Chapter 26

Waste Management

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26. WASTE MANAGEMENT

26.1 Introduction

This chapter identifies potential wastes that are likely to be generated during the construction, operation and decommissioning phases of the project and describes how waste emissions, discharges and disposals could impact on the relevant environmental values. Measures are proposed to manage those wastes to ensure that regulatory requirements for waste management are addressed and options for waste treatment and minimisation are identified.

Activities associated with the project which are likely to generate some form of waste include:

- construction activities
- clearing and earthworks (dealt with in **Chapters 6, 7, 9** and **10 –** Construction, Operation, Waste Rock and Rejects and Rehabilitation and Decommissioning respectively)
- top soil and waste rock removal
- coal handling and preparation
- office and administrative activities
- meal rooms
- on site storage of chemical and hydrocarbons
- maintenance of site vehicles and machinery
- water treatment plant
- sewage treatment plant
- decommissioning.

Not all waste products are dealt with in this chapter. A number of waste products are more appropriately dealt with in other chapters. **Table 26-1** provides a summary of key waste types dealt with in other chapters.

Table 26-1 Summary of Waste Products Addressed in Other Chapters

Waste product/management	EIS chapter
Details related to waste material specifically from the mining activity and coal processing operations, including subsoils, waste rock and coal reject material.	**7, 9**
Management of stormwater runoff from disturbed areas, including from the waste rock dumps and mine infrastructure areas.	**8, 9, 15, 16**
Management of groundwater inflows into the open pit.	**8, 17**
Management of airborne wastes, other than greenhouse gases.	**22**
Management of greenhouse gases, including fugitive emissions.	**23**

The project has been designed and will be constructed to minimise the use of resources and generation of wastes throughout all phases of the project and to ensure compliance with the relevant legislation relating to waste.

Identified legislation includes, but is not restricted to:

- *Environmental Protection Act 1994*
- *Environmental Protection Regulation 2008*
- *Environmental Protection (Waste Management) Regulation 2000*
- *Waste Reduction and Recycling Act 2011*
- *Waste Reduction and Recycling Regulation 2011*.

Waste is defined by the *Environmental Protection Act 1994* as anything left over or an un-wanted by-product from an activity or surplus to the activity and can either be gas, liquid, solid or energy.

26.2 Description of Environmental Values

The project is located approximately 20 km west of Glenden and approximately 140 km west of the regional centre of Mackay. The project boundary straddles the Isaac Regional Council (IRC) in the south and the Whitsunday Regional Council (WRC) local government area to the north east. The area traditionally has been focused on agriculture however in more recent years the mining and energy industries have experienced rapid growth. A number of council waste facilities exist in the region, including the Glenden Waste Facility, able to service the proposed project.

Table 26-2 lists the environmental values that may be affected by the project's waste streams, examples of the waste streams that may cause an impact and the chapter of the EIS in which those values are described:

Table 26-2 Environmental Values Potentially Impacted by Waste Streams

Environmental value	Waste stream	EIS chapter
Soil quality and land use	▪ unplanned release of contaminants, fuels, hydrocarbons or chemicals ▪ stockpiling of waste rock and subsoils ▪ treated effluent disposal	**6, 7, 8, 9, 13, 14**
Surface water and aquatic ecology	▪ unplanned release of contaminants, fuels, hydrocarbons or chemicals ▪ controlled discharges from water storages ▪ drainage from waste rock ▪ seepage from water and reject's co-disposal storages	**6, 7, 8, 9, 14, 15, 19**
Groundwater	▪ unplanned release of contaminants, fuels, hydrocarbons or chemicals ▪ seepage from water and reject's co-disposal storages ▪ drainage from waste rock	**7, 8, 9, 17**
Air quality	▪ emissions from dust and combustion of hydrocarbons	**22**
Terrestrial ecology	▪ unplanned release of contaminants, fuels, hydrocarbons or chemicals ▪ loss of habitat from area required for waste rock stockpiles	**7, 9, 18**

Environmental value	Waste stream	EIS chapter
Visual amenity	▪ waste rock stockpiles	**9, 25**
Health and safety	▪ spread of vectors of disease ▪ release of pollutants	**32, 33**

Chapter 8 describes the water management system and water balance for the project, including the management of water from waste rock stockpiles, groundwater inflows into the open pits and runoff from areas with mine infrastructure such as the CHPP, coal stockpiles and MIA. **Chapter 9** describes the management of waste rock and rejects, whilst **Chapter 10** describes decommissioning and rehabilitation for the project, including areas where waste rock is stockpiled or where contamination may have occurred.

