10. Waste

This section describes the waste generated and the potential impacts identified, in regards to the Project (Rail) during construction, operation and decommissioning phases. The assessment was undertaken in accordance with the requirements of the Terms of Reference (ToR) and a table cross-referencing these requirements is provided in Volume 4 Appendix C ToR Cross Reference Table.

10.1 Introduction

Waste will be generated during the construction, operation and decommissioning phases of the Project (Rail). These phases are described in detail in Volume 3 Section 2. Waste material outputs may be in solid, liquid or gaseous form and are described in terms of their physical and chemical characteristics, variability of composition and generation rates within their waste stream.

The waste management hierarchy for the Project (Rail) follows a framework for prioritising waste management practices to achieve the best environmental outcomes possible. This waste management hierarchy follows a strategy of waste avoidance, re-use, recycling, energy recovery, treatment and disposal.

10.1.1 Methodology

The methodology employed to ensure an accurate as possible understanding of waste generated through the Project (Rail) and the most appropriate waste management plan included:

- A review of the National, State and local regulatory framework relating to waste classification and management
- A review of the waste streams associated with activities during the construction, operation and decommissioning phases of the Project (Rail)
- An assessment of the physical and chemical characteristics of the waste and any associated risk to relevant environmental values
- Calculation of the approximate quantity of waste being generated, during each phase of the Project (Rail)
- Assessment of the potential impacts of the waste and the mitigation of those impacts during each phase of the Project (Rail)
- Development of the Waste Management Hierarchy for the Project (Rail) covering each waste stream during each phase
- Development of the Environmental Management Plan (EMP) framework for waste management

10.1.2 Legislative Requirements

Waste management for the Project (Rail) occurs within the framework of relevant legislation, government policies and government programs administered by the Commonwealth, Queensland and local governments.

10.1.1.1 Commonwealth Legislation

The types and quantities of waste substances generated across Australia are monitored by the National Pollution Inventory (NPI). The Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) manages the NPI Guide (DSEWPaC, 2011). The NPI establishes a 'trigger' threshold for use of various substances. If more than the trigger amount of a substance is used, then emissions of that substance must be reported under the NPI. Annual reporting of Project (Rail) waste emissions to land, air and water will be conducted in accordance with the NPI. Reporting on relevant Project (Rail) activities will be conducted in accordance with the most current relevant Emission Estimation Technique Manuals for specific activities. Emissions will be reported to DSEWPaC and be made publicly available on the NPI database (www.npi.gov.au). Reporting requirements under the *National Greenhouse and Energy Reporting Act 2007* are discussed in Volume 3 Section 8.

10.1.1.2 State Requirements

The *Environmental Protection Act 1994* (EP Act) provides the legal and strategic framework for managing waste in Queensland. The *Waste Reduction and Recycling Act 2011* (WRR Act) has repealed the Environmental Protection (Waste Management) Policy 2000 (EPP (Waste)) under the EP Act.

Waste Reduction and Recycling Act 2011

Some key provisions of the WRR Act relating to the Project (Rail) are:

- A requirement of the Queensland Government agencies and local governments to prepare waste management plans
- Product stewardship arrangements for any waste products that are identified as a growing problem for landfill in the future
- Strengthened litter and illegal dumping offences, including public reporting of vehicle related littering offences

As outlined in the WRR Act, the waste and resource management hierarchy lists the preferred order in which waste and resource management options should be considered:

- Avoid unnecessary resource consumption
- Reduce waste generation and disposal
- Re-use waste resources without further manufacturing
- Recycle waste resources to make the same or different products
- Recover waste resources, including the recovery of energy
- Treat waste before disposal, including reducing the hazardous nature of waste
- Dispose of waste only if there is no viable alternative

These principles have been considered as part of the Project (Rail) waste management options in providing best practice waste management strategies.

The Industrial waste levy has been repealed effective 30 June 2012, which is the first step in a repeal process by the Greentape Reduction legislation. The Greentape Reduction Act will amend the *Environmental Protection Act 1994* and come into force in 2012. One of the key objectives of the Greentape Reduction Act will be to introduce an integrated approval process for all environmentally relevant activities (ERA's), including activities such as mining.

Waste Reduction and Recycling Strategy 2010–2020

The Waste Reduction and Recycling Strategy has been developed by the Queensland Government. The Strategy provides a framework for sustainable waste management from 2010 – 2020. The general goals of the strategy are to:

- Reduce waste
- Optimise recovery and recycling
- Develop sustainable waste industries and jobs

The Project (Rail) waste management will align with the Waste Reduction and Recycling Strategy.

10.1.1.3 Local Authority Requirements

The Project (Rail) is located within the Isaac Regional Council (IRC) Local Government Area. Isaac Regional Council has nine resource recovery centres across the region. The acceptance of waste within the Isaac Regional Council area is governed by the WRR Act.

10.2 Project Waste Streams

10.2.1 Overview

The characterisation of waste streams for the Project (Rail) is based on the concept design of the Project, during the construction, operation and decommissioning phases. A full description of these project components and associated processes are outlined in Volume 3 Section 2 Project Description. The waste characterisation has been undertaken as a desktop assessment based on definitions as described in the WRR Act and the Waste Reduction and Recycling Regulation 2011.

Construction and demolition waste is waste generated as a result of carrying out building work within the meaning of the *Building Act 1975*, Section 5, and includes building, repairing, altering and demolishing infrastructure for building various other infrastructures. It also includes excavation work undertaken to facilitate the above. Commercial and industrial waste is waste resulting from activities including, but not limited to, accommodation services and other business activities including administrative services. The above wastes may also be classified as regulated waste depending on the substance and its chemical composition.

All waste streams associated with the Project (Rail) are defined as either construction or demolition waste, or commercial and industrial waste.

The following waste material generated may fall under either definition, depending upon the activity that has generated the waste:

- Green waste: vegetation, including grasses, trees and shrubs generated from activities associated with site clearing and maintenance
- Spoil: excess soil and material generated from earthworks activities, such as cut and fill and installation of infrastructure and services
- Building and construction waste: waste generated from building, repairing, altering and demolishing infrastructure for building various other infrastructures and constructing infrastructure. The waste typically comprises packaging and surplus construction materials such as timber, steel and metal, concrete, gravel, plastics, sleepers, rail and ballast.

