

10. Waste Management

10.1 Waste Management Regulations

The regulatory requirements governing waste management are provided within the Queensland *Environmental Protection Act 1994* (EP Act), the *Environmental Protection Regulation 1998* and associated *Environmental Protection (Waste Management) Policy 2000* (EPP (Waste)), and the *Environmental Protection (Waste Management) Regulation 2000*.

The main aspects of these regulations were presented in **Section 1**.

10.1.1 Waste Definition

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.

The *Environmental Protection Regulation 1998* defines “general waste” as waste other than regulated waste. Regulated wastes are defined in Schedule 1 of the *Environmental Protection (Waste Management) Regulation 2000* as ‘non-domestic’ waste (which is defined in Schedule 7 of the Regulation).

The EPP (Waste) states “Regulated waste,” means a waste that:

- contains a significant quantity and concentration of a hazardous contaminant; or
- the hazardous contaminant exhibits hazardous characteristics because of its toxicity, carcinogenicity, mutagenicity, teratogenicity, flammability, corrosivity, reactivity, ignitability or infectiousness, through its physical, chemical or biological characteristics; or
- the waste may cause environmental harm if improperly transported, treated, stored, disposed or otherwise managed.

10.1.2 Waste Reporting

The National Environmental Protection Council (NEPC) has endorsed a National Environment Protection Measure (NEPM) in the form of the National Pollutant Inventory (NPI).

The NPI is a database designed to provide the community, industry and government with information on the types and amounts of certain substances being emitted to the land, air and water.

Reporting of these emissions under the NPI commenced in July 1998, and will be a requirement for the Project. All NPI information is publicly available through the NPI website (<http://www.npi.gov.au/>).

The main objectives of the NPI are to:

- promote waste minimisation, cleaner production and efficient energy and resource use;
- provide information to industry and government to assist in environmental planning and management; and
- satisfy community demand for accessible information on pollutant emissions to the environment.

The NPI sets out the requirements for reporting, including how a facility triggers a reporting obligation and what substances are on the reporting list. The Project will trigger the NPI because it will be engaged in the activity of coal mining and some of its emissions will exceed the threshold levels for reporting. The Proponent will therefore estimate and report Project emissions to the NPI annually once mining commences.

In reporting waste emissions to the NPI, the Proponent will refer to the Emission Estimation Technique Manual for each of the activities associated with coal mining. The key activities relevant to the Project are:

- mining;
- fuel and organic liquid storage; and
- explosives detonation.

10.2 Waste Management Strategy

Environmental harm will only occur if wastes are not managed properly, especially where there is the potential for hydrocarbon wastes and waste waters to cause land contamination, water and/or groundwater pollution.

The waste management strategies proposed for the Project consider waste management from the concept and planning stages through design, construction and operation. Waste planning for the Project allows for considerable flexibility in the management of all wastes. Adequate separation of components of the waste stream at the point of generation will be practiced by the Project, for example the segregation of steel, glass, paper and aluminium cans.

Maintaining segregation of different types of waste during generation, storage or transportation makes recovery achievable. The appropriate management and storage of wastes will prevent on-site and off-site pollution and enhance opportunities for reuse. Waste will be sent for disposal to landfill if other options have been ruled out. Waste streams will be assessed for potential reuse, prior to transport to an approved disposal facility.

The Project will generate few wastes that will have a market demand. There are likely to be opportunities to reuse and recycle aluminium cans, some containers such as glass bottles, paper, scrap steel and conveyor belt. Some other wastes will be recycled or reused on site, such as pallets and conveyor belt, or disposed of by waste management contractors. The project will review the marketability of its waste for recycling and reuse on a regular basis.

The environmental value to be protected will be that during construction and operational 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 mine.

10.2.1 Waste Management Procedure

The Environmental Management System (EMS) to be developed for the Project will address waste management and endeavour to minimise the quantity of waste generated and improve on the waste disposal and management techniques adopted.