During the project construction, operation and decommissioning, waste will be managed to avoid adverse impacts on the health and wellbeing of the local community and the surrounding environment.

26.3 Identified Wastes

26.3.1 Overview

The primary source of waste from mining operations is excavated waste rock (overburden and interburden), coarse rejects and fine rejects (tailings) from the CHPP. Rejects management will be required since the ROM coal will require washing on-site. Management of excavated waste and rejects is described in **Chapter 9**.

Waste streams, other than excavated waste and rejects, that are likely to be produced by the project include:

- general waste, typically consisting of putrescible wastes and other general wastes, primarily generated at warehousing, workshop, office and crib room facilities
- general recyclable wastes, consisting of paper, cardboard, recyclable plastics, glass, aluminium, and steel cans, primarily generated at warehousing, workshop, office and crib room facilities
- scrap steel, primarily generated during workshop activities
- waste hydrocarbons, including oils, greases, oily water, oil and fuel filters, and oily rags, generated primarily from workshop and field service activities
- waste chemicals, other than waste hydrocarbon fluids, generated primarily from the workshop and field service activities
- waste tyres, generated from vehicle maintenance
- waste batteries, from vehicle maintenance
- sewage generated at workshop, office and crib room facilities.

A Waste Management Plan will be developed that will include schematic diagrams of processes to be used at each distinct stage of the project, indicating each waste stream and its intended fate. The Waste Management Plan will provide information on the physical and chemical characteristics, any potential variability of composition and generation rates of the key waste materials. A schematic diagram showing the processes involved in coal handling and preparation and the management of associated rejects is provided in **Chapter 7**.

26.3.2 Methodology

The waste streams generated during the construction and operation phases of the project were identified by reviewing the mine design against existing documentation on the generation and management of similar coal mines and other projects that generate similar types of waste. Quantities of waste were estimated based on similar projects, with adjustments made according to anticipated production rates.

The disposal method has been determined to achieve the highest possible level on the waste management hierarchy with regard to the principles in the *Environmental Protection (Waste Management) Policy 2000*.

26.3.3 Construction Waste

The wastes generated by construction activities during the first construction phase of the project and their management are shown in **Table 26-3**. Quantities of waste for the first construction phase were estimated based on similar projects. The second construction phase will generate approximately half of the waste generated during the first construction phase, unless otherwise noted in **Table 26-3**.

Table 26-3 Waste Inventory – First Stage of Construction

Waste type	Source(s)	Disposal method (waste hierarchy)	Controls	Estimated total quantity
Vegetation	Clearing for infrastructure construction (excludes clearing for open pit excavations which is covered in operations)	Recycle	Where required, re-use on site as fencing, fauna habitat. Otherwise, mulch and stockpile for use in revegetation works.	Approximately 300 ha of clearing of which less than 50 ha contains remnant vegetation. For the second construction phase, approximately 300 ha of clearing of which greater than 200 ha is remnant vegetation.
Sediment	Sediment Ponds	Recycle	If emptying of sediment ponds is required during construction then sediment will be dried and reused in construction activities.	Volumes are dependent on seasonality, rainfall and year of mine life.

Waste type	Source(s)	Disposal method (waste hierarchy)	Controls	Estimated total quantity
Sediment affected water	Runoff from construction areas and activities, including MIA, spoil stockpiles, access roads, (including dust suppression) and laydown areas.	Disposal/Recycled (water quality dependant)	Water collected in sumps and reused (such as in dust suppression) or released subject to water quality requirements.	Volumes are dependent on seasonality, rainfall and year of mine life.
Topsoil and some subsoils	During stripping	Recycle	Placed in windrow (stockpiles) for re-use in rehabilitation until such time as it can be used directly in progressive rehabilitation of waste rock dumps.	Approximately 300,000 m3 of top soil stripped in each of the first and second construction phases, all to be used in rehabilitation over the life of the mine.
Excess spoil from construction of TLFs (excluding topsoil)	During earthworks at the TLFs	Recycle	Design aim to balance cut / fill volumes. Refill excavations and use to construct haul roads, pads etc. If necessary, stockpile or spread for use in revegetation works.	<500,000 m3 in each of the first and second construction phases
Scrap metal	Off cuts for construction activities	Avoidance / minimise / recycle	Minimise waste by ordering what is required. Store in designated area for collection by a waste contractor for off-site recycling.	< 100 tpa
Concrete	Construction of infrastructure	Avoidance / minimise / recycle	Minimise waste by producing only the amount necessary. Prepare alternative pour areas for surplus quantities. If possible crush and re-use for road base etc. or dispose in waste rock dump.	<10 t
Timber	Pallets and off cuts from construction activities	Avoidance / minimise / recycle	Minimise waste by ordering what is required. If possible, return good pallets to sender. Chip and reuse on site as mulch for landscaping.	<10 t