- Domestic waste: waste generated from day to day activities associated with the workforce and associated accommodation, typically comprising food waste, recyclables such as paper and cardboard, glass, aluminium cans, plastics, and materials not suitable for recycling. This also includes organic wastes.
- Commercial waste: waste generated from activities associated with business and administration typically comprising waste stationery, paper and packaging, cartridges, printers, computers and office equipment
- Plant and equipment waste: waste generated from the procurement, operation and maintenance of plant, vehicles and equipment. This may include solid waste such as tyres, batteries, empty parts or oil containers and oily rags. This may also include liquid waste such as oils and oily sludge, fuels, lubricants and hydraulic fluids.
- Wastewater: sewage and wastewater generated from domestic activities such as cooking, cleaning, washing and ablutions and site stormwater
- Exhaust emissions: emitted from the operation of vehicles, plant and equipment

The above waste material outputs may be in solid, liquid or gaseous form.

10.2.2 Construction Phase

Waste generated during the construction phase is generally defined as construction and demolition waste. The construction program for the Project (Rail) defines a number of stages and activities which will take approximately two years (refer Volume 3 Section 2). The two primary stages during the construction phase are:

- Site preparation and civil works
- Track works

Site preparation and civil works includes site clearance, construction camp establishment, installation of temporary and permanent fencing, installation of drainage and water management controls and construction of site access (generally described as the pre-construction phase). It also includes bulk earthworks associated with black soil treatment, construction of cuts and embankments, installation of permanent drainage controls, construction of temporary haul roads, establishment of concrete batching plants, bridges and water course crossing construction.

Track works include the construction and installation of the rail, maintenance facilities, holding yards and supporting infrastructure.

The solid waste generated during the construction phase includes:

- Green waste generated through site clearing
- Spoil generated through earthworks
- Building and construction waste generated through the construction of the workers temporary accommodation camps, installation of services and track works
- Domestic waste generated by the construction workforce
- Plant and equipment waste generated by the vehicles, plant and equipment used to undertake earthworks, building and construction activities such as transport, excavations, haulage, grading and material compaction

Liquid waste generated during the construction phase includes:

- Sewage and wastewater generated by the construction workforce
- Plant and equipment waste generated by the vehicles, plant and equipment used to undertake earthworks, building and construction activities

Gaseous wastes generated during the construction phase include exhaust emissions generated from the operation of vehicles, equipment and plant

10.2.3 Operational Phase

Waste generated during the operational phase includes construction and demolition waste generated through maintenance activities, and commercial and industrial waste generated through ongoing operational activities. Volume 3 Section 2 Project Description outlines the activities associated with the operational phase. Associated wastes generally consist of wastes generated through routine and emergency maintenance of roads, bridges and tracks works and the operation of the maintenance facility. The operational phase will last until approximately 2102.

The solid waste generated during the operational phase includes:

- Green waste generated through clearing or trimming required for general maintenance of the Project (Rail) infrastructure
- Building and construction waste generated through the ongoing repairs or redevelopment of roads, bridges and track works
- Domestic waste generated by the operational workforce
- Plant and equipment waste generated by the vehicles, plant and equipment used to undertake maintenance of track works, and that associated with the operation of the maintenance yard

The liquid waste generated during the operational phase is generated through the maintenance facility and includes:

- Industrial water generated from train washing facilities
- Sewage and wastewater generated by the operational workforce

Waste oils, fuels, lubricants and hydraulic fluids will also be generated from maintenance of plant, equipment and vehicles used during Project (Rail) operations.

Gaseous wastes generated during the operational phase include exhaust emissions generated from the operation of vehicles, equipment and plant used for rail operations, maintenance of roads and bridges and the operation of the maintenance facility (refer Section 7 and Volume 4 Appendix AD Rail Air Quality).

10.2.4 Decommissioning Phase

The Project (Rail) will be in operation while the Mine is in operation. The Mine lifespan is in the order of 90 years. Due to the timeframe until decommissioning, the quantity of wastes likely to be generated during decommissioning and demolition of rail and building infrastructure is uncertain. If the Project (Rail) infrastructure is not designated and approved for an alternative use, it is expected that

decommissioning will involve the demolition and removal of some infrastructure and buildings generating concrete and steel waste.

10.2.5 Waste Inventory

Table 10-1 provides a summary of the wastes expected to be generated onsite during the construction and operational phases of the Project (Rail). These estimates are based on extrapolation of figures from previous audits and assessments undertaken on construction waste generation in Queensland.

Table 10-1 Indicative Construction, Operation and Decommissioning Waste Inventory

Activity	Waste generated	Quantity
Vegetation Clearing	Green waste, including site clearing, ongoing site maintenance and cutting back requirements	Construction - 400 tonnes per year Operation – negligible
Building Construction	Timbers	Construction - 20 tonnes per year Operation - < 1 tonne per year
	Steel	Construction - 10 tonnes per year Operation - <2 tonne per year
	Concrete	To be determined following confirmation of design
Domestic	Food waste	Construction - 70 tonnes per year
	Domestic waste	Construction - 110 m^3 per year
	Recyclables – paper, cardboard	Construction - 40 tonnes per year
	Recyclables – glass	Construction - 5 tonnes per year
	Recyclables - plastic	Construction - 10 tonnes per year
	Sewerage/grey water from cooking, cleaning, washing, ablutions	Construction - 140 m^3 per year
Operation of plant and machinery	Waste oil	Operation - 5 tonnes per year
	Lubricants	Operation - 220 tonnes per year
	Spent solvents	Operation - < 1 tonne per year
	Gaseous emissions	34,237 kt CO2-e
	Tyres	To be determined following confirmation of design
	Other	Construction - 200 tonnes per year
	Personal Protective Equipment	Operation - < 5 tonnes per year

Activity	Waste generated	Quantity
	Biological sludge	Operation - <1 tonne per year

10.3 Potential Impacts and Mitigation

10.3.1 Overview

The construction and operation of the Project (Rail) will generate a range of wastes as identified in Section 10.2. The Project (Rail) will adopt waste management measures to mitigate the potential impacts of waste. Such measures will be in accordance with Federal, State and local waste management legislation and strategies, particularly the principles of a waste management hierarchy. Under this hierarchy, avoidance is most preferable followed by reduction, reuse, recycling, recovery, treatment and finally disposal.

