Section 9

WASTE

9. Waste

This Section outlines the characteristics and quantities of wastes likely to be generated during construction, operation and decommissioning of the Project and provides control guidelines under a waste management strategy. Special consideration is given to the storage, use and potential impacts of hazardous materials on environmental values described elsewhere in this EIS. Project commitments to waste management are set out in Section 18.

9.1 Waste Generation

9.1.1 Construction

Points of waste generation during construction are likely to be associated with:

- Main construction camps: largely domestic and office wastes from three main construction camps located near chainages 35 km, 75 km and 135 km.
- General alignment: wastes produced during the vegetation clearing and earthworks phases will be generally divided into three sections of the alignment based around construction camp locations (chainage 0-75 km, 75-120 km and 120-212 km).
- Remote and temporary camps: these will be temporary structures for construction teams working in remote areas and/or those laying track during later stages of construction.
- Concrete batch plant: this is likely to be located near the Downfall Creek Bridge site.
- Mechanical workshop: there is likely to be one or more of these located as part of the main construction camps; and
- Bridge, culvert and stock crossing locations: these occur at various locations throughout the multi-use corridor, including the at the crossings of Juandah, Roche, Bullock, Bungaban, Cockatoo, Cabbage Tree, Downfall, Ross, Cracow, Delusion, Oxtrack, Boam, Castle, Lonesome, Banana, Ornage, Pigeon, Kianga, Spring, Bottle Tree and Stakeyard Creeks.

Figure 9-1 schematically shows the activities that are likely to generate waste during construction.

