

21. Waste Management

21.1 Introduction

This chapter sets out potential impacts pertaining to waste generation and management during construction, operation and closure of the Mt Todd Gold Project, with the aim of protecting environmental values from the impacts of wastes. The potential impacts and associated management measures identified in this chapter form the basis of the waste component of the project risk assessment undertaken in Chapter 5. The project risk assessment includes consequence; likelihood and residual risk ratings for impacts associated with waste after management measures are implemented.

Potential impacts associated with air emissions and dust (Chapter 16) or AMD (Chapter 12) are addressed separately.

21.2 Background

Under the *Waste Management and Pollution Control Act 1998*, waste is defined as anything that is:

- ▶ a solid, a liquid or a gas; or
- ▶ a mixture of such substances;

that is left over, surplus or an unwanted by-product from any activity (whether or not the substance is of value) and includes a prescribed substance or class of substances.

A licence is required for collecting, transporting, storing, recycling, treating or disposing of listed waste. Listed wastes at the mine site will only be disposed of at appropriate licensed facilities.

21.2.1 Project Waste Management Practices

Project waste management practices have been derived from a number of sources including the NT EPA who provides guidance on waste management through waste management principles and hierarchies. The principle of the waste management hierarchy states that waste should be managed in accordance with the following order of preference:

- ▶ avoidance;
- ▶ re-use;
- ▶ re-cycling and recovery of energy;
- ▶ treatment;
- ▶ containment; and
- ▶ disposal.

The performance requirements throughout the construction, operation and closure of the Project require that the waste hierarchy is considered, and aims to minimise waste generation through adoption of best practice waste avoidance, minimisation and disposal procedures.

21.2.2 Cleaner Production

The NT EPA requires that “cleaner production” should be considered in determining how waste is managed. A cleaner production program to identify and implement ways of improving a production process includes:

- ▶ using less energy, water or another input;
- ▶ generating less waste; or
- ▶ generating waste that is less environmentally harmful.

21.2.3 Environmental Values

During the project construction, operation and closure phases, waste will be managed to avoid adverse impacts on the life, health and wellbeing of people and the diversity of ecological processes and associated ecosystems surrounding the project site.

21.3 Existing Environment

The mine site is a brownfield site as a result of historic mining operations. Waste types currently generated on-site as part of the care and maintenance program include unlisted wastes such as:

- ▶ cardboard;
- ▶ plastics;
- ▶ paper;
- ▶ metals; and
- ▶ petrucibles.

Listed waste types currently generated on-site as part of the care and maintenance program include:

- ▶ tyres;
- ▶ sewerage;
- ▶ waste water; and
- ▶ hazardous wastes:
 - chemicals;
 - batteries
 - fuels; and
 - oils.

21.3.1 Existing Waste Disposal Facilities

Katherine Town Council operates a Waste Transfer Station. The station is located approximately 5km west of Katherine, roughly 50km south of the Project.

The Waste Transfer Station provides users with all-weather access to dispose of a variety of waste types included listed wastes. Those relevant to the Project include:

- ▶ inert;

- ▶ industrial;
- ▶ oil and oil filters; and
- ▶ organic waste.

The Katherine Town Council Waste Transfer Station allows users of the facility to recycle a range of materials. Those relevant to the Project include:

- ▶ oil;
- ▶ batteries;
- ▶ packaging; and
- ▶ aluminium cans.

In addition, a scrap metal merchant is located on Bovril Street, off the Victoria Highway, Katherine.

A number of companies equipped to treat and dispose of hazardous waste are located in Darwin, approximately 250km north of the Project.

21.4 Potential Impacts

The Project will generate a variety of waste types during the construction, operation and closure phases.

21.4.1 Construction and Operation

Waste generated during the construction and operations phases include:

- ▶ waste rock and tailings;
- ▶ solid wastes from the water treatment plant;
- ▶ sewage;
- ▶ sediment from sediment traps;
- ▶ packaging materials (e.g. cardboard, paper, plastics, wood);
- ▶ scrap material, timber, geotextiles and electrical off-cuts;
- ▶ concrete;
- ▶ waste fuels, oils and chemicals;
- ▶ tyres;
- ▶ green waste from clearing; and
- ▶ general domestic waste including food waste from the employee cafeteria.