Waste type	Source(s)	Disposal method (waste hierarchy)	Controls	Estimated total quantity
Building and construction waste	Scrap plasterboard, bricks, tiles, electrical off-cuts	Avoidance / minimise	Minimise waste by ordering what is required. Return to supplier what is not needed where possible. Store in a designated area for collection by a licensed waste contractor, to be recycled where commercially viable or disposed of at a licensed waste facility.	Unknown
Paints and resins, chemicals such as herbicides, chemical containers	Mining infrastructure area	Avoidance / minimise / disposal	Minimise waste by ordering what is required. Store in designated area for collection by a licensed waste contractor and disposal off site by a licensed waste receiver. Comply with requirements of MSDS.	<2 t
General waste including putrescibles, some plastics	Construction offices, workshop	Avoidance / minimise / disposal	Taken off-site for disposal at licensed waste facility.	<500 tpa during construction
Paper, cardboard, plastics, glass, aluminium cans	Construction offices	Avoidance / minimise / recycle / disposal	Collect and store in a designated area for collection by a licensed waste contractor, to be recycled where commercially viable or disposed of at a licensed waste facility.	<10 t
Sewage	Construction offices, workshop	Treat / recycle / disposal	Sewage conveyed to on-site sewage treatment plant for treatment. After treatment will be pumped to a holding dam or tank and then re-used on site or used for irrigation. Biosolids transferred by truck to a local Waste Water Treatment Plant for treatment or disposal on site in a controlled effluent management system.	20 ML

Waste type	Source(s)	Disposal method (waste hierarchy)	Controls	Estimated total quantity
Waste oil and containers	Workshop	Recycled	Collected on site and stored in a designated bunded facility. Transported off site by a licensed waste contractor to a facility licensed to accept regulated waste for either recycling or disposal.	<50 t
Oil from oily water	Workshop / MIA contaminated stormwater	Recycled / disposal	Oil will be separated from the water and the oil will be collected as per waste oil (above). The separated water will be directed to the mine affected water dams possible reuse on site for dust suppression.	<5 t
Air filters, oil filters, batteries	Workshop	Recycled	Stored in a designated area on site until there are sufficient to be collected by a licensed waste contractor for recycling off -site.	<2 t
Tyres	Light and heavy vehicles	Reuse	Collected and stored in designated area as per the EHP Operational Policy – Disposal and storage of scrap tyres at mine sites (EHP, 2012). Tyres will be repaired and re-used where possible. Where possible, negotiate take-back agreement with tyre supplier. Any on-site disposal of tyres will follow the operational policy after considering any recycling options.	50 t

26.3.4 Operations Waste

Waste rock produced as a direct result of mine pit development and rejects from the CHPP are described in **Chapter 7** and **9**, which includes, per unit quantity of product coal produced:

- the tonnage of raw materials processed
- the amount of resulting process wastes (rejects)
- the volume and tonnage of any re-usable by-products.

A schematic diagram showing rejects from the CHPP is provided in **Section 7.6.1** of **Chapter 7**. The management of topsoil in progressive rehabilitation of waste rock stockpiles, including stockpiling and

recycling of topsoil is described in **Chapter 10** and **13**. Diagrams representing the proposed management of liquid waste streams associated with runoff from disturbance areas on the mine site are presented in **Chapter 8**.

The potential for waste rock to produce acid, saline or sodic waste water, and measures to mitigate potential impacts, are described in **Chapter 9**.

The project involves the mining of approximately 15 Mtpa ROM coal. Waste quantities have been estimated based on data from similar coal mine projects. The estimated volumes of each waste type (apart from waste rock and coal processing and washing wastes) likely to be generated during mine operation and their management are detailed in **Table 26-4**. Quantities of waste for the operations phase were estimated, on an annual basis, based on similar projects.

