areas have bins that are emptied regularly but they seem to be placed in areas that people don't use them. Perimeter fencing at the landfill seems to be capturing a lot of litter but an internal fence would help to keep it even more contained.

Steps for Achieving Best Practice
1. Conduct a litter survey (contact KABC for more information and resources on litter surveys) to determine how much of a problem litter is in the community, and where it is a problem.
2. Work with the community to hold a community clean up or "emu bob" as an initial way to get rid of lots of litter, and as a regular (maybe monthly) activity to help maintain the area. It is a good idea to make it a bit more fun with a sausage sizzle or sporting event as well.
3. Ensure landfill site has a boundary fence, as well as internal moveable fences to help control litter inside the tip.
4. Work with your community to ensure households have boundary fences, to make it clear who is responsible for what litter, and to further reduce windblown wastes.
5. Look into planting some trees in and around the community and the landfill to work as windbreaks to reduce windblown litter.
6. Investigate the whole waste cycle – look at reducing packaging waste from the community store
7. Work with the community to develop education and communication activities around litter

Without litter control, public amenity is damaged and windblown materials can pollute waterways and the community (above)

A perimeter fence (above) at your landfill site can reduce the amount of windblown litter in your community

Litter bins (left) placed in strategic locations can help to reduce the amount of litter dropped in the community

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Key Performance Area: 2. ENVIRONMENTAL PROTECTION

Focus: *2.04 Pest Control*

Vermin and other pest animals (like rats and cats) often hang around landfill sites and rubbish bins. These pests seriously threaten local native animal populations and can transfer diseases to humans, either directly, or through contamination of food or other animals.

To protect public health and minimise harm to native animals an operational plan for animal control should be developed and implemented. Elements of the plan should include:

- Installation of appropriate fencing to prevent animals from gaining access to the wastes disposed of at the site
- Implementation of other controls (such as baiting and trapping programs and covering wastes with soil) to eradicate pests and to prevent animals from gaining access to, and harbouring in, the landfill.

DHF and NRETAS can provide advice on monitoring and control of vermin and feral animals. Contact details are at the back of this document

Best Practice Statement: "Material is covered with 120 mm designated fill cover daily. Bulky items are separated out to reduce the amount that needs to be covered. Organic waste is also separated out for composting to reduce putrescible waste at the landfill site. Landfill is well fenced to prevent dogs and larger pests from entering. Baiting or trapping is undertaken as needed to periodically eradicate pests. Bins in the community are emptied frequently and have lids."

Unacceptable Scenario: There is no fencing on site and animals enter waste site freely and wander back around community. Putrescible waste remains uncovered for long periods, encouraging flies, rats and dogs to the area. Bins in community are rarely emptied on time, have no lids, and tend to harbour pests.

Manageable Scenario: Site is fenced although not well maintained. Bins in the community are generally emptied quite regularly, however many don't have lids and need repairing. Occasional baiting or trapping is undertaken, but only when situation becomes quite extreme and pests are well established.

Better Practice Scenario: Landfill fence is well maintained but seems to not be excluding pests. Have baiting or trapping in place, but might need to look at management practices because don't have enough fill to cover often enough.

Steps for Achieving Best Practice
1. Ensure bins in the community are well maintained, have lids and are regularly emptied.
2. Assess your landfill for the types of pests that you need to control, if the fencing is appropriate and what other methods might be needed to control
3. Make sure you have adequate fill at the landfill to cover putrescible waste and options for if you have an unusual event (such as an animal cull, see Section 1.06 – Animal Carcasses for more information) that could attract a lot of pests.
4. Work with community to ensure people are aware of the importance of pest control and how they can help reduce it by wrapping putrescible wastes and nappies prior to disposal.
5. [Clarify about the most appropriate type of fill]

Feral animals are often attracted to materials disposed of at the landfill. Good management can help prevent feral animals from visiting your landfill and fences should be made durable enough to keep them out.

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Key Performance Area: **2. ENVIRONMENTAL PROTECTION**

Focus: *2.05 Weed Control*

Declared weeds disposed of at a landfill (e.g. mission grass) can readily spread from the site and cause problems with native plant populations and/or be poisonous to animals. Declared weeds should not be disposed of at a landfill unless the facility has been declared a designated weed disposal area under the *Weeds Management Act* but also note that the *Weeds Management Act* prohibits transportation of declared weeds over public roads, or from one property to another, without a permit.

Where weeds are found growing at the landfill they should be treated and destroyed in accordance with the requirements of the NRETAS Weeds Branch (contact details at the back of these guidelines). Staff maintaining the landfill should able to identify the various types of declared weeds which may exist in the region so that they can monitor for their presence at the facility and undertake appropriate treatment and destruction action.

Best Practice Statement*:* "Weeds are identified in the community and at the landfill site. There is a special composting disposal area for weeds, where they are composted at high temperatures and turned into a useful resource to be used around the community. There is a weed management plan for the community"

Unacceptable Scenario: Council staff does not know how to identify weeds and therefore uncontrolled vegetation growth occurs at the landfill site. All green waste including potential weeds are disposed of with general waste.

Manageable Scenario: Staff can identify declared weeds and have a basic weed management plan in terms of a schedule of activities. Composting is done where possible but generally weeds are chemically sprayed or burnt.

Better Practice Scenario: Vegetation at the landfill site is monitored for weed activity but there insufficient resources for weed control. Weeds are mostly removed within sufficient time (before seeding etc.) and are generally composted rather than burning. Weeds management plan although simple is well followed and updated, although could be made a bit more detailed.

Steps for Achieving Best Practice
1. Contact council or NT Weeds branch to see what weeds are problematic in your area and if there are any existing programs for weed control.
2. Assess your community and landfill to identify any weed infestations.
3. Designate a separate weed disposal area and set it up for composting.
4. Educate staff and community on identification and disposal of weeds.

Weeds can quickly get out of control if they are not disposed of carefully at your landfill

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3. *Service Delivery*

Waste management is core business of local government, and this is supported in the *Local Government Act 2008.* Aside from the responsibilities under the act, waste management is also an essential community service and an area that you can really work closely with your community to develop some positive outcomes.

Waste management services extend to your role to provide training to council staff, a safe working environment and general good public amenity.

Engaging your community is important for successful waste management programs, and to help you deliver the best service. Local stores, businesses and licensed premises are important contributors to any litter control plan and can play a responsible role in community litter awareness and education.

Involving the community in the program, and generating community awareness around waste management will result in increased community pride, improved quality of life and living areas, promote community safety and reduce the risk of injuries to staff and community, reduction in vermin and pests, it could even create opportunities for business enterprises, such as reuse, arts, crafts and markets.

You can use these benefits when planning their awareness campaigns. When a community has a litter problem there are usually four basic issues that could be contributing to the cause:

- Infrastructure – number of bins in the right location, signage and educational material
- Service frequency
- Awareness of the impact and consequences of littering
- Education about the correct disposal of rubbish.