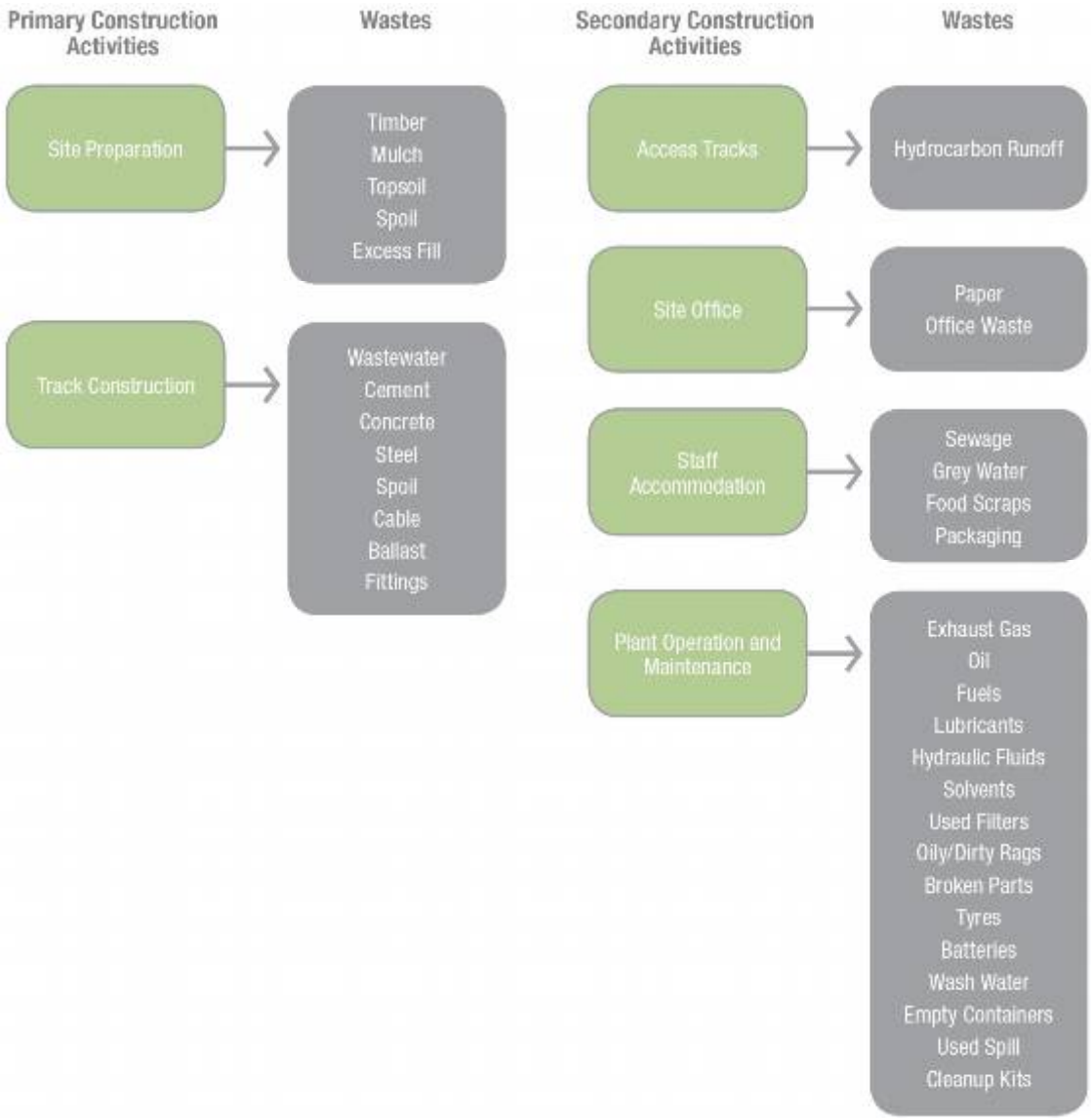

Figure 9-1: Waste Generating Activities during Construction

Table 9-1 provides an outline of waste characteristics, storage and disposal options. The largest volume of waste will be generated from the construction activities for the railway line itself, rather than ancillary services and activities associated with a construction project or the long-term operation of the railway. Estimates for the volume of waste likely to be generated from primary construction activities are not available at this stage of the Project. During the detailed design phase, the quantity estimates will be calculated and a review conducted of appropriate management measures in accordance with the recommendations set out in the EMP (refer to Section 18). Estimates for waste volumes generated by staff accomodation and site offices (main construction camps) is discussed at the end of this Section.

Table 9-1: Waste Characteristics and Disposal Options during Construction

Activity	Waste Generated	Characteristic	Disposal Option	Temporary Storage
Site Preparation – General Corridor				
Removal of vegetation	Timber	Inert solid	Sale	Stockpile
	Mulch	Biodegradable solid	Reuse	Stockpile
Removal of topsoil	Topsoil	Inert solid	Reuse	Stockpile
Excavation of unsuitable in-situ materials	Spoil	Inert solid	Reuse	Stockpile
		Potential contamination	Disposal Treatment and reuse*	Dependent on contaminant type and concentration
Place and compact fill material	Excess fill	Inert solid	Reuse	Stockpile
Concrete Batch Plant				
Concrete manufacture	Process wastewater	Alkaline liquid	Treat for reuse	Sedimentation pond
	Excess cement	Inert solid	Reuse	Stockpile
	Excess concrete	Inert solid	Reuse	Stockpile
Bridge, Culvert and Stock Crossing Locations				
Drainage and structural works	Excess concrete	Inert solid	Reuse	Stockpile
	Excess steel	Inert solid	Recycle	Scrap Metal Skip
Track Construction – General Corridor				
Laying cable	Spoil	Inert solid Potential contamination	Reuse	Stockpile
	Excess cable	Inert solid	Recycle	Scrap Metal Skip
Laying sleepers	Broken or surplus sleepers	Inert solid	Reuse	Stockpile
Placing ballast	Surplus ballast	Inert solid	Reuse	Stockpile
Laying track	Surplus steel	Inert solid	Recycle	Scrap metal skip
	Surplus fittings	Inert solid	Recycle	Scrap metal skip
Plant Operation – General Corridor				
Fuel combustion	CO_2 Water vapour Particulate matter	Inert gas	Disperse to atmosphere	N/A

