SARAJI EAST MINING LEASE PROJECT

Environmental Impact Statement

Chapter 15
Waste Management

BHP

Contents

Saraji East Mining Lease Project

15 Waste Management

15.1 Introduction

This chapter provides an assessment of the anticipated waste streams from the construction and operation of the Saraji East Mining Lease Project (the Project). It describes the regulatory framework and identifies solid and liquid waste streams, their expected quantities and proposed mitigation and management strategies to address the residual risks associated with waste generation by the Project.

Mine waste is considered separately in **Chapter 10 Geochemistry and Mineral Waste**. Air emissions and industrial wastewater discharge associated with the Project are discussed separately in **Chapter 8 Surface Water Resources** and **Chapter 11 Air Quality and Greenhouse Gas**.

15.2 Legislation and policy

This section details how waste management is regulated to protect existing environmental values and highlights legislative drivers relevant to the construction, operation and decommissioning of the Project.

15.2.1 Commonwealth

National Waste Policy: Less Waste, More Resources (National Environment Protection Council, 2009)

The *National Waste Policy: Less Waste, More Resources* (Commonwealth of Australia, 2018) (National Waste Policy) provides a framework for collective action by businesses, governments, communities and individuals to collaborate, embrace innovation and develop technologies to achieve sustainable waste management up to 2030.

The policy focuses on waste avoidance, improved material recovery and use of recovered materials to help Australia move closer to a more circular economy that eliminates waste and improve economic, social and environmental outcomes. The policy identifies five principles that underpin waste management, recycling and resource recovery in a circular economy:

- avoid waste
- improve resource recovery
- increase use of recycled material and build demand and markets for recycled products
- better manage material flows to benefit human health, the environment, and the economy
- improve information to support innovation, guide investment and enable informed consumer decisions.

National Environment Protection (National Pollutant Inventory) Measure

The National Pollutant Inventory (NPI) National Environment Protection Measure (NEPM) is a publicly accessible national database of pollutants emitted to land, air and water from various industrial facilities and diffuse sources. It holds emission estimates for 93 toxic substances and the source and location of these emissions. The NPI does not include greenhouse gas emissions.

BMA is required to comply with the NPI NEPM. The NPI Guide provides direction and trigger levels for reporting on emissions and contains emissions estimation techniques for specific activities (e.g. coal mining, fuel storage, etc.) (Department of the Environment, 2015). Subject to meeting thresholds, project waste emissions to air, land and water are estimated and reported annually in accordance with NPI requirements.

National Environment Protection (Movement of Controlled Waste between States and Territories) Measure

The Movement of Controlled Waste between States and Territories NEPM establishes a national system to track interstate transport of potentially dangerous controlled wastes; its requirements are incorporated within Queensland legislation (Section 15.2.2).

15.2.2 State

In Queensland, the strategic framework and regulatory requirements for managing waste are defined within the *Environmental Protection Act 1994* (Qld) (EP Act) and subordinate Environmental Protection Regulation 2019 (EP Regulation) and the *Waste Reduction and Recycling Act 2011* (Qld) and subordinate Waste Reduction and Recycling Regulation 2011.

Environmental Protection Act 1994

The EP Act establishes a general environmental duty and sets out a framework to prevent environmental harm, nuisance and contamination assessment, management and monitoring obligations implemented through the Act and subordinate legislation.

The EP Act defines “waste” as anything that is:

- left over, or an unwanted by-product, from an industrial, commercial, domestic, or other activity or
- surplus to the industrial, commercial, domestic, or other activity generating wastes.

Waste generated during the construction, operation and decommissioning phases of the Project may be in solid, liquid or gaseous form and will be described in terms of their physical and chemical characteristics and estimated waste generation rates to assess potential impacts and suitable management strategies.

Environmental Protection Regulation 2019

Environmentally relevant activities

Under the EP Regulation, certain waste management activities are environmentally relevant activities (ERA) and require approval i.e. Environmental Authority (EA). Waste-related ERAs that may be conducted as part of the Project, defined in Schedule 2 of the EP Regulation, include:

- waste disposal (ERA 60)
- resource recovery and transfer facility operation (ERA 62)
- sewage treatment (ERA 63)

Regulated waste

The EP Regulation establishes a waste tracking system, including obligations for generators, transporters and receivers of trackable waste to record, carry and keep prescribed information about the waste. Commencing on 4 February 2019, the Environmental Protection (Regulated Waste) Amendment Regulation 2018 (Regulated Waste Regulation) provides a risk-based waste classification framework. Regulated waste is now classified as:

- category 1 regulated waste (highest risk)
- category 2 regulated waste (moderate risk)
- not regulated waste / general waste (lowest risk).