Wastes from the water treatment plant will generally include chemical drums and other office waste similar to the sewage treatment plant and other office facilities. Chemical waste may be generated depending on the requirements for treating water to remove sediment. Used chemical drums and other office type wastes will be addressed as per the office facilities in the waste inventory. The need to manage other waste (such as to remove sediment) will be reviewed as part of the Waste Management Plan and managed in accordance with legislative requirements.

Table 26-4 Waste Inventory – Operations

Waste Type	Source(s)	Disposal Method (waste hierarchy)	Controls	Estimated Quantity per annum
Vegetation	Progressive removal of vegetation will occur as areas are prepared for mining.	Recycle	Where required, re-use on site as fencing, fauna habitat. Otherwise, mulch and stockpile for use in ground stabilisation and revegetation works.	Approximately 7,000 ha of clearing over the life of the project, of which approximately 2,000 ha is remnant vegetation.
Sediment	Sediment ponds	Recycle	If emptying of sediment ponds is required then sediment will be dried and reused on site.	Volumes are dependent on seasonality, rainfall and year of mine life.
Topsoil and some subsoils	During stripping	Recycle	Placed in windrow (stockpiles) for re-use in rehabilitation until such time as it can be used directly in progressive rehabilitation of waste rock dumps.	Approximately 18 million m3 of top soil and sub soils stripped during the life of the mine, all to be used in rehabilitation over the life of the mine.
Scrap metal	workshop	Avoidance / minimise / recycle	Minimise waste by ordering what is required. Store in designated area for collection by a waste contractor for off-site recycling.	100 tpa
Timber	Pallets and off cuts	Avoidance / minimise / recycle	Minimise waste by ordering what is required. If possible, return good pallets to sender. Chip and reuse on site as mulch for landscaping. If not suitable, dump on site.	<3 tpa
Paints and resins, chemicals such as herbicides, chemical containers	Mining Infrastructure Area	Avoidance / minimise / disposal	Minimise waste by ordering what is required. Store in designated area for collection by a licensed waste contractor and disposal off site by a licensed waste receiver. Comply with requirements of MSDS.	<10 tpa

Waste Type	Source(s)	Disposal Method (waste hierarchy)	Controls	Estimated Quantity per annum
General waste including putrescibles, some plastics	Offices, workshop	Avoidance / minimise / disposal	Taken off-site for disposal at licensed waste facility.	170 tpa
Paper, cardboard, plastics, glass, aluminium cans	Offices, workshop	Avoidance / minimise / recycle / disposal	Collect and store in a designated area for collection by a licensed waste contractor, to be recycled where commercially viable or disposed of at a licensed waste facility.	150 tpa
Sewage	Offices, workshop	Treat / recycle / disposal	Sewage conveyed to on-site sewage treatment plant for treatment. After treatment will be pumped to a holding dam or tank and then re-used on site or used for irrigation. Biosolids transferred by truck to a local waste water treatment plant for treatment and disposal on site in a controlled effluent management system.	<20 ML
Waste oil, oil filter, oily rags and containers	Workshop	Recycled	Collected on site and stored in a designated bunded facility. Transported off site by a licensed waste contractor to a facility licensed to accept regulated waste for either recycling or disposal.	350 tpa oil 200 container units 0.75 t per Mt coal (filters). 25,000 L / annum (rags).
Oil from oily water	Workshop / MIA contaminated stormwater	Recycled / disposal	Oil will be separated from the water and the oil will be collected as per waste oil (above). The separated water will be directed to the mine affected water dams for possible reuse on site for dust suppression.	3 t per Mt of coal (average of 30 Mt per annum)

Waste Type	Source(s)	Disposal Method (waste hierarchy)	Controls	Estimated Quantity per annum
Air filters, batteries	Workshop	Recycled	Stored in a designated area on site until there are sufficient to be collected by a licensed waste contractor for recycling off -site.	150 tpa
Tyres	Light and heavy vehicles, including mining vehicles	Reuse	Collected and stored in designated area as per the DERM Operational Policy – Disposal and storage of scrap tyres at mine sites. Tyres will be repaired and re-used where possible. Where possible, negotiate take-back agreement with tyre supplier. Any on-site disposal (e.g. within the open pit) of tyres will follow the operational policy after considering any recycling options.	200 tyres per annum
Mine affected water and sediment affected water	Groundwater ingress to open cut pits as well as runoff from pit walls, waste rock dumps, the MIA, coal stockpiles, access roads, (including dust suppression)and laydown areas.	Disposal / Recycled (water quality dependant)	Mine affected water collected in dams for release within water quality criteria. Mine affected water and sediment affected water will be available for general site uses such as in dust suppression or coal washing (CHPP) subject to water quality requirements.	Volumes are dependent on seasonality, rainfall and year of mine life. The mine affected water release strategy is presented in **Chapter 8, Section 8.5**.
Process Water	CHPPs	60% of the CHPP plant flow-through is recycled co-disposal supernatant water.	Process water associated with the CHPPs and co-disposal facilities will be managed in a closed circuit such that there are no planned releases. Supernatant or decant water from the co-disposal facilities, will be recycled to the process plants for coal washing.	Supernatant return water from the southern co-disposal dam is approximately 4,650 ML per annum. Supernatant return water from the northern co-disposal dam is approximately 1,500 ML per annum.