Activity	Waste Generated	Characteristic	Disposal Option	Temporary Storage
Plant Maintenance – Mechanical Workshop				
Regular plant maintenance (oil change, etc.)	Waste oil, fuel and lubricants Used filters and oily rags	Hazardous liquid and solid	Recyclable or disposable	Liquids in designated drums in a bunded area Filters and rags in a dedicated Mobile Garage Bin (MGB) for contaminated materials
Deeper level plant maintenance	Waste oil, fuel, lubricants, hydraulic fluid, solvents	Hazardous liquid	Recycle or dispose	Designated drum in a bunded area
	Broken parts	Inert solid	Recycle or dispose	Scrap metal skip General waste skip
	Tyres	Inert solid	Recycle	Stockpile in a bunded area
	Batteries	Hazardous solid	Recycle	Stockpile in a covered and bunded area
Wash down	Wash water containing sediment, hydrocarbons and detergents	Contaminated liquid	Treat for reuse	Sedimentation pond
Supply of parts, etc.	Timber pallets and crates	Inert solid	Reuse	Stockpile
Chemical and fuel storage	Empty containers	Hazardous solid	Recycle	Stockpile in a bunded area
	Surplus materials	Hazardous liquid	Recycle or dispose	Designated drum in a bunded area
	Spill cleanup materials	Hazardous solid	Dispose	Dedicated MGB for contaminated materials
Site Personnel Accommodation and Offices – Main Construction Camps				
Dining facilities	Food scraps	Biodegradable	Dispose	General waste skip
	Packaging	Inert solid	Recycle or dispose	General waste skip or recycling MGB

Activity	Waste Generated	Characteristic	Disposal Option	Temporary Storage
Ablutions	Sewage	Biodegradable liquid Biological hazard	Treat Dispose	Onsite sewage treatment plant
Printing	Waste paper	Inert solid	Recycle	Dedicated recycling MGB
Electrical equipment	Used cartridges, toner, etc.	Inert solid	Recycle or dispose	Dedicated recycling MGB General waste skip
Runoff – General Corridor				
Drainage	Runoff potentially containing sediment and hydrocarbons	Potentially contaminated liquid	Treat for reuse	Sedimentation pond

* Dependant on outcome of preliminary site investigations for contaminated land (see Section 4.4).

During construction, hazardous wastes, in the form of hydrocarbons and sewage will be generated from activities such as plant maintenance and on-site personnel ablution facilities. On site storage will be required for petrol, diesel, oil, lubricants, and sewage. The environmental implications of such hazardous materials are summarised in Table 9-2. Note that although explosives may be used during construction, they are not generally considered environmentally hazardous as they are in an immobile state.

Table 9-2: Ecological Information for Hazardous Materials likely to be Stored on site during Construction

Hazardous Material	Ecological Toxicity	Biodegradability
Fuels (unleaded petrol and diesel)	• May penetrate soil to contaminate groundwater; • May accumulate in sediments; • Not expected to bioaccumulate; • Toxic to aquatic organisms, with potential long-term effects; and • Forms a film on water, which may cause physical damage and reduced oxygen exchange.	Inherently biodegradable
Refined mineral oils (lubricants and hydraulic fluid)	• Adsorbs to soil and is immobilised; • Forms a film on water, which may cause physical damage and reduced oxygen exchange; • Likely to be non-toxic to aquatic organisms; and • Potential to bioaccumulate.	Major constituents are inherently biodegradable, minor constituents may persist in the environment

Hazardous Material	Ecological Toxicity	Biodegradability
Greases	• No evidence of bioaccumulation; and • Non-toxic to aquatic organisms.	Inherently biodegradable
Contaminated soils (livestock dip, hydrocarbons and mine wastes)	• Dependent on type of contamination (see Section 4.4).	Dependent on type of contamination (see Section 4.4).
Sewage	• Risk of pathogenic contamination; • Increased turbidity may affect foraging behaviour of aquatic vertebrates; • Biodegradation of carbon-based compounds may reduce dissolved oxygen; and • Nutrients may be toxic to aquatic organisms, or cause algal blooms.	Inherently biodegradable

Construction Camp Waste Quantities

Estimates of domestic waste volumes generated by the construction workforce are based on the following assumptions:

- General domestic waste: 195 kg per person per annum, comprising:
  - Domestic recyclable (e.g. cans plastic bottle, glass, etc.): 65 kg per person per annum; and
  - Domestic non-recyclable (e.g. food, wrapping, etc.): 130 kg per person per annum;
- Sewage and domestic wastewater: 190L per person per day.