Waste generators are responsible for classifying waste into a risk-based category by either:

- adopting a default waste category from Part 1 of Schedule 9 of the EP Regulation
- organising sampling and testing of the waste by an appropriately qualified person to demonstrate an appropriate risk-based category in accordance with Section 43 of the EP Regulation (tested waste).

Schedule 9 of the EP Regulation also provides a list of wastes that are not regulated waste. For the Project, this might include automotive equipment, computers, small batteries, treated timber and paint containers.

The amendment also requires an EA for storage of more than four tonnes of 500 equivalent passenger units of end of life (waste) tyres (Category 2 regulated waste). Operational policies for regulated waste (ESR/2015/1863, DES 2019) and disposal and storage of scrap tyres at mine sites (ESR/2016/2380, DES 2016) apply to the Project.

Land contamination

Land contamination can occur as a result of poor environmental management and waste disposal practices or accidental spills. Land that is or has the potential to be contaminated by waste disposal activities or an accidental spill is required to be listed on the Environmental Management Register (EMR) or Contaminated Land Register (CLR). Land is listed on the EMR or CLR when the Department of Environment and Science is notified or becomes aware that certain types of activities (known as notifiable activities as per Schedule 3 of the EP Act) have been, or are being, carried out on the land, or if the land is contaminated land. Land contamination is discussed in **Chapter 5 Land resources**.

Waste Reduction and Recycling Act 2011

The *Waste Reduction and Recycling Act 2011* (WRR Act) and its subordinate legislation (Waste Reduction and Recycling Regulation 2011) promotes waste avoidance and reduction and encourages resource recovery and efficiency.

The WRR Act outlines the preferred waste management hierarchy – avoid, reduce, reuse, recycle and energy recovery before safe treatment and disposal – and the principles for achieving good waste management. Under the WRR Act, a development condition may be imposed (on a development approval or as a condition on an EA) requiring a waste management program to be prepared for the authorised activities.

The Waste Reduction and Recycling Regulation is underpinned by a waste levy, which applies to general solid waste, commercial and industrial waste, and construction and demolition waste. Different levy rates apply for types of waste disposed.

Queensland Waste Management and Resource Recovery Strategy

The Queensland Waste Management and Resource Recovery Strategy outlines the high-level vision and direction for Queensland to divert waste from landfill by reusing or recovering resources. Building on the waste and resource management hierarchy, the strategy sets out three main strategic priorities:

- reducing the impact of waste on the environment and communities
- transitioning towards a circular economy for waste
- building economic opportunity.

15.2.3 Local

The Project is located within the Isaac Regional Council (IRC) Local Government Area (LGA).

Within the IRC LGA, the Mackay, Isaac and Whitsunday Regional Plan (Department of Local Government and Planning, 2012) outlines policies and programs to ensure the region's waste is minimised, reused or recycled and investment in resource recovery and suitable waste management and resource recovery sites.

The IRC *Waste Reduction and Recycling Plan* (2016) recognises mining waste as a substantial volume of the waste delivered into the Glenden and Moranbah landfill sites in particular. Generally, this waste is source separated and delivered by contractors engaged by mining companies. Council is committed to maximising waste separation and recycling, reducing the volumes of residual waste deposited at its landfills.

15.3 Description of environmental values

15.3.1 Environmental values

The EP Act defines an environmental value as a quality or physical characteristic of the environment that is conducive to ecological health, public amenity and safety. Environmental values with the potential to be impacted by waste generated from construction, operation and decommissioning of the Project include:

- health and wellbeing of sensitive receptors
- natural environment, including land, water resources, flora and fauna
- available capacity of regional waste management facilities and services.

More information on these values is presented in this section and other chapters of this EIS including **Chapter 5** Land Resources, Chapter 6 Terrestrial Ecology, Chapter 7 Aquatic Ecology, Chapter 8 Surface Water Resources, Chapter 9 Groundwater, Chapter 13 Scenic Amenity and Lighting and Chapter 20 Hazards, Health and Safety.

15.3.2 Existing environment

Existing environment of the Project site, described in **Chapter 4 Land Use and Tenure**, is consistent with land used for livestock grazing with some areas of cropping activity to the southeast. Resource and petroleum tenements are located within the Project site and surrounding area.

In addition to foundation grain production, beef and service industries, the region embraces 25 operating coal mines, including BMA's Saraji Mine immediately west of the Project site that has been operating as an open cut coal mine since 1974.