21.4.2 Closure

Waste types arising from decommissioning and closure activities include:

- ▶ waste rock;
- ▶ wastewater / effluent;
- ▶ waste fuels, oils and chemicals;

- ▶ tyres;
- ▶ vegetation;
- ▶ food waste from the employee cafeteria; and
- ▶ steel, concrete and timber from the Ore Processing Plant and other structures.

21.5 Waste Management

A Waste Management Plan will be developed in accordance to the *Waste Management and Pollution Control Act 1998*. The Waste Management Plan will require that all site employees and contractors undertake the necessary training on the handling and disposal of waste material types on site.

The Waste Management Plan will also stipulate that a hierarchy of controls have been applied to each waste stream (reduce, re-use, recycle / recovery, treatment and responsible disposal).

The following sections provide a description of the various management procedures, objectives, recommendations and commitments that will be incorporated into the management and disposal of waste on-site.

21.5.1 Reuse and Recycling

Wherever practical and economically viable, all waste materials will be recycled. Metals such as steel and copper wire will be collected in designated areas prior to removal from site for recycling. Plastic pipe including high-density polyethylene, polyvinyl chloride and acrylonitrile-butadiene-styrene will be reused wherever possible. Used tyres will be collected and periodically dispatched to off-site recyclers or a re-tread facility.

Recyclable waste will be periodically delivered to various recycling facilities or end users as back loads on regular truck schedules, therefore not impacting traffic volumes.

Green waste, topsoil, packaging waste (including cardboard, timber, plastics and polystyrene foam), scrap metal and general maintenance wastes will be appropriately managed to prevent degradation of amenity, blocking of drainage lines, and avoiding impediments to revegetation efforts.

These wastes represent resources that, if not recovered through reuse or recycling, are lost once placed in a landfill. Vista Gold will seek to maximise the use of existing recycling services wherever possible through contractual arrangements. Where these wastes cannot be recycled, they will be disposed of by authorised contractors.

To maximise the reuse of on-site material over imported material for reclamation, a site-wide inventory will be prepared for reclamation materials.

21.5.2 Waste Rock

As part of a Waste Rock Management Plan, a waste rock characterisation study has been carried out to identify potential acid forming and non-acid forming waste rock. The appropriate handling and management of the waste rock has then been determined to minimise the potential for AMD and maximise the beneficial use of non-acid forming waste rock in rehabilitation and closure activities.

A description on the management and handling of waste rock is provided in Chapters 12 and 23.

21.5.3 Tailings

Tailings will be disposed of in TSF1 during the first five to six years of operation, and TSF2 for the remaining years.

TSF1

It is proposed to dispose 62Mt of tailings at the existing TSF1 over six stages. Stages include:

- ▶ Stage 1, thickened tailings will be discharged by spigots from the embankment crest to form a beach behind the embankment wall; and
- ▶ Stage 2-6, thickened tailings will be discharged by spigots from the embankment crest to form a beach behind the embankment wall, driving the water pool to the west. The embankment crest will be raised upstream as material (fill or waste rock) for the embankment is placed on the tailings beach. Water will be removed from the water pool using the existing decant towers, which will be raised along with the embankment stages. The existing toe drain and under-drains will convey seepage water to the return water pond, where it will be pumped back to the impoundment.

From an AMD perspective the key item from the operational concept is that TSF1 will become a zero discharge facility with all contact water from TSF1 contained within the process circuit. Controlled seepage from TSF1, via the drainage system, would be managed and routed to the WTP.

TSF2

It is proposed to dispose 161Mt of tailings to the new TSF2. The TSF2 will be constructed in four stages commencing in year 4/5.

TSF2 will be managed in the same manner as the raised TSF1. The TSF2 will have a similar seepage and collection system as TSF1. The key difference with TSF2 will be the installation of a bottom liner for tailings containment consisting of a low-density polyethylene geomembrane. The liner will extend along the base of the impoundment as well as the upstream slopes of the stage 1 embankment (Appendix L).