Each of the three construction camps has a capacity of 450 people although it has been assumed the maximum workforce onsite throughout the year is unlikely to exceed 1,000 personnel (refer to Section 2.7.1). Based on this assumption, the total waste generated through the operation of the construction camps will be:

- 65 tonnes per annum of domestic recyclable waste;
- 130 tonnes per annum of domestic non recyclable waste; and
- 190 kL per day of sewage and domestic wastewater.

9.1.2 Operation

Figure 9-2 shows the wastes likely to be generated during operation of the Project. The characteristics of these waste materials are as outlined in Table 9-1. It is not expected that any hazardous materials would be stored on site during operation.

Figure 9-2: Waste Generating Activities during Operation

9.1.3 Decommissioning

As for construction, waste will be generated during the physical demolition of the railway and associated ancillary activities. Figure 9-3 schematically shows the activities that are likely to generate waste during decommissioning.

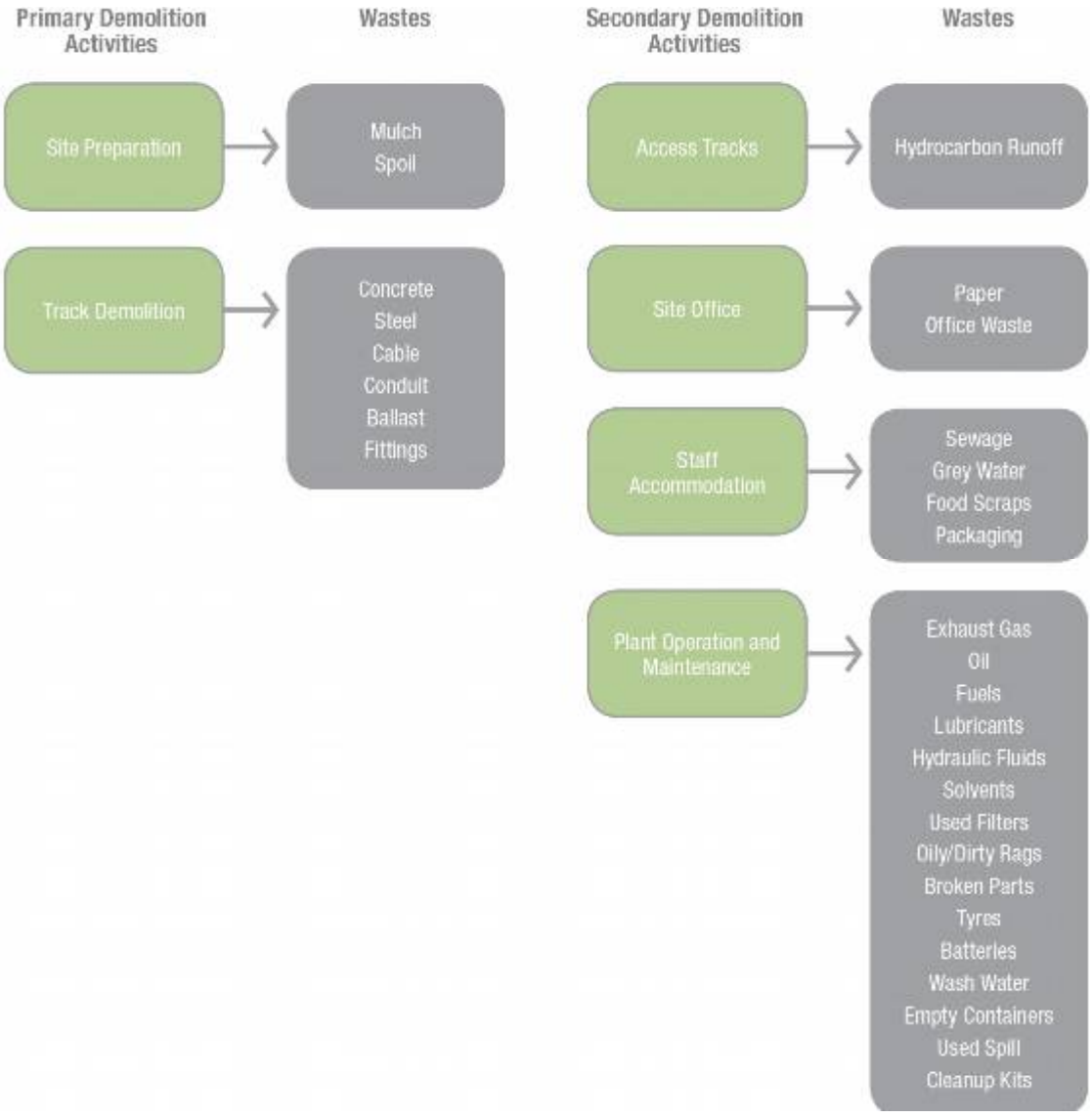

Figure 9-3: Waste Generating Activities during Decommissioning

The characteristics of the wastes are as for those generated during construction. Table 9-3 identifies waste generating activities and disposal options for the wastes. Decommissioning is likely to generate hazardous wastes in the form of hydrocarbons and sewage as per during construction (refer to Section 9.1.1).

Table 9-3: Waste Characteristics and Disposal Options during Decommissioning

Activity	Waste Generated	Disposal Option	Temporary Storage
Site Preparation			
Removal of vegetation	Mulch	Reuse	Stockpile
Removal of filled areas	Spoil	Reuse	Stockpile
Track Demolition			
Drainage works	Concrete	Reuse	Stockpile
	Steel	Recycle	Scrap metal skip
Removing cable	Cable	Recycle	Scrap metal skip