There are two homesteads located within the Project site (Lake Vermont Homestead and Meadowbrook Homestead) on freehold land. An additional five homesteads are located within the vicinity of the Project site and have been identified as sensitive receptors.

15.3.3 Regional waste management facilities

IRC currently operates six regional recovery centres that offer a combination of landfill and transfer station facilities (Moranbah, Clermont, Dysart, Middlemount, Glenden and St Lawrence) and three sites that operate solely as transfer station facilities (Nebo, Greenhill, Carmila). Resource recovery centres at Middlemount and St Lawrence will be converted to transfer station facilities.

Regional waste management facilities that have the potential to support the Project are outlined in Table 15.1. In addition, reputable private contractors operating in the region are licensed to transport and accept recyclable materials and regulated waste for recovery or treatment and disposal.

Table 15.1 Potential waste management facilities to be used by the Project

Facility	Resource recovery	Disposal
Dysart Resource Recovery Centre	Waste oil, cooking oil, cardboard and paper, batteries, scrap metal, green waste, comingled recyclable waste and timber	General waste
Clermont Resource Recovery Centre	Waste oil, cooking oil, cardboard and paper, batteries, scrap metal, green waste, comingled recyclable waste and timber	General waste
Moranbah Resource Recovery Centre	Waste oil, cooking oil, cardboard and paper, batteries, scrap metal, green waste, comingled recyclable waste and timber	General waste

15.3.4 Existing waste generation

The Project is adjacent to the existing open cut mining operations at Saraji Mine; however, BMA intend to operate these sites independently under a Project-specific EA.

The existing Saraji Mine produces general solid and liquid wastes that are typical of mine site operations in the region. These waste streams are managed in compliance with the existing approved EA (EPML00862313) according to a framework established through an existing Waste Management Plan. Accordingly, general waste streams are effectively managed onsite or by waste management facilities and recycling / reprocessing services available in the region.

15.4 Potential impacts

Potential impacts to identified environmental values and receptors (Section 15.3) may result from excessive waste generation from the inefficient use of resources or from the improper management of wastes generated by the Project.

Generation of wastes will occur throughout construction, operation and decommissioning activities that occur the life of the Project (approximately 20 years) described in **Chapter 3 Project Description**. These wastes are generally consistent with other mines in the region.

To assess potential impacts in this section, Project wastes are estimated, characterised (according to physical and chemical properties) and broadly classified as:

- Regulated waste: wastes defined by legislation (is commercial waste or industrial waste of a type, or containing a constituent of a type defined in Section 42 of Schedule 9, Part 1, Column 1 of the EP Regulation) that require specific controls or actions for handling and disposal to manage certain physical or chemical properties of those wastes (e.g. flammable, combustible, corrosive, or containing a hazardous constituent).
- General waste: wastes not defined as regulated waste under legislation that may be putrescible (easily decomposed, recyclable by composting) or non-putrescible (not easily decomposed, may be recyclable) wastes.
- Recycling: waste materials that can be reused or reprocessed to recover resources.

Mineral wastes, such as spoil, coal and coarse rejects and tailings generated by the Project are discussed in detail in **Chapter 10 Geochemistry and Mineral Waste**. Wastewater including mine affected water is discussed in **Chapter 8 Surface Water Resources**.

15.4.1 Construction

During the three-year construction phase, waste will be generated by the haul road and infrastructure upgrade works and services upgrades (communications, water, power supply and sewage). Wastes generated during construction are anticipated to include:

- regulated waste such as clinical waste, grease trap waste, lead acid batteries, hydrocarbon waste, paints, resins, detergents, solvents, batteries, sewage sludge and tyres
- general waste such as food scraps, aluminium cans, paper, cans, ceramics, glass, plastics, packaging materials, textiles, timber offcuts and pallets and glass
- recycling such as cleared vegetation, excavation materials, concrete, timber, scrap metal and steel offcuts, bricks, aggregates and sand from the construction of the Coal Handling Preparation Plant (CHPP) and other mine related infrastructure, water supply pipeline and Mine Infrastructure Area (MIA).

Wastes generated by Project construction activities are presented waste type and characteristics, source, approximate quantities (after reuse opportunities are applied) and proposed management strategy in Table 15.2.