Figure 10-1 provides an overview of waste generated during the construction and operational phases of the Project (Rail).

Figure 10-1 Overview of Waste Generated During the Construction and Operational Phase

10.3.2 Construction Phase

10.3.2.1 Green Waste

Potential Impact

The majority of green waste will be generated through site clearing. Approximately 366 ha of remnant vegetation will be cleared which will generate green waste during the construction phase of the Project (Rail).

Management Measure

The principle management measure is to minimise clearance of vegetation where possible. This will be achieved through careful survey and pegging out of areas to be cleared - removal of vegetation will be minimised wherever possible.

Cleared material will be mulched, chipped and stockpiled for rehabilitation and revegetation works on-site. Larger vegetation materials like hollow logs and hollow bearing trees will be reused in rehabilitation activities where possible or in adjoining bushland to provide habitat for fauna. Weed infected material will not be reused in revegetation and will be destroyed/disposed in accordance with relevant legislative requirements.

Based on the proposed management measures the generation of green wastes is unlikely to significantly impact the Project (Rail) or the environment.

Relationship to Waste Management Hierarchy

- Avoidance – Through route selection (refer Volume 1 Section 1 Introduction) vegetation (in particular remnant vegetation) has been avoided as far as is practicable. Due to footprint requirements, avoiding vegetation clearance entirely is not possible
- Reduction – Only those areas essential for construction and operation will be cleared. Temporary infrastructure will as far as possible be located in existing cleared or degraded areas to reduce the need for vegetation clearing
- Reuse – Cleared vegetation will be reused onsite where possible for rehabilitation and revegetation works, or to provide habitat

10.3.2.2 Spoil

Potential Impact

The majority of spoil generated through the Project (Rail) will be during the site preparation and civil works. The quantity of spoil will be determined upon further detailed design. Spoil not able to be utilised during construction (for example excess quantities, contaminated material, etc) will be managed in accordance with regulatory requirements. Stockpiling and storage on site has the potential to disturb the water quality of existing waterways along the rail alignment and corridor.

Management Measures

The design of the Project (Rail) will be developed to reduce cut and fill and as such, spoil. Generation of spoil will be minimised where possible and reused as backfill or to widen embankments. Spoil that cannot be reused onsite will be moved to an approved landfill site. Spoil will be tested in accordance

with the relevant legislation prior to disposal and stockpiled within the Project area. Topsoil will be stripped and stockpiled separately to spoil for use in revegetation. All stockpiles will be managed.

Based on the proposed management measures the spoil is unlikely to significantly impact the Project (Rail) or the environment.

Relationship to Waste Management Hierarchy

- Avoidance – Avoid unnecessary spoil through detailed design
- Reduction – Minimise spoil through detailed design
- Reuse – Re-use spoil in bunding, backfilling, the construction of embankments and building pads

10.3.2.3 Building and Construction Waste

Potential Impact

Construction activities will generate building and construction wastes including timber, steel, concrete and cabling.

Minor amounts of building and construction waste will be generated through the construction of the construction camp. Steel waste will be generated through the installation of fencing. These wastes have the potential to contribute to landfill.

Building and construction activities associated with the development of track works, such as the track, maintenance facilities, holding yards and supporting infrastructure have the potential to general wastes that may contribute to landfill.

Management Measures

Specific quantities of wastes will be determined following confirmation of design. Detailed design and specifications will minimise the generation of waste during construction. A project procurement plan will outline requirements to avoid the purchase of excess materials: quantities of materials will be carefully managed during procurement to avoid ordering and delivery of excess materials which may be wasted. Building and construction waste is not considered likely to present a significant waste impact for the Project (Rail).

Avoiding unnecessary resource consumption and reducing any waste generated and disposed will be considered as a priority during construction works, however the generation of some waste is unavoidable.

Suitable materials will be reused or recycled where possible:

- Timber will be reused on site where possible, or recycled on or offsite. Excess rail line will be recycled
- Waste concrete will be crushed and recycled where possible
- Any ballast not able to be reused can be sent for recycling
- Quantities of steel wastes will be carefully managed to avoid ordering and delivery of excess materials which may be wasted. Suitable steel off cuts or scrap metal (such as rail line) will be recycled offsite and stored in a dedicated area for periodic collection by a licensed contractor
- Cabling will be recycled

- Recyclable packaging material will be captured and sent to a recycling facility

Relationship to Waste Management Hierarchy

- Avoidance – Procurement procedures will ensure the supply of excess materials is avoided
- Reduction – Through procurement procedures, potential waste generation of excess construction materials will be reduced
- Reuse – Excess steel, concrete and timber will be reused either onsite or at an alternative construction site
- Recycle – Where the material cannot be reused it will be recycled

10.3.2.4 Domestic Waste

Potential Impact

The construction camp will produce domestic waste, generated by the construction workforce. Domestic waste has the potential to contribute to landfill.

Management Measures

Domestic waste will be recycled or composted where suitable facilities are available to do so in preference to disposal to landfill.

Putrescible wastes will be separated and stored in allocated waste disposal bins for collection by a licensed contractor for disposal to a licensed facility.

Recycling bins will be provided around the construction camps. Recyclable materials such as glass, aluminium, plastic and paper will then be taken offsite for recycling.

Due to the opportunity of sorting and recycling of materials, domestic waste generated from construction workers is not considered likely to present a significant waste impact for the Project.

Relationship to Waste Management Hierarchy

- Avoidance – Food scraps and putrescible wastes are an unavoidable component of the construction camp
- Reduction – Management of resources and consumption will reduce waste volumes
- Recycle – Recyclable wastes would be separated
- Recover – Options to consider the conversion of putrescible wastes and food scraps to energy through bio-methanation will be considered. Given the remote location and considerable distances to transport the waste recovery will be limited.

10.3.2.5 Plant and Equipment Waste

Potential Impact

Both the site preparation and civil works, and track works will require the use of plant and equipment, which generate waste through use and maintenance. Waste batteries, empty oil containers, waste oil, oily sludge, oil filters, lubricants, fuel and tyres may contribute to landfill or land contamination, or present a fire hazard.