There are contact details in the back of these guidelines for Keep Australia Beautiful Council (NT) who can provide more information and support on community awareness and education campaigns.

Included in this section:

3.01 Education and Community Awareness

3.02 Occupational Health and Safety

3.03 Staff Training

3.04 Bins

3.05 Collection Vehicles

3.06 Collection of Waste

3.07 Frequency

Key Performance Area: 3. SERVICE DELIVERY

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Focus: **3.01 Education and Community Awareness**

An important part of waste management is community awareness and education. You should conduct community liaison throughout the life of any waste management programs to ensure local communities are informed and aware of the program. Community liaison should be conducted in an open and timely fashion, and allow local knowledge to be obtained.

It is important that the community is able to readily contact an informed representative of the council regarding waste management and that queries are dealt with in a timely fashion. It is also important to gather local knowledge when determining the location of a new waste disposal site or any significant change to waste management services. A record of community comments regarding waste management programs should be maintained.

Community awareness campaigns can be targeted to sections of the community, such as school children or businesses, or they can involve the whole community. Awareness of waste problems can be generated by an event, or built up over time through news items and announcements in local and regional media.

Best Practice Statement: **"Education campaigns have been specifically designed for the community, and address the specific needs of our community in waste management."**

Unacceptable Scenario: There is little or no signage and the community is not kept informed about waste management programs and priorities. Education campaigns in the past have been developed without community input.

Manageable Scenario: Educational materials have been developed with limited input from the community

Better Practice Scenario: Community has been involved in some of the development of materials, however it could be done better.

Steps for Achieving Best Practice
Each community will be different when it comes to education and awareness, however when planning a community awareness campaign, consider how you can best achieve the following:

- Ensure everyone is aware of a problem and the solution you have in mind.
- Encourage community members to suggest ideas for running the project.
- Provide opportunities for people to get directly involved in solving the problem:
  o choose times and days that will suit most people
  o Break the project into tasks that can be done by various members of the community, such as school children, people with cars, older people, etc.
  o perhaps arrange a child care centre for small children to free up their parents
- Provide the means to solve the problem (collection bins and bags, a vehicle to pick up waste, gloves, shovels, etc.)
- Acknowledge the efforts and achievements of your community (individuals, groups, or the community generally)
- Publicise the results so that people are aware of changes, improvements, and benefits (make announcements at gatherings, on local radio, or in local newspaper stories).

Simple signage at your landfill will inform people of what restrictions there are on activities and penalties that may apply. Depending on your audience, you might need your signs to be in English or language, and pictures are helpful too.

A recycling station like this one above has a dual function, both as a place to dispose of recyclable materials and as education – it tells people what recycling is.

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Key Performance Area: **3. SERVICE DELIVERY**

Focus: **3.02 Occupational Health and Safety**

You must provide a working environment that is safe for staff. You must also ensure that the health and safety of any other person is not adversely affected by the work. Some of the things you must do in complying with this requirement are:
- Providing and maintaining plant and equipment so that it is safe
- Developing, implementing and maintaining safe systems of work
- Ensuring the safe use, handling, storage and transporting of dangerous goods and hazardous substances
- Maintaining workplaces under your control and management in a condition that is safe and without risk to health
- Providing information, instruction, training and supervision to workers
- Ensuring visitors to your community are aware of the safety requirements.

An important aspect of safety when dealing with waste is correct Personal Protective Equipment (PPE). Appropriate PPE for all staff working with waste includes solid boots, thick gloves, long pants and long sleeved shirt, high visibility vests or markings if possible and eye protection such as goggles. Sun safety gear is also recommended as many staff will be working out in the sun for extended periods.

Another aspect of any operational position, such as working with waste, is developing Safe Working Method Statements (SWMS). These are simple statements that explain each step in a task or work method, and how to do it safely.

Further information about workplace safety from is available from the NT WorkSafe website:
http://www.worksafe.nt.gov.au/

Best Practice Statement: "All council staff is routinely and regularly trained in safe work methods. PPE is available for all council staff. At any time there is at least one council staff member who has first aid training on duty. Safe Work Method Statements exist for all processes. In the event of an OHS incident, there is an incident reporting strategy to ensure any OHS incidents are investigated and followed up. Council staff has been vaccinated as necessary for handling waste."

Unacceptable Scenario: Council staff has never been trained in their work tasks; they just turn up and follow basic instructions. No safety gear is provided; council staff is expected to wear adequate clothing. Contractors and anyone can access the tip site, without any control or guidance as to the safety requirements.

Manageable Scenario: Council staff is generally using safe working methods but they don't have adequate equipment. There is some makeshift signage talking about safety, but it isn't comprehensive. Safety breaches or incidents don't usually get reported.

Better Practice Scenario: Council staff has been trained early on, although this hasn't been well recorded or updated. There is no strategic plan targeted skill sets or safety requirement. There is some incident reporting, but outcomes are not really followed up.

Steps for Achieving Best Practice
1. Develop Safe Work Method Statements (SWMS) for each work task that council staff is involved in.
2. Train in safe use of equipment and use of SWMS.
3. Supply and maintain PPE for all council staff
4. Ensure at least one permanent council staff member, preferably the supervisor, has a current first aid certificate.
5. Develop an incident reporting processes to monitor any safety breaches.

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Key Performance Area: *3. SERVICE DELIVERY*

Council staff involved in waste management need to be trained in the safe working methods and operational requirements of the job, including operating any equipment. Depending on the size of your community, you may decide to have council staff presents at the landfill site during operational hours. Council staff can perform tasks such as sorting materials as they are delivered or assisting residents and other users in putting materials in the right place. Council staff should also have training in personal occupational health and safety and suitable personal protective equipment should be provided. This should include steel cap safety boots, leather work gloves, and coverall clothing. It is recommended that council staff also be trained in fire suppression if burning of waste is to take place. Training in weed identification and control would also be useful for effectively managing the site. Other levels of training relevant to waste management operations include that listed in the table below.

There are Registered Training Organisations (RTOs) that provide specialised training for waste management workers in the Northern Territory. This includes the Batchelor Institute of Indigenous Tertiary Education (BIITE) who offer different level Certificates in Indigenous Environmental Health and Charles Darwin University (CDU) who have a school for Remote Indigenous Knowledge. Contact details are at the back of these guidelines

Best Practice Statement: **"All council staff has been trained in the necessary aspects of waste management. A council staff training register is used to plan out future training and make sure that there are no gaps in skills or qualifications. Training is scheduled for review annually or as necessary."**

Unacceptable Scenario: Council staff has not received any waste management or OHS training, or there are no records to support past training efforts.

Manageable Scenario: Council staff has received some *ad hoc* OHS training but not a lot of specific waste management training, and there are some out of date records of this. No training plan is in place to plan and track progression.