Table 15.2 Waste generation and management construction

Waste stream	Waste type	Waste source	Estimated quantity	Management strategy
Cleared vegetation	Recycling; solid, putrescible, green waste	Site infrastructure (i.e. CHPP, water pipeline, transmission line, rail spur and conveyor)	< 1 tonnes (t)	Where possible use on re-vegetated areas, onsite as fauna habitat and or chipped as mulch for landscaping, erosion control and rehabilitation activities.
Non-mining excavated waste	Recycling; solid, inert, construction waste	Site infrastructure, underground mine portal	5 t	Used as fill onsite where suitable for construction of haul roads and pads.
Concrete and bricks	Recycling; solid, inert, construction waste	Site infrastructure (i.e. accommodation village, CHPP, mine portal and MIA)	35 t	Minimise waste by producing/procuring only the amount necessary. Reuse on site where suitable for construction of haul roads and pads. Concrete not suitable for reuse will be transported by a waste contactor off site for recycling.
Steel/metal offcuts	Recycling; solid, inert, construction waste	Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	20 t	Minimise waste by producing/procuring only the amount necessary. Segregation and collection onsite. Transportation from site by a waste contractor for re-use or offsite recycling.

Waste stream	Waste type	Waste source	Estimated quantity	Management strategy
Timber pallets and offcuts	Recycling; solid, inert, construction waste	Site infrastructure (i.e. accommodation village, CHPP and MIA)	200 t	Minimise waste by producing/procuring only the amount necessary. Undamaged pallets returned to the workshop/warehouse for reuse; some damaged pallets repaired and reused. Irreparably damaged pallets transported from site by a waste contractor for offsite recycling.
Paints, resins, sealers and solvents	Regulated waste [Category 1 – solvents, Category 2 – paints]; liquid, flammable, combustible, toxic containing hazardous constituents	Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	2 t	Minimise waste by producing/procuring only the amount necessary. Collection onsite and stored in a regulated area. Transportation offsite by authorised regulated waste contractor and disposal by a regulated waste receiver.
Putrescibles and organic (food waste) and some plastics	General waste; solid, putrescible and non-putrescible	Site infrastructure (i.e. accommodation village, CHPP, MIAs and construction offices)	160 t	Taken offsite for disposal to authorised waste facility or composting of organic wastes.
Paper, cardboard, some plastics, metal cans	Recycling; solid, commingled, putrescible and non-putrescible	Site infrastructure (i.e. accommodation village, CHPP, MIA and construction offices)	8 t	Collection and segregation onsite. Transportation by a waste contractor for offsite recycling.
Waste electrical and electronic equipment	Recycling; solid, inert and potentially containing hazardous constituents	Site infrastructure (i.e. accommodation village, CHPP, MIA and construction offices)	<1 t	Collection and segregation onsite. Transportation by a waste contractor for offsite recycling.

Waste stream	Waste type	Waste source	Estimated quantity	Management strategy
Grease trap wastes	Regulated waste [Category 2] and recycling; liquid and potentially containing hazardous constituents	Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system	2.5 t	Collected and transported offsite by a licensed regulated waste contractor to a licensed regulated waste receiver for recycling.
Waste oil and containers	Regulated waste [Category 2] and recycling; liquid and solid	Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	130 t	Collected and stored onsite in a bunded and covered area. Transported offsite by authorised regulated waste transporter to an authorised regulated waste facility, for filtering and dehydration processes and recycling.
Hydrocarbon contaminated waste	Regulated waste [Category 2] and recycling; liquid	Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	24 t	Collected and stored onsite in a bunded area. Transported offsite by authorised regulated waste transporter to an authorised regulated waste facility, for disposal.
Oily water	Regulated waste [Category 2] and recycling; liquid	Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	12 t	Oil will be separated from water. The resulting oil will be collected and transported offsite by a licensed regulated waste transporter to a licensed regulated waste receiver for recycling. The separated water will be managed as part of the mine water management system.
Tyres	Regulated waste [Category 2]; solid, inert	Vehicles for the construction of site infrastructure	2,000 t	Tyres will be transported from site by a licensed regulated waste transporter to a licensed facility for recycling or disposal.

Waste stream	Waste type	Waste source	Estimated quantity	Management strategy
Batteries	Regulated waste [Category 2 – lead acid batteries] and General waste [small batteries]; solid, corrosive, containing hazardous constituents	Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	4 t	Collection and segregation onsite. Transportation by a waste contractor for offsite recycling.
Sewage effluent and sludge	Regulated waste [Category 2] and recycling [effluent]; liquid and solid	Site infrastructure (i.e. accommodation village, and offices)	400 mega litres (ML) (effluent) 240 t (sludge)	To treat sewage generated onsite, a package sewage treatment plant (STP) will be installed to service the MIA and the accommodation village. Sewage from the stockpile, CHPP area and ablutions facility at the mine portal will be pumped back to the MIA. Treated effluent from the STP will be used for dust suppression or irrigation. Dewatered sludge will be transported offsite for disposal by licensed contractors.