	Conduit	Recycle	General waste skip
Lifting sleepers	Concrete sleepers	Reuse	Stockpile
Removing ballast	Ballast	Reuse	Stockpile
Lifting track	Steel rail	Recycle	Scrap metal skip
	Fittings	Recycle	Scrap metal skip
Plant Operation			
Fuel combustion	CO_2 Water vapour Particulate matter	Disperse to atmosphere	N/A
Plant Maintenance			
Regular plant maintenance (oil change, etc.)	Waste oil, fuel and lubricants Used filters and oily rags	Recyclable or disposable	Dedicated drum in a bunded area Filters and rags in a dedicated MGB for contaminated materials
Deeper level plant maintenance	Waste oil, fuel, lubricants, hydraulic fluid, solvents	Recyclable or disposable	Designated drum in a bunded area
	Broken parts	Recyclable or disposable	Scrap metal skip General waste skip
	Tyres	Recyclable or disposable	Stockpile in a bunded area
	Batteries	Recyclable or disposable	Stockpile in a covered and bunded area
Wash down	Wash water containing sediment, hydrocarbons and detergents	Treat for reuse	Sedimentation pond

Activity	Waste Generated	Disposal Option	Temporary Storage
Supply of parts, etc.	Timber pallets and crates	Reuse	Stockpile
Chemical and fuel storage	Empty containers	Recycle	Stockpile in a bunded area
	Surplus materials	Recycle or dispose	Designated drum in a bunded area
	Spill cleanup materials	Dispose	Dedicated MGB for contaminated materials
Site Personnel Accommodation			
Dining facilities	Food scraps	Reuse	Dedicated MGB for food scraps
	Packaging	Recycle or dispose	General waste skip or recycling MGB
Ablutions	Sewage	Treat for reuse	Dedicated storage tank
Site Office			
Printing	Waste paper	Recycle	Dedicated recycling MGB
Electrical equipment	Used cartridges, toner, etc.	Recycle or dispose	Dedicated recycling MGB General waste skip
Site Access			
Drainage	Runoff potentially containing sediment and hydrocarbons	Treat for reuse	Sedimentation pond