26.3.5 Decommissioning Wastes

At the decommissioning phase of the project, a comprehensive assessment of waste will be undertaken in accordance with the waste management hierarchy in order to identify the most appropriate measures to manage the remaining waste on the project site. Site infrastructure will generally be decommissioned and demolished in line with the post mine land use. Further detail on decommissioning wastes and potential management of these wastes is provided in **Chapter 7, 9** and **10**. The potential for the site to be included on the Environmental Management Register or the Contaminated Land Register is described in **Chapter 9, 10** and **14**, along with measures to remediate or manage any potentially contaminated land.

Any construction facilities that are decommissioned following construction phases will be managed in accordance with the waste management hierarchy and the controls described above for construction wastes. Areas of potential contamination will be investigated and managed / remediated if required.

26.4 Potential Impacts and Mitigation Measures

26.4.1 Potential Impacts

Potential impacts of waste generated by the project during all phases of the project, other than waste rock and rejects, include:

- water pollution caused by release or spills of solid or liquid waste either directly to receiving waters or indirectly via run-off from waste contaminated sites
- land contamination caused by spills or inappropriate waste disposal to soil
- groundwater contamination caused by spills of solid or liquid waste
- littering due to unsuitable storage and containment measures for general waste
- odour caused by inappropriate storage and/or treatment of putrescible waste
- increased vermin and potential spread of disease due to inappropriate storage of waste
- reduced visual amenity due to improper storage of waste
- waste of raw materials
- waste of embedded energy and greenhouse gas emissions
- consumption of landfill space , for example, Glenden Waste Facility
- risks to human health and safety through poor management of hazardous materials.

The management methods proposed are based on minimising the potential environmental impacts associated with waste generation at the project.

26.4.2 Mitigation Measures

A detailed Waste Management Plan will be developed for the project that defines and describes the objectives and measures for protecting or enhancing environmental values from impacts by waste. The management measures will be assessed against the waste hierarchy, and describe how the measures will achieve the standards, set and detail objectives that will be monitored, audited and managed.

The purpose of the Waste Management Plan is to detail how the project will:

- comply with all relevant environmental legislation
- minimise the amount of waste created during the project, including during construction
- recycle waste materials where practicable
- minimise the impacts of construction and operational activities

- minimise the storage volumes kept on site, and ensure segregation where appropriate
- ensure that there are systems in place to demonstrate compliance with environmental legislation with respect to waste, including regulated waste disposal
- implement waste control measures that avoid environmental harm to groundwater, surface water, soil, fauna, flora and the community
- implement waste control measures to minimise odour, minimise loss of visual amenity and litter
- minimise impacts to human health
- ensure and promote sustainable practices for waste management for both on-site and off-site.

The scope of the Waste Management Plan will address the management of construction and operational wastes including storage, transport and disposal. The plan will address the principles of avoid, reuse, recycle, recover and disposal and include proposed methods for waste management at each stage of the project to achieve the highest possible level on the waste management hierarchy taking into consideration the *Environmental Protection (Waste Management) Policy 2000.*

Implementation of the Waste Management Plan will be monitored on a regular basis via the project site inspection and auditing requirements.

During the project, the following principles for waste minimisation and management will apply:

- compliance with waste management legislation
- implementation of the waste minimisation hierarchy - waste avoidance, re-use, recycling
- water conservation, treatment and reuse
- efficient energy usage
- effective waste disposal – as the final option.

26.4.3 Summary of Key Environmental Design Features

Key environmental design criteria will be utilised to ensure that the impact of waste is minimised and that the waste containment and storage facilities perform satisfactorily.