The principles for waste minimisation and management for the Project are:

- implementation of the waste minimisation hierarchy with these waste management options:
 - waste avoidance;
 - waste re-use; and
 - waste recycling.
- water conservation, treatment and reuse;
- efficient energy usage;
- compliance with national and state waste management policies, the EP Act and associated regulatory instruments as a minimum; and
- effective waste disposal (as a last option).

All waste generated on-site during the construction and operation phase will be disposed of in accordance with a Waste Management Procedure (WMP), which will include:

- waste stream characterisation and separation;
- assessment of waste reduction opportunities for identified waste; and
- management of waste in accordance with the waste management hierarchy.

10.2.2 Cleaner Production

Generally, cleaner production can be achieved through any or all of the following techniques:

- input substitution - this is not readily applicable to this Project;
- product reformulation - this is not readily applicable to this Project;
- production process modification - selection of the best available practicable technologies;
- improved operation and maintenance - this refers to the selection and use of the most appropriate processes and equipment;
- reuse of resources that are otherwise wastes; and
- closed-loop recycling – where a product is recycled and used again in the same form.

Aspects of the Project that contribute to cleaner production outcomes include:

- selection of the best available practicable technology (fixed and mobile plant and equipment) for coal extraction and processing to ensure appropriate energy intensity and production efficiency of product coal;
- use of the most appropriate processes and equipment for operation and maintenance, such as the reuse of wastewater within the mine water management and CPP systems; and
- recycling of glass, aluminium, steel and cardboards.

Contracts with construction companies will be prepared to encourage all contractors to adopt best practice waste minimisation procedures. This includes the purchase of materials cut to standard sizes, reuse of concrete formwork where practicable, and source separation and segregation of all recoverable materials. Separate skips will be provided to maintain segregation and maximise economic reuse and recycling, in preference to disposal to landfill.

10.2.3 Waste Tracking

The movement of regulated waste in Queensland is subject to a waste tracking system. The WMP for the Project will incorporate an approved waste tracking system for those wastes that require tracking. The WMP will include procedures for identification of regulated wastes.

In addition, the treatment, storage and transport of regulated waste requires an Environmental Authority under the EP Act. Where a contractor carries out these activities, the contractor will be required to hold the appropriate approvals. This requirement will be incorporated into the WMP.

10.2.4 Spill Containment and Remediation

Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials will be adopted. This will include the use of spill containment material and spill clean up kits located at workshops.

Sites that become contaminated will be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act.

10.2.5 Waste Monitoring

Waste monitoring and auditing will be undertaken at the Project. The purpose of monitoring waste management activities and outcomes on-site include:

- assessing actual waste results and comparing with predicted impacts and mitigation measures;
- monitoring for potential environmental impacts; and
- providing baseline data to enable continuous improvement of waste avoidance, reduction and management measures throughout the Project.

10.3 Waste Inventory, Characteristics and Management

10.3.1 Waste Characteristics

The major sources of waste generation from the Project are shown in **Table 10-1**, **Table 10-2** and **Table 10-3**.

In summary they are:

- waste rock from mining, coal rejects and tailings;
- water from the CPP;
- regulated waste (hydrocarbon waste, detergents, solvents, batteries, tyres);
- general waste (food scraps, paper, rags, cans and glass);
- scrap metal; and
- sewage effluent and sludge.

The characteristics of mining wastes (waste rock, coal rejects and tailings) and their management are discussed in detail in **Section 3.6**.

Water from the Coal Washery Waste Disposal Area will be recovered and reused in the CPP.

10.3.2 Construction Wastes

The wastes generated by infrastructure construction activities at the Project and their management are shown in **Table 10-1**.

Quantities of waste were estimated based on experience at RTCA's Hail Creek Mine, a recently constructed coal mine.