Management Measures

Vehicle and machinery components will be purchased in bulk and/or with minimal packaging to reduce packaging waste.

Lead acid vehicle batteries will be stored on-site in a designated area within weatherproof battery storage containers. Other dry or gel cell batteries will be stored in dedicated containers within a battery storage area for collection and recycling or disposal by a licensed contractor. A licensed contractor will collect stored vehicle batteries and transport them off-site for recycling, treatment or disposal.

Where practicable, tyres will be repaired and reused. Otherwise tyres will be stored in a designated area free of flammable material.

Where practicable, engine air filters will be recycled off-site by a licenced contractor, or otherwise disposed of at a local waste disposal facility. Engine oil or fuel filters will be crushed and evacuated of oil. Filters will be clearly labelled and appropriately stored in bunded facilities for collection and recycling by a licensed contractor.

Hydrocarbon wastes such as waste oils, fuels, lubricants and hydraulic fluids generated from the maintenance of light vehicles, plant and equipment will be stored in approved containers and conditions onsite prior to removal offsite for treatment and disposal by a licensed waste management contractor, to a licensed waste management facility. Those substances listed in Schedule 1 of the *Waste Reduction and Recycling Regulations 2011* will be disposed of in accordance with regulatory requirements. Refer Volume 4 Appendix D for further details.

All chemicals, fuels and oils will be stored in bunded areas in accordance with Australian Standards to minimise potential for any spills. Oily water generated at interceptors or in the event of a spill involving oil or diesel will be treated to separate oil from water. The separated water will be directed for evaporation or reused on-site for dust suppression. Spilled oil will be removed by a licensed vacuum truck contractor and disposed of at a licensed facility. Oil drums will be drained of all remaining product and stored on-site within a bunded facility for collection by a licensed contractor and recycler.

Decanted hydrocarbons from interceptors will be stored in sealed tanks and will be removed by a licensed vacuum truck contractor and disposed of at a licensed facility. Other waste oils and liquids, including water/sludge mixtures from interceptor pits and grease traps, surplus solvents and surplus sealants, will be stored in designated containers within a dedicated bunded area for collection by a licensed contractor and recycled off-site in accordance with material safety data sheet (MSDS) regulatory requirements.

Other miscellaneous oil/hydrocarbon wastes will be stored in designated bins for collection by a licensed contractor for energy recovery and/or disposal. Coolants will be stored in a separate tank for collection and reconditioning by suppliers.

Based on the proposed management measures plant and machinery waste streams are unlikely to significantly impact the project or the environment.

Relationship to the Waste Management Hierarchy

- Avoidance – procurement processes will ensure the supply of excess materials will be avoided
- Recycle - Appropriate materials will be separated for recycling

- Disposal – All materials that cannot be recycled will be stored and disposed of in accordance with regulatory requirements.

With specific regard to tyres, the following relationship to the Waste Management Hierarchy will apply:

- Avoidance – Operation of plant, machinery and vehicles will generate used tyres. When negotiating purchase agreements with tyre suppliers, the Proponent will seek opportunities for take-back clauses to maximise freight backloading opportunities
- Reduction – Efficient operation of vehicles, plant and machinery may reduce the frequency at which tyres need to be replaced
- Recycle – Used tyres may be reused onsite for other operational activities like bunding or as part of retaining walls. Opportunities will also be explored to recycle scrap tyres onsite and locally through use in impact-absorbing surfaces, bitumen and road construction, pastoral and agricultural use, and civil engineering applications. Relevant consent and requirements for the approval of beneficially reusing exempt waste would be discussed with the Queensland Department of Environment and Heritage Protection (DEHP) prior to this action.
- Disposal – Where there are no feasible uses onsite to reuse used tyres, they will be stockpiled onsite prior to removal to disposal, which will include taking them offsite for recycling by a licenced contractor

10.3.2.6 Wastewater

Potential Impact

Wastewater generated through the Project (Rail) construction includes approximately 140 m^3 of sewage waste for each year of the construction phases. Sewage may impact the water quality of existing waterways along the rail alignment and corridor if not appropriately managed.

Surface water runoff of sediment-laden water may impact the water quality of existing waterways.

Management Measures

Sewage and grey water will be treated on-site prior to disposal and site specific wastewater management plans will be developed and implemented to ensure compliance with effluent treatment and discharge requirements. Based on the proposed management measures (i.e. package onsite waste water treatment plants and irrigation following treatment) the generation of sewage is unlikely to significantly impact the project or the environment.

Temporary site drainage and surface water runoff management (erosion and sediment control plans) will be developed and implemented, including on-site treatment prior to discharge to waterways. Based on the proposed management measures the generation of sediment laden water is unlikely to significantly impact the project or the environment.

Relationship to the Waste Management Hierarchy

- Avoidance – Activities will be designed to only use water as required. In addition, the proposed design packages onsite waste water treatment plants and irrigation following treatment to minimise discharge to the surrounding waterways
- Reduction – Water saving fixtures will be used wherever possible (e.g. ablutions)

- Reuse – Where possible wastewater generated through onsite activities will be treated and reused onsite

10.3.2.7 Exhaust emissions

Potential Impact

Plant and equipment and vehicles are used during the construction of the Project (Rail). Emissions and exhausts can potentially impact air quality within the surrounding environment.

Management Measures

Maintenance of vehicles, plant and machinery will be implemented to ensure efficient operation which will reduce unnecessary exhaust emissions.

As outlined in Section 7 Air Quality (refer also Volume 4 Appendix AD Air Quality Assessment), gaseous exhaust emissions dispersed in to the rural environment are unlikely to be a significant waste issue for the Project (Rail).

Relationship to Waste Management Hierarchy

- Avoidance – Operation of vehicles, machinery and equipment only as necessary
- Reduction – Efficient operation and maintenance of vehicles, plant and machinery will reduce the emissions

10.3.3 Operational Phase

10.3.3.1 Green Waste

Potential Impact

Minimal green waste will be generated through site clearing and cut backs for ongoing site maintenance during operations.

Management Measures

Management measures implemented during the operational phase reflect those of the construction phase outlined in 10.3.2.1.