Better Practice Scenario: Council staff has received OHS and some specific waste management training, there are records of who and when this occurred. There is no training plan yet, but one is being developed.

Steps for Achieving Best Practice
1. Start a training register – this doesn't have to be a complex document, just a list of names, dates of training and type of training.
2. Conduct initial OHS training for all Council Staff – if you aren't sure how to do this, contact your council.

Key Performance Area: 3. SERVICE DELIVERY

Areas For Waste Management Council Staff Training

Topic	Subjects
Waste acceptance	Identification of wastes and hazards
	Accepted wastes
	Covering waste loads
	Recording waste data
Emergency and safety	OHS requirements and safety plan
	Emergency response plan
	Manual handling of waste
	First Aid
	Personal Protective Equipment
	Risk identification and management processes
Operating Systems	Policy/management systems/procedures
	Use of site plant and equipment
	Storage and covering of wastes
	Site maintenance requirements
Customer Service	Customer inquiries and complaints procedures
	How to educate the public about waste management issues
Environment	Environmental management systems and strategies
	Potential environmental impacts from operations and appropriate controls

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Key Performance Area: 3. SERVICE DELIVERY

Focus: 3.04 Bins

In small communities and outstations, modified 44 gallon drums are often used as garbage bins. These bins are increasingly not considered to be ideal for disposing of waste, for several reasons. These include the safety risk to workers lifting and emptying bins, the lack of lid, and the increased likelihood for community members to burn waste at the household level.

Mobile Garbage Bins (MGB) or "Wheelie Bins" are widely accepted as being the best storage container for household waste for the following reasons:
- its long service life (>10 years)
- storage capacity (up to 240L)
- close fitting lid (fly proof)
- stability
- portability (wheeled to where it is required)
- Price (bins are affordable).

Lockable posts can also be obtained for MGBs that secure the bin upright. The Australian Standards for bin design indicate that household waste bins should have a red lid, while recycling bins should have a yellow lid. If provided, garden vegetation (green waste) bins should have a green lid.

⭐ *Best Practice Statement:* **"Wheelie bins are used by households and in public places. Households store their own bin on their property, and bring it out for collection on the nominated day. Bins are regularly emptied, and there are spare bins kept at the depot for replacements and public events."**

🛑 *Unacceptable Scenario*: Houses have drums and regularly burn their waste. Council workers have to empty out the remaining rubbish and ash. No lids on the bins means lots of flies and odour around bin areas, litter often blows out of bins.

⚠️ *Manageable Scenario*: There are some wheelie bins in the community, but still many drums being used. Bins are poorly maintained, with no spares. Bins are also not very compatible with trucks or collection vehicles, meaning that collection staff is emptying them unsafely.

✅ *Better Practice Scenario*: All houses have wheelie bins, although there still seems to be some drums being used occasionally. The wheelie bins are pretty well suited for the collection vehicle, but they are often damaged. Some education and community awareness could be needed for improving community use of bins.

Steps for Achieving Best Practice
1. Investigate options for acquiring wheelie bins for your community.
2. Talk to the community about the benefits of wheelie bins instead of drums; try to get some wheelie bins to demonstrate the difference.
3. Find out whether your collection vehicle will work with wheelie bins, and what is necessary to adapt it to the wheelie bins.
4. Once you have wheelie bins for your community, work on community awareness as you roll them out.
5. You may need to install lockable posts to stop your bins being knocked over.

Often old metal drums are used as bins, and the waste is burned. This is now generally considered to be an inadequate bin and should be phased out, along with the burning of waste

Mobile Garbage Bins (MGBs) or "Wheelie" bins are widely used across Australia, and the world. They are durable, environmentally sound, safe and easy to use. These bins should be brought into communities where infrastructure exists to empty them.

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Focus:	*3.05 Collection Vehicles*

The type of collection vehicle which your community needs depends is dependant on things like garbage bin type and status of local roads. A four-wheel-drive vehicle may be required to negotiate difficult roads during the wet season. A rear lifter garbage truck allows collection of bulky items such as mattresses, whereas a side arm lifter does not.

Best Practice Statement: **"Collection vehicles are appropriate to the task, are well maintained and meet OHS requirements. Vehicle is a trailer that can be connected to other vehicles and has a hydraulic lift and tipper. It is simple to use and easy to maintain, and is easily and effectively charged (for hydraulic lifter). There is a secure storage place onsite and an alternate, back up vehicle available in case of breakdowns."**

Unacceptable Scenario: There isn't really a proper collection vehicle, just use an open trailer, where rubbish is dumped in from bins. Staff has to manually lift bins into it. There are no ramps to make it easier to wheel up. Staff is not adequately licensed or trained in using larger vehicles.

Manageable Scenario: The collection vehicle is difficult to use but has a ramp or a basic lifter. Collection vehicle is not very versatile or might be too big for community needs. Collection vehicle needs a HR or other additional licence, which few if any people in the community have. Breakdowns are common and there is no back up collection vehicle.

Better Practice Scenario: Collection vehicle is fine but no there is back up available. There is no secure vehicle storage and maintenance is not as frequent as it could be.

Steps for Achieving Best Practice
1. Find out how many of each bin type are in the community (drums and wheelie bins).
2. Examine existing collection vehicles to determine if they are appropriate to the bins that you have, and what modifications might be necessary to increase compatibility. Don't necessarily upgrade your drum collection vehicle for a wheelie bin collection vehicle if there are still lots of drums in the community.
3. Contact the council to see if there are other vehicles you can use
4. Assess other community vehicles, such as trailers to determine if they can be used or modified for a back up vehicle.
5. Train council staff in how to use your various collection vehicles SAFELY so they don't injure themselves or damage the vehicles.
6. Make sure council staff has the correct licences to drive the collection vehicles. If some collection vehicles require a special licence, make sure there's more than one person in the community with that type of licence.
7. Review maintenance schedule for collection vehicles to ensure regular maintenance.

Collection vehicles in your community should be "fit for purpose". It is important that they are compatible with the bins you have in your community and are easily maintained. The trailer (top left) is good if you still have old drums in your community, and can be attached to a variety of vehicles, but if you are thinking to upgrade to wheelie bins, you might need a rear loader (top right) that can take both drums and wheelie bins.

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Focus: *3.06 Collection of Waste*

There are a number of factors that contribute to your waste collection service and your community needs, including:

- Population – and how much it changes with seasons
- The average number of residents per house
- What are the consumption characteristics, and what things are sold in your community store
- Climate (for green waste generation)
- Bin size and type
- Waste reduction activities such as recycling
- Non resident waste generation (e.g. tourists, tour operators, local industries).

You should consider having separate and regular collections for rubbish, recycling, and green waste and bulky items.