26.4.3.1 Liquid Waste

The project will utilise a variety of technologies and practices to control, minimise and re-use liquid wastes. Where practicable, these measures will include:

- segregation and treatment (i.e. oily water separation) of potentially contaminated runoff from mine infrastructure areas prior to release to mine affected water dams
- removal of waste oil from site for re-use
- segregation of water from areas of disturbance from clean water
- maximizing the area of successfully completed progressive rehabilitation so that there is less water from disturbed catchments
- reuse of rejects decant water in the CHPP
- reuse of treated effluent for onsite irrigation or dust suppression
- use of secondary containment structures (bunding) for storage of hazardous liquid wastes
- design of facilities to Australian Standards for the storage and handling of dangerous goods such as fuels and chemicals.

Management of liquid waste associated with rejects is described in **Chapter 8** and **9**.

As described in **Chapter 7** and **8**, the mine affected water will be released from the site subject the quality and volume criteria described in **Chapter 8** and **15**.

A number of options are being considered for management of treated effluent, including irrigation to land as part of rehabilitation or to a separate area. At this stage of planning, discharge criteria have not been established. These will be based on discharge rates of nutrients and other water quality parameters that do not result in long term impacts to soil quality or runoff to watercourses.

26.4.3.2 Solid Waste

The project will utilise a variety of technologies and practices to control, minimise and re-use solid wastes. Where practicable, these measures will include:

- maximise recycling and re-use opportunities
- re-use of cleared site vegetation (including mulching) to aid site rehabilitation and erosion and sediment control following site earthworks
- develop contract conditions with suppliers to minimise waste entering the site
- topsoil and some subsoils will be reused in rehabilitation.

Solid waste will be temporarily stored at the MIAs (refer to figures in **Chapter 7 (Figure 7-15** and **Figure 7-16**) before transfer to a waste disposal facility.

Management of solid wastes associated with waste rock and rejects is described in **Chapter 9.**

26.4.3.3 Air Emissions

The project will utilise a variety of technologies and practices to control and minimise air emission wastes. Where practicable, these measures will include the following:

- vehicles and machinery used will be fitted with appropriate emission control equipment and maintained in a proper and efficient manner in accordance with the manufacturer's specifications
- alternative low emission technologies will be investigated as appropriate including electric drive motors
- efficient blast design
- management of waste rock dump activities during high wind conditions
- dust suppression measures will be implemented, including watering haul roads.

26.4.4 Waste Management Hierarchy

The waste management hierarchy, taking into account the principles in the *Environmental Protection (Waste Management) Policy 2000* will be the primary mechanism to ensure sustainable waste management during all phases of the project.

26.4.4.1 Waste Avoidance

Waste avoidance will be achieved through the consideration of alternative products, implementation of appropriate technology and procurement processes.

26.4.4.2 Waste Re-use

The re-use of waste will be achieved through identifying opportunities onsite and subsequently identifying market demands for waste items. To maximise re-use opportunities wastes will be segregated and stored in designated areas on site. Waste items generated by the project that may be re-used include timber pallets and scrap metal.

Investigations regarding waste re-use will be ongoing throughout the project life. This will include the regular review of marketability of wastes to ensure that potential new and emerging opportunities for waste re-use are realised. **Table 26-5** summarises current market demand for recyclable waste.

Table 26-5 Market Demand for Recyclable Waste

Recyclable product	Potential use	Marketability
Scrap metal	Managed by a licensed waste contractor. Taken from site, shredded or crushed and re-smelted.	High marketability. Ongoing demand from local and global market.
Lead acid batteries	Managed by a licensed waste contractor. Taken from site, batteries are stripped and parts are made into new batteries.	High marketability including within Queensland markets.
Paper, cardboard, glass, cans	Managed by a licensed waste contractor. Taken from site to an appropriate materials recycling facility. Will be re-sold, dependent on product.	Low – medium marketability as markets tend to fluctuate.
Waste oils	Managed by a licensed waste contractor. Taken from site. Oils will be filtered and de-mineralised and distilled to produce oil, or recycled for use as fuel oil.	High marketability including within Queensland markets.
Decommissioned equipment	Decommissioning plan to be developed. Metals to be managed as above and plant and equipment to be sold.	Medium to high marketability due to high value recyclable materials generated.

26.4.4.3 Waste Recycling

Waste recycling will be used on-site wherever practicable. Waste generated through the project that can be recycled includes:

- waste oils
- construction materials
- scrap metal
- paper and cardboard, glass, some plastics, tins and cans
- waste water.