15.4.2 Operation

Operational waste will be generated through mine development, mining works and from workshops and offices. Waste types likely to be generated during operation include:

- regulated waste such as hydrocarbon wastes, waste oils, oily water and oil by-products (e.g. oil filters, drums, sludges, grease and rags), paints, resins, detergents, solvents, batteries, spoil, rejects, tyres, sewage effluent and sludge
- general waste such as food scraps, rags, glass, ceramics, plastics and packaging materials
- recycling such as food scraps, cardboard and paper, aluminium cans, cans, glass, hard plastics, conveyor belt rubber, timber offcuts and pallets.

Waste streams generated throughout Project operation are presented by waste type and characteristics, waste source, approximate quantities and proposed management strategy over the 20-year life of mine in Table 15.3. Wastes quantities are estimated based on comparable operations in Central Queensland and assumes a maximum mining rate of 11 million tonnes per annum (Mtpa) of Run of Mine (ROM) coal (rather than adjacent open cut Saraji Mine operation). Mineral wastes such as dewatered tailings are addressed separately in **Chapter 10 Geochemistry and Mineral Waste**.

Table 15.3 Waste generation and management: operation

Waste stream	Waste type	Source	Estimated quantity	Management method
Cleared vegetation	Recycling; solid, putrescible, green waste	Site infrastructure (i.e. CHPP, water pipeline, transmission line, rail spur and conveyor system)	Minimal	Where possible use on re-vegetated areas, onsite as fauna habitat and or chipped as mulch for landscaping, erosion control and rehabilitation activities.
Waste oil	Regulated waste [Category 2] and recycling; liquid	Site infrastructure (i.e. CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	110 kilo litres (kL) per annum	Minimise waste by procuring only the amount necessary. Collected and stored in a bunded area. Transported offsite by an authorised regulated waste transporter to an authorised regulated waste facility, for filtering and dehydration processes and recycling.
Waste oil containers	Regulated waste [Category 2] and recycling; solid	Site infrastructure (i.e. CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	20 t per annum	Collected and stored onsite in a bunded and covered area. Transported offsite by authorised regulated waste transporter to an authorised regulated waste facility, for filtering and dehydration processes and recycling.
Oily sludge, absorbent, degreaser, grease, oily rags, oil filters	Regulated waste [Category 2] and recycling; solid	Site infrastructure (i.e. CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	110 t per annum	Collected onsite then transported offsite by an authorised regulated waste transporter to an authorised regulated waste facility, for filtering and dehydration processes and recycling.
Hydrocarbon contaminated waste	Regulated waste [Category 2] and recycling; solid	Site infrastructure (i.e. CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	440 t per annum	Segregated onsite then transported offsite by an authorised regulated waste transporter to an authorised regulated waste facility.
Scrap metal	Recycling; solid, inert, construction waste	Site infrastructure (i.e. CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	8.5 t per annum	Minimise waste by producing/procuring only the amount necessary. Stored in bins and/or skip bins and/or stockpiled in appropriate areas to be collected by scrap metal merchants under the supervision of waste contractor.

Waste stream	Waste type	Source	Estimated quantity	Management method
Food waste (putrescibles) and some plastics and paper not suitable for recycling	General waste; solid, putrescible and non-putrescible	Site infrastructure (i.e. CHPP, MIA and offices)	3,750 t per annum	Waste will be compacted and transported offsite by the waste contactor to an authorised waste facility or composting of organic wastes.
Recyclable waste (paper and cardboard, metal cans and some plastics)	Recycling; solid, commingled, putrescible and non-putrescible	Site infrastructure (i.e. CHPP, MIA and offices)	1,660 cubic metres per annum	Collection and segregation onsite. Transportation by a waste contractor for offsite recycling.
Paints and resins	Regulated waste [Category 1 – solvents, Category 2 – paints]; liquid, flammable, combustible, toxic containing hazardous constituents	Site infrastructure (i.e. CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	3 t per annum	Minimise waste by producing/procuring only the amount necessary. Collection onsite and stored in a regulated area. Transportation offsite by a licensed regulated waste transporter and disposal offsite by a regulated waste receiver.
Timber pallets and offcuts	Recycling; solid, inert, construction waste	Site infrastructure (i.e. CHPP and MIA)	10 t per annum	Minimise waste by producing/procuring only the amount necessary. Undamaged pallets returned to the workshop/warehouse for reuse; some damaged pallets repaired and reused. Irreparably damaged pallets transported from site by a waste contractor for offsite recycling.
Tyres	Regulated waste [Category 2]; solid, inert	Vehicles for the construction of site infrastructure	480 t per annum	Minimise waste by producing/procuring only the amount necessary. Tyres will be transported from site by a licensed regulated waste transporter to a licensed facility for recycling or disposal.
Conveyor belts	Recycling; Solid, inert	Conveyor system	Minimal	Collection and segregation onsite. Transportation by a waste contractor for offsite recycling.