Best Practice Statement*:* "Waste is collected from households on a weekly basis, using 'wheelie' bins and loaded into the truck on a mechanised system, e.g. a 'rear loading' truck. Waste is sorted at household / source for specific collections which are well advertised and coordinated. There is clear signage and education to support the different types of collections and drop off points."

Unacceptable Scenario: Waste is rarely collected from households and so many people burn waste or take it to the landfill themselves, where it is poorly disposed.

Manageable Scenario: Household collections happen, although pretty sporadic. There is only one type of collection (for household waste) although occasionally special collections are done on request (for bulky items etc.). Collection vehicle is often in poor working condition.

Better Practice Scenario: Household collections are regular and reliable, although there is only a collection for waste, not for special materials. Special collections are arranged periodically to collect bulky items, green waste, dangerous goods. Collection vehicle is in relatively good condition, and there is a back up option for break down days.

Steps for Achieving Best Practice
1. Talk with community members about what kind of waste collection they prefer.
2. Assess waste for volume and component to determine how often and what kinds of materials can be collected.
3. Ensure community has a reliable collection vehicle (with possible back up option).
4. Provide community with appropriate bins (appropriate in size, number and type).
5. Make collection schedules well known in the community, as well as what to do if there's been a problem with the service.
6. Monitor numbers of collections and schedule maintenance of vehicles.
7. Be mindful of special events in the community that might require additional collections.

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Key Performance Area: **3. SERVICE DELIVERY**

Collection frequency is determined by the number of residents and the amount of waste generated. In some remote communities more frequent pick ups better than having larger bins. But, if the collection service is too frequent residents may leave bins out on the roadside permanently which can attract animals, encourage vandalism and littering. Over-servicing of bins adds unnecessary expense to the community in terms of fuel, vehicle, wear and tear costs, and labour costs. Under-servicing can result in overflowing bins with rubbish spilled on the ground. Collection services should be explained to residents and users and include details on:

- Garbage collection days
- Recycling collection days and what is accepted
- Bin placement for ease of service.

Many councils also offer an annual large item collection service. In the Top End of the Northern Territory, this is an important service as it allows people to dispose of large items before the cyclone season when such objects can potentially become dangerous debris during storms. It is still a useful service in non cyclone areas as it encourages people to do a cleanup of bulky items.

Best Practice Statement: "Waste is collected from households once per week (or as determined to be appropriate), on the nominated day. When collected, bins are generally close to full, but not overflowing. Occasional clean up or once off collections are arranged to target specific types of waste such as green waste, or chemical waste."

Unacceptable Scenario: Collection of waste is completely unmonitored and random, usually only happening once bins are overflowing and messy. Community has no idea when to put bins out for collection, so they are left out all the time, get knocked over by wind and animals and cause a mess.

Manageable Scenario: Collection definitely occurs in community, but is not regular. Some bins are really full, and others are really empty when they are emptied.

Better Practice Scenario: Collection is regular, a few times per week. Bins are generally quite empty when they are picked up. Might need to reduce the number of collections or look at smaller bins

Steps for Achieving Best Practice
1. Conduct a waste audit or assessment of your community; monitor how full the bins are over a period of time. This will give you an idea of how much waste you are generating in the community.
2. If bins are always empty upon collection then maybe you need to decrease the frequency of your collection. If they are always very full, you might want to consider having more frequent collections.
3. Decide on which day/s you will be collecting household waste, and publicise this in the community. Make sure people know when to expect the collection, and how often.
4. If you decide to have collections for other things (e.g. bulky items or chemical clean outs) make sure that they are often enough that people don't dispose of them in the normal waste, or dump them at the landfill themselves.

Key Performance Area: 3. SERVICE DELIVERY

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4. *Ongoing Site Management*

Landfill siting requires detailed investigation and you should not start a new site in your community without consulting with the council and the relevant agencies, for example NRETAS and DHF. When deciding where to locate a new site, you will need to consider the following: site capacity; hydrology; local topography and soils; adjacent land uses; aboriginal and heritage issues; climate; local flora and fauna; and road access. NRETAS has developed guidelines on the siting and management of landfill facilities; they can be accessed at www.nt.gov.au/nreta/environment/waste/guidelines/pdf/landfillguidelines.pdf .

You need to consider the local climatic conditions when siting a waste disposal facility. For example: during heavy rainfall events which occur in the Territory, even sites with minimal slopes can have severe erosion (through sheetflow runoff). Additional care should be taken with drainage works and sites that are not protected from prevailing winds that will require extra provisions in order to control litter and dust.

Landfill boundaries need to be clearly identified to ensure that the landfill does not extend beyond its 'footprint' or onto any adjoining allotments.

As much as possible, you should try to have a landfill site that you can use for decades into the future. Aside from good siting of your landfill, you can extend the life of your current site with good management. Extending the life of your landfill will also save you money and help to protect your local environment. Ideally the landfill should be big enough to have enough trenches or area to hold waste for at least ten years. Usually for design purposes in smaller communities, it is assumed that each person produces about 800 to 1000 kg of waste a year. The amount of waste that is generated in your community might vary significantly from this depending on the following:

- Availability of transport to and from the community – which determines how many people visit your community and how you can move things around
- Closeness to source of supplies – will affect what kinds of materials you have in your community, and what packaging is used to transport things
- Social structure of community
- Standard of housing which include the age of housing, likely quantity of demolition and new housing waste materials.

Simple things like separating car bodies, construction waste and bulky household items like fridges and furniture will extend the life of the landfill; using vegetation on your covered waste site will help prevent wind blown debris and reduce the need for additional fencing.

Other aspects of site management include improving the occupational health and safety of staff and the community, making sure you have the right equipment to manage the work required and restricting access to the site.

Included in this section:

4.01 Plant and Equipment

4.02 Security and fencing

4.03 Access to Tip Face

4.04 Signage

4.05 Separation of Materials

4.06 Emergency Management Plan
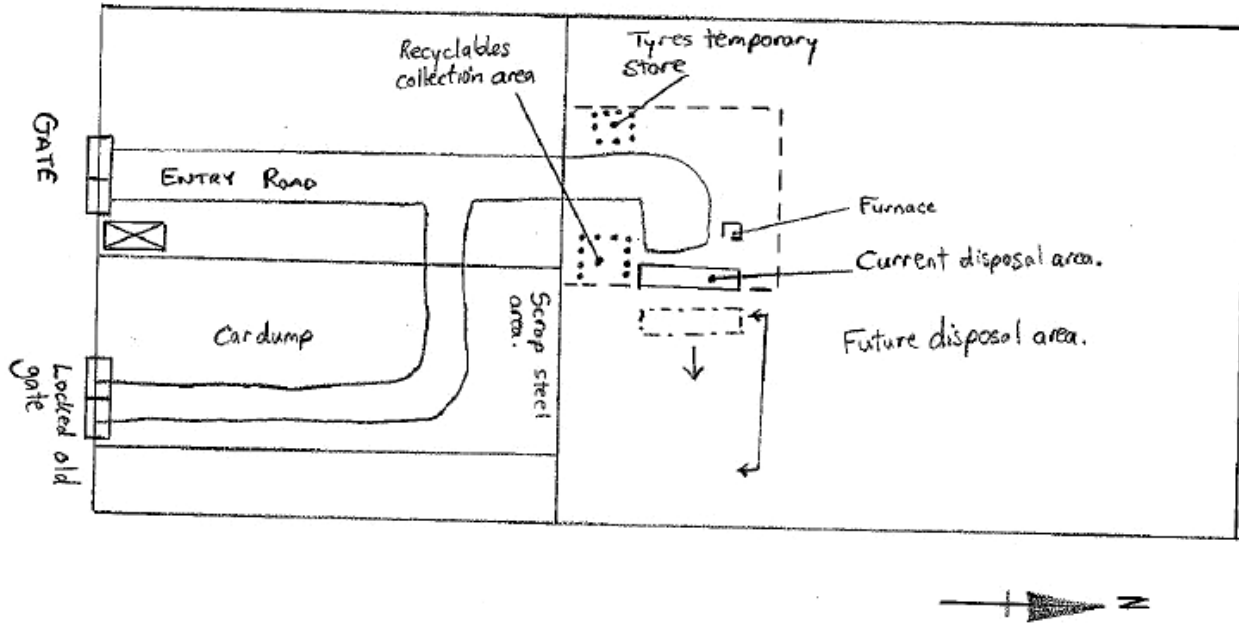
The design of your landfill site doesn't have to be too technical (see above), but it is important to have a plan or map of the area so that you can develop a good operational plan, monitor run off and plan for future development.

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Focus: **4.01   Plant and Equipment**

Suitable equipment for compacting and covering wastes should at least be available to carry out operations for the site. Outstation communities with limited access to equipment should be assessed on a case by case basis to determine practicalities of removal of waste on a periodic basis.

Any equipment should be chosen for its ability to:
- Be fit-for-purpose, with the most appropriate functions for the needs of the community
- Give trouble-free service and be easily maintained onsite
- Run economically
- Be easily stored securely – you might consider smaller sized equipment that can be locked away in a work shed or shipping container
- Necessary licensing for operation – be careful of equipment which requires additional licensing as you might not have people in the community with necessary licences.

You may find that a variety of equipment can give adequate service but in general the larger the population served by the landfill, the more robust the equipment will have to be to enable the landfill to be operated efficiently and effectively.

Depending on supply of cover material you might need haul trucks, dozers, and loaders. At larger sites these may be permanent fixtures but at most sites they will have to be supplied on a periodic basis, by the councils or outside contractors.

Equipment for combating small fires, e.g. fire extinguishers, water tanks, pumps and hoses - should be available at larger sites, and in those areas of high fire risk. Sites with periodic or minimal supervision onsite might only need a water tank or a fire extinguisher. In such cases, the local fire authority may be able to provide equipment and fire fighting services.

It is useful to have vehicle washing areas to help prevent waste materials and soil being transported off site. Wash down facilities should be constructed so that they have:
- An impervious hardstand
- A suitable water supply
- An appropriate wastewater collection and disposal system.

Best Practice Statement: **"Equipment onsite is well maintained and appropriate to the tasks and environment of the community. Equipment that is not used frequently is kept at a centralised depot and shared amongst communities within the council. At a minimum, have access to a back hoe and front end loader. Equipment is stored securely onsite and maintenance logs are updated."**

Unacceptable Scenario: There is no appropriate equipment in the community to undertake even simple tasks, like waste collection. Equipment was present but is in complete disrepair.

Manageable Scenario: Some basic plant and equipment exists onsite, but no maintenance records. Nearby communities are also assessing their equipment and options will exist for shared equipment in the future. Some storage in community, but it is not well secured. Some equipment is inappropriate to the community, in terms of tasks, size, function etc.

Better Practice Scenario: Plant and equipment are sufficient for community needs, and additional equipment is available as necessary from the council. Equipment is generally well maintained, but long distances and costs sometimes result in things being unusable for considerable periods of time. Storage is secure.

Steps for Achieving Best Practice
1. Work with your council asset manager to assess all existing plant and equipment for condition reports.
2. Update, or commence, maintenance registry, including condition reports.
3. Ensure equipment storage area is secure and sufficient for existing equipment.

The type of plant and equipment to have in your community for ongoing site management will depend on your needs. A small front loader (above left) can be useful to push waste up, dig small trenches and generally maintain your landfill site. If you have recycling programs, a simple mobile compaction unit (above right) could be shared between communities.

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Key Performance Area: **4 ONGOING SITE MANAGEMENT**

Fencing at your site can help with the following:
- Control access to, and movement within, the site
- Reduce the dumping area to a minimal practical size
- Provide litter control
- Protect areas which are undergoing decommissioning and rehabilitation.

As well as external fencing to the landfill site, fencing within the site is necessary to help control a number of issues, e.g. 1.02 m high, three strand wire fencing may be adequate to protect areas being rehabilitated, while two or more panels consisting of 2 m high chicken wire mesh on a large steel frame would be appropriate for litter control. Moveable fences around the active landfill trench can be moved with the filling of the trench.

Recommended fencing for landfill perimeters (from NRETAS Guidelines) is between 1200 mm wire for small sites up to 1800 mm wire mesh security fencing for large, licensed landfill sites.

It is also important to remember the purpose of the fencing, i.e. to keep some things in and other things out. If you have feral animals in your area, they may damage your fence. If you have prevailing winds, you will need fencing to reduce windblown litter from the landfill site. Planting vegetation around the landfill helps improve the visual amenity of the site and provides wind barriers to help control dust and minimise blowing litter.

★ *Best Practice Statement:* "Site is open only during standard business hours, and is locked outside of these hours. Signage is present that indicates this. Around the site there is a permanent 1800 mm high feral-proof fence. Within the site there are a variety of smaller, movable fences to control litter, restrict access to dangerous areas and to guide users to the correct disposal sites."

🛑 *Unacceptable Scenario*: There is no fencing at all onsite. Litter blows around and into community; feral animals wander through site and scavenge at the tip face. There is no restriction of access or security onsite.

⚠ *Manageable Scenario*: External fencing is present, but not high or strong enough. There is no internal fencing, so there is still plenty of litter around.

✔ *Better Practice Scenario*: External fencing is adequate height but may be damaged by feral animals. Some experimentation is being done to reduce feral animal impacts such as attaching tin cans to the fence or using solar powered electric fencing.

Steps for Achieving Best Practice
1. Work with community to determine external boundary of landfill site (refer to NRETAS Guidelines for more information).
2. Determine fencing needs for your site, as in height, material and distance.
3. Assess materials at landfill site to see if anything can be used for movable internal fencing.
4. Regularly inspect fencing for damage and repair as early as possible.