Regulated waste which can be recycled will be transported off-site by a licensed contractor to an appropriate recycling facility.

26.4.4.4 Waste Disposal

Disposal of wastes will only be used where there is no other reasonably viable option available. General waste will be transported to a local landfill for disposal in accordance with regulatory requirements. Regulated waste that cannot be recycled will be transported off-site by a licensed contractor to an appropriate regulated waste facility. Further discussion related to the actual location of waste management facilities is provided in the chapter discussing transport where the waste management transport task is considered.

Byerwen Coal does not intend to develop a landfill on site. This does not preclude the disposal of certain wastes (e.g. tyres and decommissioning waste as described in **Chapter 9** and **10**) into cells within the open pits. The potential impacts of waste disposal in the open pits will further analysed as the

requirements are better defined and waste will not be disposed of in the open pit where there is a risk of ongoing contamination of waters. QCoal may in future assess the potential for the disposal of limited wastes in pit.

26.4.5 Cleaner Production

Cleaner production is a continual improvement process designed to maximise resource usage and operational efficiency in order to minimise waste disposal. Cleaner production techniques applicable to the project during all phases include the following:

- improve operation and maintenance practices to reduce the quantity of resources used and minimise the amount of waste generated. For example, reuse wastewater within the mine water management system and CHPP system.
- select and use the most appropriate technology to reduce the quantity of resources used and minimise the amount of waste generated. This can be achieved by using best available coal extraction to ensure appropriate energy intensity and production efficiency of product coal.
- select the best available technology (considering environmental and economic factors) for the CHPP to ensure optimum water use efficiency and energy efficiency, minimum dust emissions and waste minimisation.
- site extraction design to minimise the volume of waste rock in relation to coal to be removed.
- segregate waste to enable recovery and re-use.
- closed-loop recycling where a product is recycled and used again in the same form.

Chapter 22 describes the waste minimisation methods and technology options to reduce particulate emissions in order to achieve air quality objectives at sensitive receptors. **Chapter 22** identifies that the project will have negligible impact on the levels of nitrogen oxides and sulfur oxides, respectively, in the atmosphere. **Chapter 23** describes the minimisation methods and cleaner technology options to reduce greenhouse gas emissions (carbon dioxide and methane).

26.4.6 Natural Resource Use Efficiency

The water management strategy for the project is described in **Chapter 8** and it is proposed that the mine is a release site, subject to approved volume and quality discharge criteria. Decant water from the co-disposal storage facilities will be reused in the CHPP and, depending on water quality, used for dust suppression and vehicle washdowns.

Raw water will be supplied from the Burdekin to Moranbah water supply pipeline that intersects the project area. In this way, the project is minimising the additional resource use that would be required to source raw water from other sources (e.g. groundwater) and using raw water from an established supply source with capacity to meet project needs without compromising the water supply needs of others.

Power will be supplied by connection to an existing power line that intersects the project area. This will take advantage of existing supply capacity in the electricity supply grid without compromising the energy supply to other users. In addition, resources will not be unnecessarily expended on developing alternative energy supplies such as co-generation plants.

Treated water from sewage treatment systems may be reused in the CHPP or in irrigation of rehabilitation areas. Biosolids from sewage treatment will be preferentially used on site, with appropriate treatment and management, as a means to increase nutrient levels in soils to be used for rehabilitation.

The largest footprint created by the project is associated with the open pits and in-pit and out of pit waste rock dumps. The proponent will progressively rehabilitate waste rock dumps over the life of the project, thereby minimising the disturbance footprint at any one time. Other disturbance areas are associated with co-disposal dams and dams required to store mine affected water. Dam construction will be staged over time, thereby maintaining the most available land for ongoing pastoral activities during the operational life.

26.4.7 Council Waste Facilities

Byerwen Coal proposes to use IRC's Glenden Waste Facility for disposal of general wastes other than:

- wastes that are reused or recycled, either on-site or at a designated facility
- wastes planned for on-site disposal
- regulated wastes or other wastes that cannot be accepted by the Glenden Waste Facility.

Glenden Waste Facility is located on Ewan Drive, Glenden.

26.4.8 Cumulative Impacts

Cumulative impacts from waste generation and management from the Byerwen Coal Project and other projects in the region are described in **Chapter 34**.