Relationship to Waste Management Hierarchy

- Avoidance – Vegetation will only be cleared as required in the maintenance schedule or if required for emergency works
- Reduction – Only those areas essential for operations and maintenance will be cleared. Temporary infrastructure and activities will as far as possible be located and/or undertaken in existing cleared or degraded areas to reduce the need for vegetation clearing
- Reuse – The amount of vegetation requiring clearing is not sufficient to warrant effective reuse, however mulched vegetation may be reused for ground cover stabilisation where possible

10.3.3.2 Building and Construction Waste

Potential Impact

Maintenance activities undertaken during the operational phase will generate minimal building and construction waste. Maintenance of roads and bridges will generate construction waste including steel, concrete, gravel and asphalt which may all contribute to landfill.

Management Measures

Suitable materials will be reused or recycled where possible:

- Timber will be reused on site where possible, or recycled on or offsite. Excess rail line will be recycled
- Concrete sleepers will be used for another purpose or crushed and recycled and ballast removed and cleaned off site for reuse. Waste concrete will be crushed and recycled where possible
- Any ballast not able to be reused can be sent for recycling
- Quantities of steel wastes will be carefully managed to avoid ordering and delivery of excess materials which may be wasted. Suitable steel off cuts or scrap metal (such as rail line) will be recycled offsite and stored in a dedicated area for periodic collection by a licensed contractor.
- Cabling will be recycled
- Recyclable packaging material will be captured and sent to a recycling facility

Relationship to Waste Management Hierarchy

- Avoidance – Procurement procedures will ensure the supply of excess materials is avoided
- Reduction – Through procurement procedures, potential waste generation of excess materials will be reduced
- Reuse – Excess steel, concrete and timber will be reused either onsite or at an alternative construction site
- Recycle – Where the material cannot be reused it will be recycled

10.3.3.3 Domestic Waste

Potential Impact

Domestic waste generated during the ongoing operation of the track will be limited to that generated through the operational workforce, predominantly at the maintenance facility.

Management Measures

- Domestic waste will be recycled or composted where possible, with as little waste going to landfill as possible
- Putrescible wastes will be separated and stored in allocated waste disposal bins for collection by a licensed contractor for disposal to a licensed facility.
- Recycling bins will be provided around the maintenance facilities. Recyclable materials such as glass, aluminium, plastic and paper will then be taken offsite for recycling.
- Non-recyclables will be taken offsite for disposal by a licenced contractor for disposal to a licensed facility.

- Due to the opportunity for sorting and recycling of materials, domestic waste generated from construction workers is not considered likely to present a significant waste impact for the Project.

Relationship to Waste Management Hierarchy

- Avoidance – Food scraps and putrescible wastes will be an inevitable component of the construction camp
- Reduction – Management of resources and consumption will reduce waste volumes
- Recycle – Recyclable wastes would be separated
- Recover – Putrescible wastes and food scraps can be converted to energy through bio-methanation. This can be undertaken at an approved facility. However, given the remote location and considerable distances to transport the waste recovery will be limited.

10.3.3.4 Plant and Equipment Waste

Potential Impact

Plant and equipment waste associated with the ongoing operation of the track will be minimal, associated predominantly with activities undertaken at the maintenance yard.

Management Measures

Vehicle and machinery components will be purchased in bulk and/or with minimal packaging to reduce packaging waste.

Lead acid vehicle batteries will be stored on-site in a designated area within weatherproof battery storage containers. Other dry or gel cell batteries will be stored in dedicated containers within a battery storage area for collection and recycling or disposal by a licensed contractor. A licensed contractor will collect stored vehicle batteries and transport them off-site for recycling, treatment or disposal.

Where practicable, tyres will be repaired and reused. Where this is not practicable, then tyres will be stored in a designated area free of flammable material.

Where practicable, engine air filters will be recycled off-site by a local contractor, or otherwise disposed of at a local waste disposal facility. Engine oil or fuel filters will be crushed and evacuated of oil. Filters will be clearly labelled and appropriately stored in bunded facilities for collection and recycling by a licensed contractor.

Hydrocarbon wastes such as waste oils, fuels, lubricants and hydraulic fluids generated from the maintenance of light vehicles, plant and equipment will be stored in approved containers and conditions onsite prior to removal offsite for treatment and disposal by a licensed waste management contractor, to a licensed waste management facility. Those substances listed in the Schedule 1 of the *Waste Reduction and Recycling Regulations 2011* will be disposed of in accordance with regulatory requirements. Refer to Volume 4 Appendix D for further details.

All chemicals, fuels and oils will be stored in bunded areas in accordance with Australian Standards to minimise potential for any spills. Oily water generated at interceptors or in the event of a spill involving oil or diesel will be treated to separate oil from water. The separated water will be directed for evaporation or reused on-site for dust suppression. Spilled oil will be removed by a licensed vacuum truck contractor and disposed of at a licensed facility. Oil drums will be drained of all

remaining product and stored on-site within a bunded facility for collection by a licensed contractor and recycler.

Decanted hydrocarbons from interceptors will be stored in sealed tanks and will be removed by a licensed vacuum truck contractor and disposed of at a licensed facility. Other waste oils and liquids, including water/sludge mixtures from interceptor pits and grease traps, surplus solvents and surplus sealants, will be stored in designated containers within a dedicated bunded area for collection by a licensed contractor and recycled off-site in accordance with MSDS regulatory requirements.

Other miscellaneous oil/hydrocarbon wastes will be stored in designated bins for collection by a licensed contractor for energy recovery and/or disposal. Coolants will be stored in a separate tank for collection and reconditioning by suppliers.

Based on the proposed management measures plant and machinery waste streams are unlikely to significantly impact the project or the environment.

Relationship to the Waste Management Hierarchy

- Avoidance – procurement processes will ensure the supply of excess materials will be avoided
- Recycle - Appropriate materials will be separated for recycling
- Disposal – All materials that cannot be recycled will be stored and disposed of in accordance with regulatory requirements

With specific regard to tyres, the following relationship to the Waste Management Hierarchy will apply:

- Avoidance – Operation of plant, machinery and vehicles will generate used tyres. When negotiating purchase agreements with tyre suppliers, the Proponent will seek take-back clauses to maximise freight backloading opportunities.
- Reduction – Efficient operation of vehicles, plant and machinery may reduce the frequency at which tyres need to be replaced.
- Recycle – Used tyres may be reused onsite for other operational activities like bunding or as part of retaining walls. Opportunities will also be explored to recycle scrap tyres onsite and locally through use in impact-absorbing surfaces, bitumen and road construction, pastoral and agricultural use, and civil engineering applications.
- Disposal – Where there are no feasible uses onsite to reuse used tyres, they will be stockpiled onsite prior to removal to disposal, which will include taking them offsite for recycling by a licenced contractor.