Waste stream	Waste type	Source	Estimated quantity	Management method
Grease trap waste	Regulated waste [Category 2] and recycling; liquid	Site infrastructure (i.e. CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system)	35 kL per annum	Collected onsite then transported offsite by an authorised regulated waste transporter to an authorised regulated waste facility.
Waste electrical and electronic equipment	Recycling; solid, inert and potentially containing hazardous constituents	Site infrastructure (i.e. CHPP, MIA and offices)	<1 t per annum	Collection and segregation onsite. Transportation by a waste contractor for offsite recycling.
Printer cartridges	Recycling; solid, inert and potentially containing hazardous constituents	Offices	<0.5 t per annum	Collection and segregation onsite. Transportation by a waste contractor for offsite recycling.
Sewage effluent and sludge	Regulated waste [Category 2] and recycling [effluent]; liquid and solid	Site infrastructure (i.e. offices)	Volume will vary depending on the number of personnel onsite. Based on 1400 EP, estimate 126 ML per annum (effluent) and 20 t sludge per annum	Sewage generated onsite will be treated in a package sewage treatment plant (STP) installed to service the MIA and the accommodation village. Sewage from the stockpile, CHPP area and ablutions facility at the mine portal will be pumped back to the MIA. Treated effluent from the STP will be used for dust suppression or irrigation. Dewatered sludge will be transported offsite for disposal by licensed contractors.

15.4.3 Decommissioning and rehabilitation

Project decommissioning and rehabilitation will occur on a staged basis over several years prior to final closure. It is anticipated that major infrastructure, water dams and other facilities will be decommissioned and removed from site, while concrete pads and mine roads will be ripped and removed or covered with benign waste rock, topsoil and revegetated. Project decommissioning and rehabilitation is further discussed in **Chapter 5 Land Resources and Soils**.

Prior to decommissioning, a comprehensive assessment of waste expected to be generated by the Project will be undertaken to ensure wastes are managed in accordance with the waste management hierarchy Depending on condition and demand, infrastructure including the CHPP, workshops, warehouses, plant and equipment will be repurposed for other BMA operations rather than being disposed as waste. During decommissioning, the types of wastes expected to be generated include:

- regulated waste such as hydrocarbon wastes, detergents, tyres, batteries, solvents, paints and chemicals
- recycling such as construction materials including concrete, timber, metals, bricks and aggregates.

15.5 Mitigation measures

To protect environmental values and receptors identified in Section 15.3, BMA will implement a practical framework for waste minimisation and management specifically designed to avoid and minimise waste generation and ensure proper management of wastes generated by the Project.

This section details Project waste management objectives, performance standards/indicators and management strategies (Table 15.4) and controls for segregation/storage (Section 15-16), transport (Section 15-16) and spill response (Section 15-16) to ensure proper management of wastes generated by the Project.

15.5.1 Waste minimisation and management framework

Project wastes generated from construction and operation will be managed through systematic implementation of a site-specific waste management and minimisation plan that details a program for safe reuse, recycling or disposal of each waste stream in accordance with the waste and resource management hierarchy Figure 15-1 and legislative compliance requirements (i.e. EA and waste tracking requirements).