An appropriate perimeter fence (above left) will keep feral animals out of your landfill site and help to prevent inappropriate dumping of materials. It also acts as a wind break to reduce the amount of litter (above right) that blows around your landfill. You should also consider internal and movable fences within your site to further control litter and dumping of materials

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Key Performance Area: 4 ONGOING SITE MANAGEMENT

The active 'tip face' is the part of your landfill or dumpsite that is open and actively being dumped at. If your tip face is very large, it is difficult to control litter, materials start to break down in the open air, vermin and feral animals have access to the waste and generally it becomes a bigger task to manage. By restricting the 'active' tip face, you reduce the amount of open and exposed waste that is at your site, and reduce a lot of the issues associated with that.

Using earth bunding around the tip face of unmanned sites is also important for the safe operation of vehicles, to prevent accidental reversing into trench or similar.

Best Practice Statement: **"Public access to tip face is restricted to a strip of only 2 m along the trench, which is clearly indicated by appropriate signage. Access is restricted using some earth bunding, preventing vehicles from backing up to the site, and fencing. Council staff regularly inspect the site to ensure materials are not dumped outside the tip face, and that inappropriate items don't remain in the tip face."**

Unacceptable Scenario: Tip face is completely open to anyone to dump anywhere. Trench is full to different levels, rarely covered over, often burnt, and all sorts of materials are dumped in there. No machinery can get into the tip face to compact or push it up.

Manageable Scenario: Tip face is open to anyone, although some ad hoc bunding restricts where materials are dumped. Trench is wide enough for machinery to get in there, but it is rarely compacted, pushed up or covered. Staff occasionally visit site and push up waste, although they often don't have adequate equipment to do this.

Better Practice Scenario: Tip face is restricted using some quite good bunding. Material is pushed up regularly, when equipment is available, but not really compacted. Inappropriate materials are often disposed of at the face, and staff try to remove them when possible.

Steps for Achieving Best Practice
1. Decide what part of the tip is best for access, a section of only about 2 m to 5 m.
2. Restrict open tip face area using internal fencing or bunding.
3. Using what machinery or equipment is available, compact or push wastes up to one end.
4. Cover waste regularly, and consider use of vegetation to assist in covering and dust suppression.
5. Ensure council staff monitor site to remove inappropriate items from tip.
6. As access area become full, open more of the tip face up along the trench site, being sure to restrict access to full area.

Key Performance Area: 4. ONGOING SITE MANAGEMENT

Signage is often not enough to encourage people to dump materials in the correct place (above left). If access to the tip face is not restricted (above right), materials are dumped everywhere and difficult to manage.

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Key Performance Area: **4 ONGOING SITE MANAGEMENT**

Focus: *4.04 Signage*

One of the most simple things you can do to improve management of your landfill site is put signs up so that people know what goes where. Without signs, you can't expect people to put their materials in the right place. Signs don't have to be expensive, detailed or technical. Using pictures instead of words will help address issues of different languages. Simple arrows and directions signs can also help to guide people where to drive at the site.

Best Practice Statement: **"Signs are locally and culturally appropriate, using graphics and local language to support the message. Where relevant they refer to appropriate legislation and possible penalties. Signs are durable, made of steel with weatherproof paint to Australian Standards. Different signs are used for different audiences and purposes. Signs refer to disposal processes, safety processes, opening hours, access to site, contact details."**

Unacceptable Scenario: There is no signage anywhere on the site.

Manageable Scenario: Signs are present but are unclear or irrelevant. They are poorly made and not very durable. Written only in English and display no graphics.

Better Practice Scenario: Signage is present and generally well maintained, although doesn't indicate penalties or legislation for incorrect disposal. There is not enough detail in some of the signs (like safety practices, and emergency contact details).

Steps for Achieving Best Practice
1. Decide on the information that needs to be sign posted (good idea to do a 'walk through' of the site and think which things need to be pointed out).
2. Work with community and staff to ensure message is clear and culturally appropriate.
3. Gather materials from within the community (possibly from the landfill site) that could be re-used for signage.
4. Consider working with community centre or school to design signs. Maybe have a drawing or art competition?
5. Signs containing information for users of the landfill should be posted at the entrance and at appropriate points within the facility.
6. As a guide, the following information should be included in your signs:
   - Name of the facility (possibly the community name, or street name)
   - Owner and operator of the facility (i.e. council council, or community name), including contact details for reporting emergency situations, making inquiries, registering complaints etc.
   - Hours of operation of the site
   - Any arrangements or facilities for separation of materials, recycling and reuse of material
   - Wastes which should not be dumped at the landfill (and who to contact for advice on acceptable methods for disposal of such wastes)
   - Areas that are not open to the public, e.g. areas under rehabilitation or construction, or hazardous disposal points
   - Controls over scavenging, lighting or fires, littering and illegal dumping
   - Prohibited materials – see Section 1.04 for more information on prohibited wastes
   - Prohibited activities (e.g. litter on approach roads, burning waste or unauthorised disposal of waste) and the penalties for offences.

Signage doesn't have to be highly technical or professional. It is better to have some kind of signage to give people direction for dumping materials, than to wait until you have enough money for more professional signs. You can even re-use scrap materials gathered from the landfill site as signs. It can help to educate people – for example, using a car door for a sign that points to car bodies, using a fridge door to point to whitegoods disposal.

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Although recycling options are limited in small communities, the separation of materials at the landfill site will have major benefits to your waste management. Aside from the importance of separating dangerous goods (see Key Performance Area 1 - Hazard Reduction), other benefits include, but aren't limited to:

- Minimise reliance on plant and equipment because less damage when pushing up, and less need for compaction and pushing up
- Increase the longevity of your tip by not having bulky items disposed there
- Provide materials for reuse for community, such as wood for firewood, building materials, and furniture.

Some good examples of reusing of materials include tyres used for bunding and fencing at the landfill or in the community, washing machine bowls and other bulky items can be used as small garden beds or plant holders, building materials reused to create shade spaces or dog kennels in the community. The list is endless!

Best Practice Statement: "Only final residual waste is disposed of at the landfill. All bulky materials, paper, cardboard, containers and green waste are separated out. The site is well planned, easily accessed and clearly signposted. Materials separated include septage, hazardous wastes, construction materials, large bulky items, cars, whitegoods, carcasses, trees, recyclable materials."

Unacceptable Scenario: No separation at all, with everything going into the one trench.

Manageable Scenario: Some separation of bulky items such as cars and whitegoods, and some dangerous goods such as batteries and used oil, but there is no signage at the site. Separation of these materials is not enforced or managed by any staff.

Better Practice Scenario: Nearly all bulky and dangerous goods are separated out from the landfill, and some reuse projects are in place. Signage is present. Staff monitor the site, because a number of incorrect items still end up in the trench.