26.5 Waste Treatment, Handling and Storage

26.5.1 Waste Treatment

The treatment of sewage and runoff from mine infrastructure areas will be the only waste treatment to occur on-site. Sewage effluent managed on-site will be treated to a standard suitable for irrigation or reuse. Runoff from mine infrastructure areas will, if required, pass through an oily water separator before release to the mine water dams. **Section 26.4.3.1** describes options for sewage management. **Chapter 8** describes the management runoff from areas disturbed by mining.

26.5.2 Waste Handling and Storage

Designated waste storage areas will be planned and constructed across the site in accordance with the Waste Management Plan. The waste storage areas will consist of labelled colour coded bins for different wastes such as metals, paper, oils, batteries, general waste and will be made available where the waste is likely to be generated. Where required, smaller bins will be located throughout offices and site infrastructure to achieve maximum waste recovery and, in this circumstance, the bins will be regularly emptied into the relevant skip. Bins for general waste will have lids and will not to be overfilled to avoid issues with vermin and odour.

The waste storage areas will be bunded or have a suitable containment system in place for the type of waste to be stored. The containment systems will ensure wastes are contained and do not cause environmental harm including surface water and groundwater contamination.

A separate hazardous waste storage area will be available to ensure that any hazardous waste is managed to prevent environmental harm. Measures to be implemented include the following:

- bunds will be designed in accordance with Australian Standard AS 1940 – The storage and handling of flammable and combustible liquids
- the area will have a roof to prevent ingress of rainwater
- regular inspections will be undertaken and any spills will be pumped out and disposed of appropriately

- hazardous waste containers will have lids and be kept closed
- all containers will be clearly labelled as per the legislative requirements
- absorbent material and spill kits will be located in the hazardous waste management area and inspection of these will be undertaken in accordance with the site inspection regime
- where practicable, all loading and unloading will take place within the containment area
- ensure availability of material safety data sheets, which provide information on storage and handling requirements.

26.5.3 Spill Containment and Remediation

Hazardous materials will be stored in appropriate bunding in accordance with Australian Standard AS 1940 and other relevant standards. Spill containment material and spill kits will be located in areas where liquid waste is stored and handled and training in spill response will be conducted for all relevant employees. Where required, bioremediation measures will be undertaken on-site to effect the remediation of any incident involving specific wastes.

26.5.4 Regulated Waste Tracking

The *Environmental Protection (Waste Management) Regulation 2000* (QLD) requires the tracking of "Trackable Wastes" listed in Schedule 1. The predominant types of trackable waste produced by the project are:

- oil and water mixtures or emulsions, or hydrocarbons and water mixtures or emulsions
- grease trap waste
- sewage sludge and residues including night soil and septic tank sludge
- tyres.

All identified trackable wastes are required to be accompanied by a Waste Transport Certificate and there is a requirement for a licensed waste transporter to collect and dispose of the waste utilising the appropriate DEHP procedures.

A register will be developed and maintained for all regulated wastes generated on site. It will include the following details:

- source of waste
- type of waste
- quantity of waste
- storage location and details
- dates of collection
- date of disposal/recycling
- name and details (including licencing details) of transporter and facility used to dispose the waste.

The relevant EHP forms will be completed in line with the requirement under the *Environmental Protection (Waste Management) Regulation 2000*.

26.5.5 Waste Auditing and Monitoring

Waste streams, quantities and waste management practices will be audited during the construction and operational phases of the project. The objectives of auditing the waste management activities include:

- assessment of the actual wastes compared to predicted waste streams and quantities

- monitor potential impacts from wastes
- review the waste transportation records to ensure compliance
- identify improvement in waste management practices, including establishment of waste reduction targets, where possible
- monitor the implementation of the Waste Management Plan.

Regular inspections will be conducted of the designated site waste management areas to ensure that the waste material is appropriately separated, stored and labelled.

26.6 Conclusion

Waste streams, and management of waste streams, associated with waste rock and rejects from coal processing and washing are described in **Chapter 9**. Waste streams associated with runoff from disturbance areas, and the management of these waste streams, is described in **Chapter 8**. Emissions to air, and management of emissions, are described in **Chapter 22**.

This chapter identified all other waste streams during construction, operations and decommissioning; and management methods for these waste streams. With appropriate management these streams are expected to have negligible impact on environmental values. Waste management strategies have been proposed to manage wastes in accordance with the waste management hierarchy, minimise environmental harm and to ensure proper disposal of the waste streams identified where reuse and recycling are not available. A detailed Waste Management Plan will be developed and will form part of the project's overall environmental management systems.