10.3.3.5 Commercial Waste

Potential Impact

Commercial waste has the potential to contribute to landfill. Based on the proposed management measures office wastes are unlikely to significantly impact the project or the environment.

Management Measures

Procurement processes for administrative and office facilities will be managed to reduce excess or inappropriate office materials. Internal practices will include recycling office stationery, cartridges and computer waste.

Use of electronic documents, double-sided printing and reuse of non-confidential printed material will be encouraged to minimise paper waste.

Recycling bins will be provided around site offices. Recyclable materials such as glass, aluminium, plastic and paper will then be taken off site for recycling at regional recycling facilities. Waste computer equipment including monitors, keyboards and printer cartridges will be stored within office areas for collection by a licensed contractor and recycler.

Non-recyclable materials will be removed by a licensed contractor for disposal to a licensed facility.

Relationship to Waste Management Hierarchy

- Avoidance – Procurement processes will be implemented that avoids excess or unrequired office supplies
- Reduction – Internal processes will be implemented to encourage the reduction of the use of office supplies, such as the use of electronic documents and a recycling system for stationary or other waste.
- Reuse – Double-sided printing and reuse of non-confidential printed material will be encouraged to minimise waste paper
- Recycle – Any suitable office materials will be recycled

10.3.3.6 Wastewater

Potential Impact

Wastewater generated during the operational phase includes:

- Industrial water generated from train washing facilities within the maintenance facility
- Stormwater generated from within the maintenance facility
- Sewage and grey water generated from operation of the maintenance facility

Wastewater may impact the water quality of existing waterways or contaminate soil.

Management Measures

Industrial wastewater and/or stormwater will be recycled where possible for reuse in non-potable sources. Sediment laden stormwater will be treated on-site to a water quality standard where it can be discharged to existing waterways in accordance with environmental management procedures.

Based on the proposed management measures stormwater or industrial wastewater is unlikely to significantly impact the project or the environment.

Relationship to Waste Management Hierarchy

Avoidance – activities will be designed to only use water as required

Reduction – water saving fixtures will be used wherever possible (e.g. ablutions)

Reuse – Where possible wastewater generated though onsite activities will be treated and reused onsite.

10.3.3.7 Exhaust emissions

Potential Impact

Plant and equipment and vehicles are used during the operation and maintenance of the Project (Rail). Emissions and exhausts can potentially impact air quality within the surrounding environment.

Management Measures

Maintenance of vehicles, plant and machinery will be implemented to ensure efficient operation which will reduce unnecessary exhaust emissions.

As outlined in Section 7 Air Quality (refer also Volume 4 Appendix AD Air Quality Assessment), gaseous exhaust emissions dispersed in to the rural environment are unlikely to be a significant waste issue for the Project (Rail).

Relationship to Waste Management Hierarchy

- Avoidance – Operation of vehicles, machinery and equipment only as necessary
- Reduction – Efficient operation and maintenance of vehicles, plant and machinery will reduce the emissions.

10.4 Waste Management

10.4.1 Cleaner production

The repealed EPP (Waste) requires that cleaner production be considered in determining how waste is managed. A cleaner production program is defined in the EPP (Waste) to identify and implement ways of improving a production process so that the process:

- Uses less energy, water or another input; or
- Generates less waste; or
- Generates waste that is less environmentally harmful.

Cleaner production principles are generally not applicable during the operational phase. However, Table 10-2 outlines the aspects of the Project (Rail) construction phase where cleaner production principles may be applied.

Table 10-2 Cleaner Production Principles and Adaptation

Cleaner Production Principle	Application to Project
Input substitution	Biodiesel fuels
Production process modification	A Project specific procurement strategy will avoid the purchase of excess materials which may otherwise be disposed.
Technology change	Regenerative breaking
Improved operation and maintenance	The most efficient process equipment and plant will be used for the Project (Rail)

Cleaner Production Principle	Application to Project
Reuse of resources that are otherwise wastes and closed loop recycling	Scrap metal will be managed via a third party licensed recycling contractor. The product will be removed from the site, shredded and either re-smelted or used in the smelting process. Any grade of steel can be recycled to top quality new metal
	Batteries will be managed via a third-party licensed recycling contractor. The lead acid batteries will be removed from the site and stripped with workable components recycled into new batteries.
	Scrap / surplus concrete crushed and re-used where possible.
	Paper, cardboard, glass, some plastics, tins and cans recyclable wastes will be managed via a third-party licensed recycling contractor. The products will be removed from site and taken to a material recovery facility to sort to specifications, baled, shredded, crushed, or otherwise prepared for resale.
	Waste oils will be managed via a third-party licensed recycling contractor. The oils will be taken from the site(s), filtered and demineralised, propane de-asphalted and distilled to produce re-refined base oil suitable for use as a lubricant, hydraulic or transformer oil.

10.4.2 Waste Disposal

Certain waste management activities including disposal and transport of waste are considered to be ERA's and require approval of DEHP and local government. The Waste Regulation also contains requirements for handling specific waste streams.

Wastes that cannot be recycled or reused onsite will be disposed of to minimise environmental harm. All wastes will be disposed in accordance with industry regulation and good practice. Waste disposal facilities within the region include the following:

- Moranbah Resource Recovery Centre
  - Landfill
  - Recycling
  - General waste
- Mackay Regional Waste Management Facility
  - Trade waste
  - Recyclables
  - Waste oil recovery
  - Regulated waste
  - Landfill

10.4.3 Waste Management Plan

Prior to the commencement of construction, operation and decommissioning phases a Waste Management Plan (WMP) will be developed that will include waste management measures controls, monitoring and other safeguards, in line with the relevant legislation and government waste reduction strategies.