Steps for Achieving Best Practice
1. Set up drop off bays within the boundary of your landfill, away from the active tip face or trench.
2. Create "yes" signs for the various items to be separated, as well as "no" signs to stop items going in the wrong place.
3. Investigate ways these items could be reused in the community, and investigate collections for items that can't be reused (e.g. lead acid batteries).
4. Work with community to target specific items (such as batteries) around the community.
5. Arrange for separate household collection of bulky items, green waste and dangerous goods.

Key Performance Area: **4. ONGOING SITE MANAGEMENT**

If you don't separate any materials, you will quickly run out of space in your trench (above left). Designate areas with signs, bunding and markers to show people what materials get separated and where to (above right).

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Focus:	*4.06 Emergency Management Plan*

Because of the nature of materials being disposed at landfill sites, you could have urgent or emergency situations that require a fast response. This could be things like uncontrolled fires onsite, flooding, chemical spills, damaged asbestos, contaminated food items or even a sudden influx of medical wastes.

The aim of an emergency management plan is to clarify management strategies and structures that are needed to coordinate events of that may be a declared or non declared emergency within the community. These events may be beyond the capacity of your community to effectively manage or control, however it is important that you have a clearly defined strategy to ensure the event is managed by the appropriate and capable authorities when necessary.

Developing a simple emergency management plan, and making sure all staff is aware of what to do in these situations can really reduce the risk of a bad situation getting much worse.

Best Practice Statement: "An Emergency Management Plan is in place and is reviewed regularly. Topics include floods, hazardous wastes, fire, high wind events, workplace injury, and storm conditions. Identify risky seasons and schedule preparedness measures. Identify equipment and processes to manage. The planning and location of facility should be to mitigate risks.

Unacceptable Scenario: Site has not ever been assessed for emergency procedures. No plan or preparation in place

Manageable Scenario: Some plans for emergencies exist, although they aren't all kept together and are very outdated. Emergency procedures are not known by staff or the community. Emergency equipment may be present, but it is not known.

Better Practice Scenario: An emergency management plan has been written, but not all staff has been trained or briefed in procedures. Much of the equipment needed for full emergency preparedness is not yet present onsite.

Steps for Achieving Best Practice
1. Contact LGANT for resources on emergency planning.
2. Conduct a 'walk through' of waste site to identify issues that may require emergency response.
3. Consider each issue and determine how you could address them in an emergency situation.

Some examples of simple fire fighting equipment

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Important Contact Details

Agency / Organisation	Most Relevant Position	Contact Details
Department of Natural Resources, Environment, The Arts and Sport (NRETAS)	Environmental Operations	Darwin – (08) 8924-4046; (08) 8924 4137 Alice Springs - (08) 8951-9201
Department of Health and Families (DHF)	Environmental Health Program Officers, including Environmental Health Officers	Greater Darwin Region - (08) 8922 7377 East Arnhem - (08) 8987 0440 / 8987 0441 Katherine – (08) 8973 9061 / 8973 9062 Barkly – (08) 8962 4302 Central Australia - (08) 8955 6122
Department of Local Government and Housing	Regional Managers	<u>Alice Springs Regional Manager</u> Leichhardt Building, 21 Gregory Tce, Alice Springs NT 0870 p...(08) 8951 5616 l f...(08) 8951 5539 <u>Darwin Regional Manager</u> 1st Floor, RCG House, 83-85 Smith Street Darwin NT 0800 p… (08) 8999-8437 l f… (08) 8999-8403 <u>Katherine Regional Manager</u> Government Centre, Ground Floor, First Street Katherine NT 0851 p…(08) 8973 8519	f… (08) 8973 8999 <u>Gove Regional Manager</u> Arnhem Shopping Village, Arnhem Road Nhulunbuy, NT 0881 p…(08) 8987 0528	f.. (08) 8987 0353 <u>Tennant Creek Regional Manager</u> First Floor Government Centre, Peko Road Tennant Creek NT 0861 p...(08) 8962 4387 l f...(08) 8962 4430
The Centre for Appropriate Technology	Waste Management Research Officer	(08) 8951-4322
NT WorkSafe		Darwin – 1800 019 115, 08 8999 5141 Katherine – 08 8973 8416; 08 8973 8930 Alice Springs - (08) 8951 8682 (08) 8951 8618
Keep Australia Beautiful Council (NT)	CEO	(08) 8981-5535
Katherine West Health Board	Environmental Health Officer	(08) 8971-9315
Charles Darwin University	School of Australian Indigenous Knowledge Systems	(08) 8946-7749
Batchelor Institute of Indigenous Tertiary Education	Lecturer – Environmental Health	p… (08) 8939-7348 f… (08) 8939-7123
Cleanaway	Community Education Officer	p… (08) 8935 1110
Shire services managers	[to be inserted]	
Council Director of Infrastructure	[to be inserted]	
Council Asset & Works Manager	[to be inserted]	

Appendix B – Risk Matrix

An environmental risk assessment was undertaken for the Nolans Project and associated construction, operation and closure. The risk assessment identified the risk source (hazard and event), receptors and potential impact. The consequence and likelihood were determined using the descriptions identified in Table B1 and Table B2 respectively. The risk matrix is provided in Table B3.

Table B1 Consequence Description

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Air	Air quality	No measurable air quality impacts or exceedance of air quality standards.	Local short term and approaching exceedance of air quality standards.	Local minor long term, or widespread minor short term or exceedance of air quality standards.	Widespread (regional) major short term exceedance of air quality standards.	Regional long term change in air quality or exceedance of air quality standards.
Air	Noise	Applicable standards / guidelines met at all sensitive receptors at all times.	Isolated and temporary increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Short term, local increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Long term, local increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Long term, regional increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.
Biodiversity	Listed Flora Species	Minor local habitat modification and/or lifecycle disruption for a listed species.	Moderate local habitat modification and/or lifecycle disruption for a listed species.	Substantial local habitat modification and/or lifecycle disruption for a listed species.	Moderate regional habitat modification and/or lifecycle disruption for a listed species.	Substantial regional habitat modification and/or lifecycle disruption for a listed species.
Biodiversity	Listed Threatened Fauna Species	No loss of individuals of listed fauna species.	Minor local decrease in size of population(s) of listed fauna species.	Moderate local decrease in size of population(s) of listed fauna species.	Substantial local decrease in size of population(s) of listed fauna species.	Moderate or substantial regional decrease in size of population(s) of listed fauna species.
Biodiversity	General flora and fauna	Insignificant or imperceptible effects.	Local short term decrease in abundance of some species with no lasting effects on local population.	Local long term decrease in abundance of some species resulting in some change to community structure.	Regional decrease in abundance of some species resulting in some changes to community structure.	Regional loss of numerous species resulting in the dominance of only a few species.
Historic and cultural heritage	Aboriginal and cultural heritage	Minor repairable damage to more common structures or sites. No disturbance of historic and / or cultural heritage sites.	Moderate or repairable damage or infringement to sensitive structures or sites of cultural significance or sacred value.	Considerable damage or infringement to sensitive structures or sites of cultural significance or sacred value.	Major damage or infringement to sensitive structures or sites of cultural significance or sacred value.	Irreparable and permanent damage to sensitive structures or sites of cultural significance or sacred value.