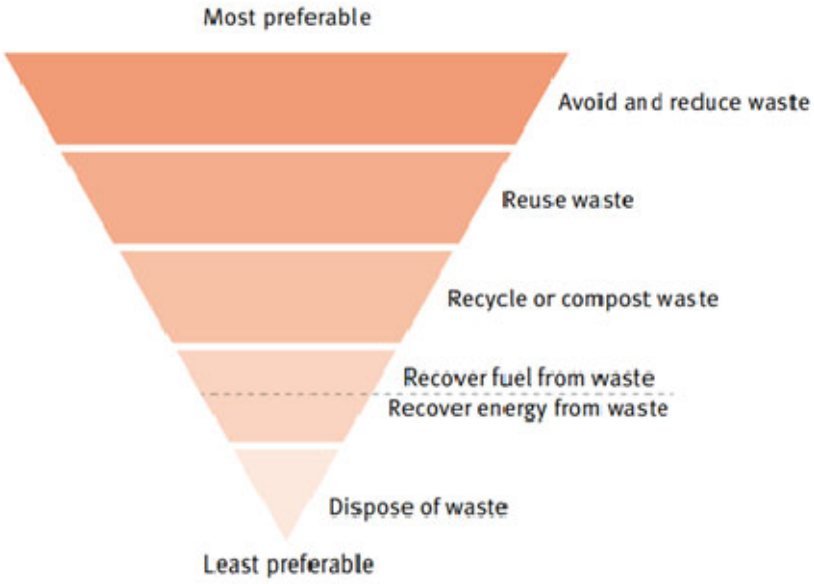

Figure 15-1 Waste and resource management hierarchy

The waste management and minimisation plan will outline the approach to be adopted for safe reuse, recycling and disposal of each waste stream and detail waste management control strategies for segregation and storage, transport and spill response planning. Primary objectives of the waste management and minimisation plan will be to:

- avoid or minimise waste generation
- maximise resource recovery through reuse and recycling
- safely manage waste streams to protect health and environmental values
- comply with waste management, monitoring and reporting requirements.

To facilitate waste management for the Project, the Project EA will need to authorise certain waste-related ERA. Depending on the waste management activities and corresponding thresholds for waste sorted, stored or disposed of at the Project site, the EA is expected to authorise:

- waste disposal (ERA 60) (1) waste disposal (a) operating a facility for disposing of (i) only regulated waste
- resource recovery and transfer facility operation (ERA 62) (1) Resource recovery and transfer facility operation consists of operating a facility for (b) receiving and temporarily storing waste before it is moved to a waste facility
- sewage treatment (ERA 63) (1) Sewage treatment consists of (a) operating 1 or more sewage treatment works at a site that have a total daily peak design capacity of at least 21EP.

Key strategies for management of Project wastes in accordance with the waste management hierarchy are summarised in Table 15.4.

Table 15.4 Waste management hierarchy and controls

Hierarchy	Controls
Avoid and reduce waste	• accurate material estimation and specification to avoid wastage of construction materials such as steel and concrete • purchase in bulk or products in minimal or biodegradable packaging to avoid unnecessary or excess packaging • regular stock reviews for efficient stock control • site inductions to include waste awareness training • review production processes to identify opportunities to generate less waste or waste that is less environmentally harmful or reusable for another process • natural resource use efficiency for the Project discussed in Chapter 2 (Project Alternatives).
Reuse waste	• reuse timber pallets • return waste oil containers for cleaning and reuse • treated effluent from the STP can be used for dust suppression on haul roads where authorised by the EA • encourage reuse practices and review industry developments to identify opportunities for external reuse programs

Hierarchy	Controls
Recycle or compost waste	• sort and segregate recoverable waste streams to maximise reuse and recycling • recycle aluminium, steel, paper, cardboard and appropriate plastics • collect waste oil and hydrocarbon contaminated waste for licensed contractor to transport offsite and reprocess for recycling, recovery and/or disposal • collect scrap metal and empty drums for transport by a licensed waste contractor for recycling (crushing) offsite • collect timber offcuts and unusable pallets for recycling offsite • collect paper and cardboard for recycling • collect and return printer cartridges and batteries • encourage reuse practices and review industry developments to identify opportunities for external reuse program
Recover – energy/fuel from waste	• collect hydrocarbon contaminated rags, absorbent and containers for transport offsite by a licensed waste contractor to a licensed facility for recovery • monitor industry developments to identify new opportunities for generation of waste energy.
Dispose of waste	• general waste will be segregated and stored in a safe, secure manner ready for disposal at a licensed landfill offsite • effluent from onsite STP will be treated and disposed of by irrigation where there is no other beneficial reuse

Subject to meeting thresholds, Project waste emissions to land (air and water) will be estimated and reported annually in accordance with NPI requirements. Monitoring and audit reviews will identify non-conformances and opportunities for improvement that can be addressed by corrective and adaptive management processes set out in the waste minimisation and monitoring plan. The Project will adopt similar waste performance indicators to those in Table 15.5.

Table 15.5 Performance indicators for waste management for the Project

Performance indicator	Target
Establish and maintain a waste minimisation program	Waste minimisation program developed and implemented
Comply with EA conditions	100% compliance
Comply with applicable BMA standards	100% compliance
Apply the waste hierarchy to management of Project waste	Identify opportunities to minimise volumes of waste generated Control strategies applied to each waste type that is consistent with the waste hierarchy Review waste management to identify opportunities for improvement
Safe storage and disposal of waste and hazardous substances	100% hazardous wastes tracked, managed and disposed of in accordance with AS 1940 - The Storage and Handling of Flammable and Combustible Liquids (AS 1940)

15.5.2 Segregation and storage

To prioritise segregation of wastes, waste management areas and receptacles distributed onsite will be easily identifiable, using clear signage and colour coding. Enough appropriately sized bins will be provided to maximise recycling opportunities and appropriate segregation of hazardous wastes. Solid wastes will be retained in wheelie bins and skip bins and liquid wastes will be contained within bunded areas to reduce the risk of accidental release of wastes prior to offsite disposal. Smaller bins and larger bins or skips will be covered (where practical) to reduce the potential for attracting insects and vermin.