The WMP will include and address the following:

- Characterise wastes generated and general volume trends
- The waste management hierarchy when selecting waste management strategies
- Procedures for the identification of regulated wastes and an approved tracking system for regulated waste movement
- Waste removal and transport from site by licensed contractors with disposal only to licensed recyclers or waste disposal facilities
- Procedures for dealing with accidents, spills and other incidents that may impact on waste management
- Measures to ensure wastes do not attract or propagate pests, disease vectors or vermin
- Monitoring of waste streams and auditing against the relevant waste management plan and procedures with measures for continuous improvement
- Training of personnel on procedures concerning waste minimisation, handling, storage, reuse, segregation, collection and disposal
- Identify requirements for waste avoidance, reduction, reuse and recycling
- Provide procedures for handling, stockpiling/storage, and reuse of waste
- Identify disposal sites and relevant testing and approvals required before disposal
- Set out procedures for meeting legislative requirements for transport of waste
- Set out procedures for obtaining the required approvals for off-site management of waste

Waste disposal and recycling facilities will be provided on site by licensed, commercial operator/s in a designated waste transfer station area. Arrangements for any waste to be disposed at landfills will be negotiated with the licensed operator and the relevant local council or private owner.

Any transfers of waste will take place in accordance with legislated docket tracking systems that ensure waste reaches the appropriate destination. Only licensed contractors and drivers will be utilised. Any transporters will be expected to meet legislative requirements for spill control and be equipped with emergency equipment.

In particular, the Environmental Management Plan will be developed together with the construction program to ensure the delivery of construction materials and staging of the construction activities achieves waste avoidance, reduction and resource efficiency principles. Details of the Environmental Management Plan are provided in Volume 3, Section 13.

10.4.4 Designated Waste Storage Areas

A designated waste management area will be constructed for waste sorting and waste storage prior to transport offsite. The waste management area will be a hardstand area and bunded or have a suitable containment system in place for the type of waste to be stored. The area will have

appropriate drainage and leachate collection system in place to assist with the drainage and collection and storage of any potential leachate.

All other solid and semi-solid wastes will be stored in mobile garbage bins and suitably sized roll-on/roll-off bins with proper waste identification, colour and labels to reduce double handling and increase re-sue and recycling.

Liquid wastes will be stored in bulk containers, and smaller containers as required, within bunded areas that will be designed in accordance with Australian Standards and regulatory requirements appropriate to the types of wastes being stored. Bunds will contain 110 per cent of the total volume of the largest container. Bunds containing liquid will be pumped out as required and disposed of appropriately. Spill containment material and spill kits will be strategically located across the construction laydown areas, workshops and maintenance locations and employees will be trained to use the kits.

There will be a dedicated section in each of the temporary and permanent waste management areas for regulated and/or hazardous wastes. They will be stored within a bunded area.

Designated waste transfer areas and stockpiles will be managed appropriately to avoid any impact on the surrounding environment and will contain the following controls:

- Excess non-contaminated spoil stockpiles will be enclosed within a stormwater diversion bund to divert surface run off away from stockpiles during rainfall events
- All general municipal putrescible waste will be temporarily stored within designated bins, no open stockpiling of putrescible waste will occur within permanent or temporary infrastructure
- Recyclable waste including glass, aluminium and paper and cardboard will be separated from non-recyclable waste within designated bins
- Separate temporary stockpiles will be established for construction and demolition waste, green waste and contaminated soil. Each stockpile will include a basal liner and stormwater diversion bunds. Where possible recyclable and non-recyclable stockpiles will be established for each waste stream.

10.4.5 Waste Management Strategies

Figure 10-2 is a schematic of the waste management processes employed during the construction and operational phase of the Project (Rail).

Table 10-3 provides an overview of waste management strategies applicable to the Project (Rail).