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Human health and safety	Safety	Low level short term subjective inconvenience or symptoms. Typically a first aid and no medical treatment.	Reversible / minor injuries requiring medical treatment, but does not lead to restricted duties. Typically a medical treatment.	Reversible injury or moderate irreversible damage or impairment to one or more persons. Typically a lost time injury.	Single fatality and/or severe irreversible damage or severe impairment to one or more persons.	Multiple fatalities or permanent damage to multiple people.
Human health and safety	Health	Reversible health effects of little concern, requiring first aid treatment at most.	Reversible health effects of concern that would typically result in medical treatment.	Severe, reversible health effects of concern that would typically result in a lost time illness.	Single fatality or irreversible health effects or disabling illness.	Multiple fatalities or serious disabling illness to multiple people.
Radiation	Occupational exposure	<1 mSv/y Measurable increase in radiation dose with outcomes below public dose limit.	<5 mSv/y Measurable increase in radiation dose with outcomes remaining below dose constraints.	>5 mSv/y and <20 mSv/y Measurable increase in radiation dose with outcomes between dose constraint and dose limit (averaged over five years).	>20 mSv/y and <50 mSv/y Measurable increase in radiation dose with outcomes between dose limit (averaged over five years) and maximum annual dose.	>50 mSv/y Measurable increase in radiation dose with outcomes greater than the maximum annual dose.
Radiation	Public exposure	No change from background Dose not discernible above natural background.	<0.3 mSv/y Measurable increase in radiation dose with outcomes below public dose constraint.	>0.3 mSv/y and <1 mSv/y Measurable increase in radiation dose with outcomes between dose constraint and dose limit (averaged over five years) for public.	>1 mSv/y and <5 mSv/y Measurable increase in radiation dose with outcomes between dose limit (averaged over five years) and maximum annual dose for public.	>5 mSv/y Measurable increase in radiation dose with outcomes greater than the maximum annual dose for public.
Radiation	Environmental impact	ERICA RQ < 0.1	ERICA RQ >0.1 and <1.0	ERICA RQ >1.0 plus justification	ERICA RQ >1.0 and no justification	ERICA RQ > 10.0

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Socio-economic	Community	Local, small-scale, easily reversible change on social characteristics or values of the communities of interest or communities can easily adapt or cope with change.	Short-term recoverable changes to social characteristics and values of the communities of interest or community has substantial capacity to adapt and cope with change.	Medium-term recoverable changes to social characteristics and values of the communities of interest or community has some capacity to adapt and cope with change.	Long-term recoverable changes to social characteristics and values of the communities of interest or community has limited capacity to adapt and cope with change.	Irreversible changes to social characteristics and values of the communities of interest or community has no capacity to adapt and cope with change.
Socio-economic	Visual and landscape	Almost imperceptible or no visual change from sensitive receptors or places of cultural and natural value. No loss of / or change to features or characteristics of the landscape.	Minor visual change from sensitive receptors or places of cultural and natural value. Minor loss or alteration to key landscape characteristics, or introduction of elements that may be visible but not uncharacteristic.	Moderate visual change from sensitive receptors and places of cultural and natural value. Discernible changes in the landscape due to partial loss or change to characteristics of the landscape.	Significant visual change from sensitive receptors and places of cultural and natural value. Discernible change which is out of scale with the landscape, at odds with landform and will leave an adverse impact.	Catastrophic visual change from sensitive receptors and places of cultural and natural value. A substantial change to the landscape due to total loss of elements or characteristics, causing the landscape to be permanently changed and its quality diminished.
Transport	Traffic and transport operations and conditions	Negligible adverse impact on traffic and transport conditions. No perceptible deterioration of road integrity.	Detectable adverse changes in traffic and transport condition (decrease in Level of Service) at one or two locations at any one point in time during the construction period or at a single location during operations. Seasonal, local deterioration of road integrity.	Detectable adverse change in traffic and transport conditions (decrease in Level of Service) at multiple locations. Short term, local deterioration of road integrity.	Traffic and transport congestion and delays exceed acceptable levels at multiple locations. Short term, regional deterioration of road integrity.	Traffic and transport congestion and delays severely restrict the safe operation and efficiency of the transport network. Long term, regional deterioration of road integrity.

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Transport	Road safety	No increase in vehicle incidents along relevant haulage routes above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of five per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of ten per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of twenty per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of greater than twenty per cent above historical baseline trend.
Water	Surface water	Minimal contamination or change with no significant loss of quality.	Local minor short term reduction or change in water quality. Local contamination or change that can be immediately remediated.	Local minor long term or widespread minor short term or local major short term reduction or change in water quality. Local contamination or change that can be remediated in long term.	Widespread (regional) major short term reduction or change in water quality. Local contamination or change that cannot be remediated in long term. Widespread contamination or change that can be remediated.	Regional long term reduction or change in water quality. Widespread contamination or change that cannot be immediately remediated.
Water	Groundwater	Negligible change to groundwater regime, quality and availability.	Changes to groundwater regime, quality and availability but no significant implications.	Changes to groundwater regime, quality and availability with minor groundwater implications for a localised area.	Groundwater regime, quality or availability significantly compromised.	Widespread groundwater resource depletion, contamination or subsidence.

Table B2   Likelihood Description

Likelihood	Rare	Unlikely	Moderate	Likely	Almost Certain
Description	The event may occur only in exceptional circumstances. This event is not expected to occur except under exceptional circumstances (up to once every 100 projects of this nature).	The event could occur but is improbable. This event could occur up to once every 10-100 projects of this nature.	The event could occur but not expected. This event could occur up to once every 10 projects of this nature.	The event will probably occur in most circumstances. This event could occur up to once during a project of this nature.	The event is expected to occur in most circumstances. This event could occur at least once during a project of this nature.
Chance of Occurring (%)	0 - 1%	2 - 10%	11 - 50%	51 - 90%	> 91%

Table B3   Risk Matrix

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost Certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	High	Extreme
	Possible	Low	Medium	Medium	High	High
	Unlikely	Low	Low	Medium	Medium	High
	Rare	Low	Low	Low	Medium	Medium

GHD

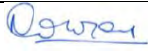Level 5, 66 Smith Street Darwin NT 0800
GPO Box 351 Darwin NT 0801
T: (08) 8982 0100   F: (08) 8981 1075   E: drwmail@ghd.com.au
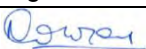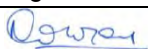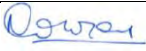
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Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
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