Table 10-1 Site Construction Village – Waste Management: construction phase

Waste Type	Source(s)	Management Method	Approximate Quantity
Cleared Vegetation	Mine, Highway Realignment, Stock Route, Mine Access Road, Conveyor and Access Track, Transmission Line, Site Infrastructure (including: Site Construction Village, CPP, dams and STP), Diversion Channel.	Chip and reuse on-site as mulch for landscaping and erosion control, dispose of in waste dump or rake up and burn.	470 ha
Excavated Waste	Conveyor and Access Track, Transmission Line, Site Infrastructure, Site Fencing.	Refill any excavations and spread any excess over the nearby area and allow to revegetate.	Minor amounts.
	Diversion Channel.	Waste materials will be reused to construct the diversion levees.	200 000 m ³

Waste Type	Source(s)	Management Method	Approximate Quantity
Concrete	Conveyor, Site Infrastructure area and Site Construction Village.	Minimise waste by producing / procuring only the amount necessary. Disposal in waste rock dump.	5 t
Steel/ metal off cuts	Conveyor, Site Infrastructure area and Site Construction Village, Transmission line.	Minimise waste by producing / procuring only the amount necessary. Segregation and collection on-site. Transportation off-site by a waste contractor for off-site recycling.	<1 t (Conveyor) 8 t (Site Infrastructure) <1 t (Site Construction Village) <1 t (Transmission line)
Timber – pallets and off-cuts	Conveyor, Site Infrastructure area and Site Construction Village.	Minimise waste by producing / procuring only the amount necessary. Dispose of in waste dump, chip and reuse on-site as mulch for landscaping and erosion control.	<1 t
Paints and Resins	Conveyor, Site Infrastructure area and Site Construction Village.	Minimise waste by producing / procuring only the amount necessary. Collection on-site and storage segregated area. Transportation off-site by licensed regulated waste transporter, and disposal off-site by a regulated waste receiver.	Minor amounts.
General wastes including putrescible & organic (food waste), some plastics and paper	Construction Offices, Site Construction Village.	General waste will be taken off-site for disposal at the Clermont town landfill.	340 t
Paper and cardboard, plastics, glass, aluminium cans	Construction Offices, Site Construction Village.	Collection and segregation on-site. Transportation by a waste contractor for off-site recycling.	15 t
Grease Trap wastes	Temporary Workshop	Wastes will be collected and disposed of off-site by licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling.	2.5 t
Waste oil and containers	Temporary Workshop	Collected and stored on-site in a bunded tank. Transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling.	45 t
Other hydrocarbon wastes (e.g. grease and black jack)	Temporary Workshop	Collected and transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for treatment and recycling or disposal.	<1 t

Waste Type	Source(s)	Management Method	Approximate Quantity
Oily Water	Temporary Workshop	Oil will be separated from water. The resulting oil will be collected and transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling. The separated water will be disposed of through the STP system.	5 t
Tyres	Temporary Workshop	Tyres will be stored and disposed of in the waste rock dump or transported off-site by a licensed regulated waste transporter to a licensed regulator waste receiver for disposal.	120
Sewage Treatment Plant (STP) waste and residues (sewage sludge)	Construction Offices, Site Construction Village	Buried in waste rock dump.	1 t/a
Sewage Treatment Plant (STP) effluent	Construction Offices, Site Construction Village	STP effluent to be discharged to evaporation ponds or discharged to the process water system, if of sufficient quality.	32 ML /annum (based on 350 EP). Volumes will vary depending on number of personnel living and working on the site.
Water Treatment Plant (WTP) residues	Construction Offices, Site Construction Village	Backflush water from the WTP will be discharged to adjacent backflush settlement ponds and evaporate. The small amount of residue will accumulate in the ponds and the ponds will be remediated at the end of the mine life.	<1 t/a

10.3.3 Operational Wastes

The waste produced as a direct result of box-cut development and mine operation is detailed in **Table 10-2**.

Table 10-2 Mining Wastes

Materials	Estimated Volume	Estimated Quantity of Waste	Waste: Coal (v:v)
Waste Rock	715 Mbcm	1 500 Mt	5:1
Coal Washery Waste (Tailings/Rejects)	6.4 Mm ³	9.7 Mt	1:22

The estimated volumes of each waste type (apart from waste rock and coal washing wastes) likely to be generated during mine operation and their management method are shown in **Table 10-3**.

Quantities of waste have been estimated from mining operations at RTCA's Hail Creek Mine, the BAM and from other industrial developments.