Figure 10-2 Schematic of Operational Waste Management Processes

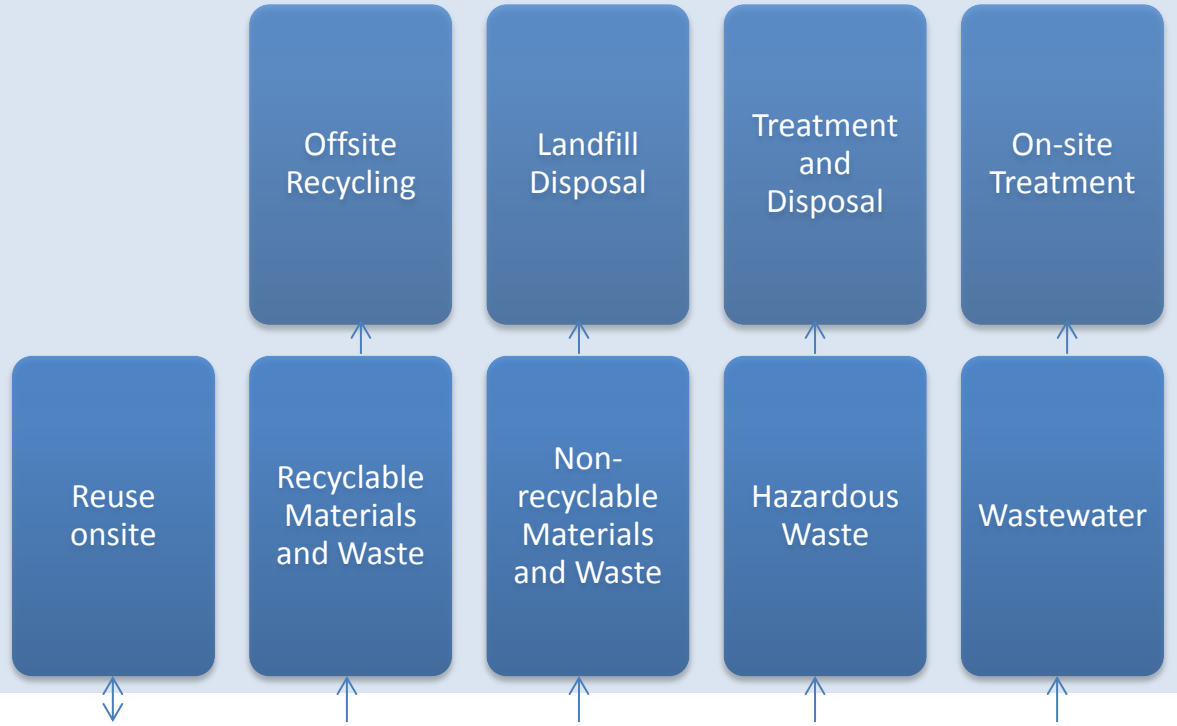

Table 10-3 Waste Management Strategies

Activity	Waste Generated	Management Option
Site clearing	Green waste	◗ Minimise clearance of vegetation where possible. ◗ As far as practicable, ensure that vegetation materials are mulched and used onsite for rehabilitation and revegetation works. ◗ Larger vegetation materials such as hollow logs and hollow bearing trees may be stockpiled for use in rehabilitation activities or placed in adjoining bushland.
Building and construction	Timbers	◗ Suitable wood waste will be reused or recycled where possible, for example for firewood/wood chips.
	Steel	◗ Suitable steel off cuts or scrap will be recycled.
	Concrete	◗ Crush and recycle.
	Sediment laden water	◗ Divert as much stormwater away from disturbed areas as possible. Treat sediment laden water on-site to a quality where water can be discharged to existing environment.
Construction camp and Maintenance	Domestic Waste	◗ Recycling bins will be provided around construction camps, site offices and amenities. Recyclable materials such as glass, aluminium, plastic and paper will then be taken off

Activity	Waste Generated	Management Option
facilities	Industrial waste	site for recycling at regional recycling facilities. ◗ Garbage will be removed by an appropriate licensed contractor for disposal.
	Wastewater	◗ Onsite recycle water where possible for reuse in non-potable sources.
	Sewage	◗ On-site treatment, re-use and disposal.
Excavation works	Excess materials/spoil	◗ Wherever practicable, reuse spoil onsite as backfill or to widen embankments.
		◗ Transport any surplus soil that cannot be reused off – site to an approved landfill site (Mackay Regional Waste Management Facility) where it can be used beneficially (e.g. landfill cap material or to backfill borrow pits). The material would be tested in accordance with relevant legislation prior to disposal. Any reuse would be in accordance with the relevant approval requirements of DEHP and associated exempt waste application guide.
		◗ Locate material and stockpiling areas for spoil within the construction corridor until such time as it can be appropriately treated or disposed of.
		◗ Ensure detailed designs and specifications minimise the generation of waste during construction.
	Contaminated materials	◗ Classification by an appropriately qualified engineer. ◗ On-site treatment if possible or disposal.
Construction works	General construction packaging material	◗ Separate recyclable material including glass, aluminium, plastic and paper will then be taken off site for recycling at regional recycling facility.
		◗ Non-recyclable material sent to licenced landfill facility.
		◗ Project specific procurement plan which outlines specific requirements in order to avoid purchasing of excess materials and subsequent waste.
		◗ Ensure detailed designs and specifications minimise the generation of waste during construction.
	Gaseous emissions	◗ Appropriate maintenance of vehicles, plant and machinery to ensure they run at optimum level.
Operation of plant equipment and machinery	Used oils, fuels etc.	◗ Waste oils and liquids will be stored in designated containers and appropriately disposed of at a licensed facility or recycled where possible. ◗ All chemicals, fuels and oils will be stored in appropriately

Activity	Waste Generated	Management Option
		bunded areas in accordance with Australian Standards to minimise potential for any spills. ◗ Paints and solvent use will be minimised by using pre-painted products where practicable. ◗ Used or waste paints and solvents will be recycled or sent for disposal by an appropriately licensed facility.
Maintenance and track servicing	Ballast	◗ Ballast may be removed and cleaned off site for reuse. Any ballast that cannot be reused can be sent for recycling where it may be crushed and used as construction fill.
	Rails	◗ Steel track will be sent to scrap metal recycler for reuse and recycling.
	Sleepers	◗ Concrete sleepers may be crushed and recycled.
Track demolition	Concrete	◗ Crush and recycle.
	Steel	◗ Steel track will be sent to scrap metal recycler for reuse and recycling.
	Cabling	◗ Recover and recycle.
	Ballast	◗ Wash and reuse where possible, treatment on or off site possible.
	Electrical fittings	◗ Recover and recycle.

10.5 Summary of Waste Impact Assessment

Waste will be generated during the construction, operation and decommissioning phases of the Project (Rail). The waste management hierarchy for the Project (Rail) follows a framework for prioritising waste management practices to achieve the best environmental outcomes possible. This waste management hierarchy follows a strategy of:

- Avoiding unnecessary resource consumption
- Reducing waste generation and disposal
- Re-using waste resources without further manufacturing
- Recycling waste resources to make the same or different products
- Recovering waste resources, including the recovery of energy
- Treating waste before disposal, including reducing the hazardous nature of waste
- Disposing of waste only if there is no viable alternative

The characterisation of waste streams for the Project (Rail) is based on its concept design during the construction and operational phases, and is generally defined as either construction or demolition

waste, or commercial and industrial waste under the WRR Act. The construction phase will include site preparation, civil works and track works. The operational phase will include ongoing operation of the track and maintenance activities. Similar waste material will be generated during both phases, however, in different quantities. These and the associated management measures are as follows:

- Vegetation clearing will be carefully undertaken to minimise vegetation removal and generation of green waste, and where required will be reused for rehabilitation and habitat
- Spoil will be reduced through detailed design based on avoiding excess, and reused, where suitable, for embankments, bunding and backfilling
- Building and construction waste will be reduced through considered purchases as a result of developing a procurement process. Materials such as metals, concrete and timber will be recycled where possible
- Domestic waste will be recycled or composted where possible, with as little waste going to landfill as possible
- Commercial waste will be purchased through a considered procurement process, reducing excess material and associated waste. Materials such as paper, computer and printer waste and equipment will be recycled where possible
- Plant and equipment waste will be recycled where possible, and stored and disposed of in accordance with regulatory requirements
- Wastewater will be treated and reused where possible, or disposed of in accordance with regulatory requirements
- Exhaust emissions will be minimised through efficient use and maintenance of vehicles, plant and equipment

Based on the management measures proposed for the Project (Rail), it is unlikely that the waste generated during the construction and operational phases of the Project (Rail) will have a significant impact.