Waste handling and storage will aim to control environmental impacts (such as odours, noise from transfer and transport, dust from transfer and transport, leachate from storage vessels and vermin/pests) through:

- designated location for waste collection, sorting and transfer to collection vehicles
- designated traffic routes for waste transport
- covered storage vessels to minimise odours and vermin/pests
- housekeeping practices
- regular monitoring and reporting.

Waste will be sorted and stored for minimum time prior to removal by waste contractor.

15.5.3 Transport of waste

Waste removed from site will be transported by a licensed contractor to a facility lawfully allowed to accept such waste. Waste generation and movements will be monitored, recorded and reported routinely as part of waste contractor reports, environmental performance audits, waste tracking requirements and compliance reporting.

15.5.4 Spill response

Onsite facilities for the storage of flammable and combustible materials will be designed and constructed in accordance with the most current version of AS 1940 to reduce the risk of loss of containment.

Activities will be undertaken in a way that minimises the risk of ground and water contamination through hydrocarbon and/or chemical spills (and the generation of associated waste). Management measures for the prevention of spills and to minimise the risk of harm if a spill occurs include:

- site drainage designed to facilitate retention of spills onsite
- stormwater directed away from potentially contaminated areas
- engineered hardstand above the natural ground level
- construction of appropriate spill containment facilities for all areas where process reagent and petroleum products are stored (e.g. impervious containment and bunding around stationery/fixed storage areas in accordance with Australian Standard (AS) 1940)
- regular inspection and maintenance of spillage control devices
- overfill protection
- efficiency measures such as auto-shutoff nozzles on vehicles

- procedure for the storage and handling of hazardous substances
- procedure for the refuelling and servicing of vehicles and machinery
- prompt spill clean-up and reporting
- spill kits located at points that are easily identifiable, accessible and most likely to be needed such as high-risk areas i.e. refuelling points and the workshops
- firefighting equipment readily available, easily identifiable and accessible in high risk areas associated with hydrocarbons
- appropriate personal protective equipment to be used.

The potential for underground spills will be minimised by:

- storing oil drums in locations where the possibility of impacts from vehicles is minimised
- appropriate housekeeping
- capture of oil drained from machinery during maintenance in containers which will be returned to the surface and pumped into the waste oil storage facility.

15.6 Residual impacts

The Project will generate waste streams similar to other mine site operations in the region through to closure of the mine (approximately 20 years).

The residual impact assessment has been informed by comparing the estimated waste streams produced by the Project against regional waste generation characteristics, as sourced from the Recycling and Waste in Queensland 2018 report (Queensland Government, 2018). The Project will contribute less than 3 per cent of waste landfilled or incinerated in the broader Mackay region, based on the 2017-18 period.

The estimated waste streams produced by the Project will be managed by licensed waste contractors who will be required to comply with industry standards and all statutory requirements pertaining to waste and resource management through condition of contract. Furthermore, complying with the requirements of the Waste Management Plan, potential environmental impacts arising from waste materials associated with the Project are expected to be minor to negligible.

Areas subject to contaminating activities (existing or future) including tyre disposal areas will be identified, listed on the EMR or CLR and remediated where practical. Land contamination is discussed in **Chapter 5 Land resources.**

15.7 Summary and conclusions

During the construction, operation and decommissioning of the Project, wastes generated will be consistent with those waste types generated by other mines operating in the region.

To protect identified environmental values and receptors, BMA will implement a practical framework for waste minimisation and management specifically designed to avoid and minimise waste generation and ensure proper management of wastes generated by the Project.

Throughout all Project phases, waste generation will be minimised through strategic planning, procurement and continuous improvement in the implementation of the waste management hierarchy as set out in the Project specific waste minimisation and management plan. Appropriately licensed waste contractors will be engaged to transport, recycle and dispose of wastes at licensed waste management facilities in compliance with EA and other legislative requirements. In consultation with regional operators, residual wastes will be disposed of at local offsite waste management facilities as appropriate depending on waste type.

Cumulative impacts associated with waste production will be minor due to implementation of a responsible proven waste management approach.