Table 10-3 Waste Management: Operation Phase

Waste Type	Source(s)	Management Method	Approximate Quantity
Road base gravel	Peak Downs Highway and Gregory Developmental Road – partial removal	Excavation and reused for site haul roads and hardstand areas. Surplus to be placed in the North West Waste Dump.	88 000 t
Replacement parts/equipment – (steel/metal)	conveyor	Segregation and collection on-site. Transportation off-site by a waste contractor for off-site recycling.	50 t/a
Waste oil, oily waste and waste from oil separator	workshop	Collected and stored in a bunded tank. Collected and transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling or treatment and disposal.	12.50 t per Mt coal
Oily sludge, absorbent, degreaser, grease, oily rags, oil filters	workshop	Collected on-site. Then transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling or treatment and disposal.	2 t per Mt coal (oily sludges, absorbent, greases) 30 000 L/a (rags) 0.5 t per Mt coal (filters)
Waste Oil containers	workshop	Drained on-site. Drums will be transported off-site by waste contractor for off-site reuse, recycling or disposal. Oil will be collected, then transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling.	Approximately 200 items per year
Conveyor belt	conveyor	Recycled either on-site or off-site, or on-site disposal by burial in waste rock dump	About 30 t /a on average
Scrap metal, drums	Mine plant, including administration, workshops	Segregation and collection on-site. Transportation off-site by a waste contractor for off-site recycling.	3-4 t/a
Rejects decant water	CPP	Decanted from coal washery waste disposal area for recycling.	Average 1070 ML/ annum
Coal Washery Waste (Rejects, Tailings and fines)	CPP	Placed in coal washery waste co-disposal area (See Section 2).	9.7 Mt (life of mine)
General wastes including putrescible & organic (food waste), some plastics and paper not suitable for recycling.	workshop, office	Collection on-site and stored in segregated area. Transportation off-site to Clermont Town landfill.	335 t/a

Waste Type	Source(s)	Management Method	Approximate Quantity
Recyclables – including paper and cardboard, plastics, and glass.	workshop, office	Segregation and collection on-site. Transportation by a waste contractor for off-site recycling.	360 t/a
Hazardous waste - paints & Resins	workshop	Collected on-site and stored in a segregated area. Then transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for treatment and disposal.	<1 t/a
Timber pallets and off-cuts	Mine Plant, including administration, workshops	Minimise waste by producing / procuring only the amount necessary. Dispose of in waste dump, chip & reuse on-site as mulch for landscaping & erosion control.	<1 t/a
Tyres	Mine Plant, including administration, workshops	Tyres will be stored and if not required by local landowners (e.g. for agricultural related purposes) disposed of in the waste dump or transported off-site by a licensed regulated waste transporter to a licensed regulator waste receiver for disposal.	60 per year
Vehicle batteries	Mine Plant, including administration, workshops	Collected on-site in a segregated area. Then transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling.	200 per year
Regulated waste - sewage waste and residues (sewage sludge)	STP	Buried in waste rock dump.	<0.5 t/a
Regulated waste – sewage wastewater discharged from the STP	STP	STP effluent to be discharged to evaporation ponds or discharged to the process water system	32 ML /annum (based on 350 EP) Volume will vary depending on the number of personnel on site
Water Treatment Plant (WTP) residues	Construction Offices, Site Construction Village	Backflush water from the WTP will be discharged to adjacent backflush settlement ponds and evaporate. The small amount of residue will accumulate in the ponds and the ponds will be remediated at the end of the mine life.	<1 t/a

10.3.4 Management of General Wastes

During construction and operation, colour-coded, signed bins will be used to segregate and collect food wastes, paper and recyclables. The bins will be located throughout offices and Site Construction Village areas to achieve maximum economic waste recovery. These bins will be emptied into larger bins or skips regularly. All smaller bins and larger bins or skips will have lids, to reduce the potential for attracting insects and vermin. General wastes will be collected regularly and transported for disposal to the Clermont landfill at Turruma Road.