For more information on the management and disposal of tailings, refer to Chapters 2, 12 and 23.

21.5.4 Water Treatment

The water treatment process is based on lime precipitation conducted in a high-rate solids contact clarifier. Water will be pumped from an equalisation pond to the high rate clarifier, where lime is added to increase the pH and ferric chloride. The water is then neutralised and sent through a microfiltration skid. The microfiltration backwash and all sludges will be sent to the TSF for disposal.

Some of the treated water (approximately 1%) will be used as process water for the plant with the rest sent to a pond for monitoring, and finally either discharge to Batman Creek or use elsewhere on-site.

WAD cyanide used in ore processing will be reduced and disposed to the TSF. Residual WAD cyanide will be present in the tailings. Any cyanide in the return water from the tailing will be treated and reused.

More information on the WTP, including water treatment, water quality objectives and mine water discharge, is provided in Chapter 10.

21.5.5 Disposal

Storage

As part of the site's general waste management, all wastes will be collected and stored in waste management areas until removed from the site to avoid any amenity concerns or other issues arising from wastes lying around the site.

Chemicals, fuels and oils will be stored and contained inside a bunded area with spill protection according to Australian Standards and Regulations.

Inert Waste

Concrete foundations, walls and bridges and other non-reactive, non-combustive, non-corrosive and non-hazardous demolished waste will be broken up and either:

- ▶ placed in the WRD;
- ▶ buried in-place;
- ▶ or backfilled against cutbanks and highwalls throughout the Process Plant and Pad Area, as well as other areas that will be reclaimed at Mt Todd (Appendix Y).

The solid waste disposal facilities will be maintained in a manner that would not attract wildlife.

Where inert industrial wastes cannot be practically or economically disposed of off-site they will be co-disposed with other inert waste being disposed on-site. Burial will be at least 3m below the final surface. Any empty drums will be cleaned and flattened prior to burial.

Process Plant and other Structures

The process plant (or portions thereof) will be demolished (disassembled), removed (salvaged) or hauled to a solid waste landfill or other suitable location on-site, capped, and reclaimed. Some buildings will remain to support closure operations and post-closure site maintenance (Appendix Y).

General Waste

Putrescible and domestic waste will be collected and disposed of in a designated landfill site. The receiving site is a licenced waste transfer station managed by Katherine Town Council, located on Novis Road, approximately 5km from Katherine. The facility has adequate capacity to receive all putrescible and domestic waste from the Project.

Hazardous Waste

The anticipated hazardous waste types likely to arise include:

- ▶ waste oil and chemicals;
- ▶ waste lubricants; and
- ▶ batteries.

Batteries and waste oils will be recycled at the Katherine Waste Transfer Station. All other hazardous waste material will be transported off-site by a licenced carrier for disposal / treatment at an appropriate facility.

Sewage

Sewage treatment will be via either a septic tank system or package treatment plant with water disposal via either irrigation or a lagoon. The facility will cater for the requirements of up to 450 construction personnel and 350 mining and plant operations personnel. The system will be able to treat 114 litres per minute of effluent. The facility will be licenced by the Department of Health and an additional WDL will be applied for if treated effluent is to be discharged from site.

21.5.6 Monitoring

Monitoring the activities and outcomes related to waste management include:

- ▶ recording of waste types and volumes generated on-site and being transported off-site;
- ▶ assessing actual waste volumes against forecasted waste volumes; and
- ▶ monitoring for potential environmental impacts including water quality monitoring (Chapter 10).

The activities listed above should help form the appropriate corrective actions to reduce or eliminate waste generation or impacts associated with the Project. The following management plans will address the monitoring of waste:

- ▶ Waste Management Plan;
- ▶ Waste Rock Management Plan;
- ▶ Tailings Management Plan;
- ▶ Water Management Plan; and
- ▶ Hazmat Transport Management Plan.

21.5.7 Waste Commitments and Targets

Waste commitments and targets will be developed to assist in effective waste management to:

- ▶ reduce the level of waste produced and any associated environmental impact;
- ▶ recover and recycle where practicable;
- ▶ create awareness of the waste management strategy and waste commitments / targets; and
- ▶ optimise re-use and recycling systems.