Decommissioning the construction site may also generate a number of once-off wastes for the Project. This may include obsolete furniture, electrical items, fencing and so on. In general, the waste management hierarchy (refer to Section 9.2.2) should be used to identify suitable disposal opportunities for these wastes. For example:

- Furniture or electrical goods may be donated to a charity for reuse;
- Fencing and site offices may be dismantled and used at another construction site; and
- Damaged metal items, such as fencing, may be sold to a scrap metal merchant.

It is likely that the decommissioned construction camps will undergo one or more of the following actions upon decommission:

- Partly or all facilities donated to local authorities and/or townships;
- Down size for operations and maintenance use; or
- Total removal followed by landscaping.

9.2 Waste Management

9.2.1 Waste Management Strategy

The Project has the potential to impact on the environment through resource consumption and through the uncontrolled release of contaminants and waste to the environment. These processes, if not managed appropriately, have the potential to cause direct and indirect harm to the local natural environment.

Potential impacts to environmental values resulting from poor waste management include:

- Contamination of land resulting in additional costs for clean-up, removal and monitoring. See Section 4.4 for more detail.
- Contamination of surface waters (particularly the perennial waters of the Dawson River) resulting in direct impact to aquatic ecosystems and indirect impacts to downstream water users (water is currently sourced for town drinking water, irrigation and industrial supply, as well as having recreational and cultural values). See Section 6.1 for more detail.
- Contamination of shallow sub artesian aquifer systems which are used as a source of stock water, irrigation and domestic supply throughout the region. See Section 6.2 for more detail.
- Injury or death to native fauna or domestic stock who may access inappropriately stored waste, ingest or become entangled.
- Generation of nuisance odours and poor aesthetics for surrounding communities.

In the case of resource consumption, the Project has a broader responsibility to consider the implications at a wider scale (regional, state and national) within the principles of sustainability.

The following Section sets out the principles that underpin a waste management strategy (the waste management hierarchy) that include the requirement for a Waste Management Plan (WMP) and controls for the disposal and release of wastes into the environment. The controls as defined in this Section will be implemented on the Project through the EMP (refer to Section 18).

9.2.2 Waste Management Hierarchy

The Waste Management Hierarchy is defined in Queensland waste management legislation. From most preferred to least preferred the hierarchy is:

- Avoid;
- Reuse;
- Recycle;
- Recover energy; and
- Dispose.

Waste Avoidance

Improper management of waste and procurement results in increased resource consumption. Primarily this is by ordering excess materials that are disposed of as surplus and therefore increase the material requirements of the Project. Waste can be avoided and reduced by planning during the design and procurement stages of the Project. Consideration should be given to the “Waste

Reduction Guidelines" and "Waste Wise Construction Handbook" prepared as part of the Waste Wise program by the Commonwealth Government in 2000.

Reuse, Recycle and Disposal

Construction Materials

Table 9-5 and Table 9-6 present the opportunities available to the Project with regard to reuse, recycle and disposal of solid and liquid wastes. The overarching principle is to prioritise the reuse and recycling of materials. There is opportunity to utilise Council operated waste transfer stations located at Biloela, Thangool and Moura for the acceptance of recyclable commercial waste. Specialist contractors will be sought for those recyclable wastes produced in quantities too large for acceptance by the local waste transfer stations. Likely examples are waste oil, office paper and scrap metal from structure work.

Construction waste that cannot be practicably reused or recycled can be taken to Trap Gully landfill (located approximately 16 km east from Biloela) or other similar facilities by arrangement. The Trap Gully landfill accepts commercial wastes and some regulated wastes. The volume of construction waste to landfill is anticipated to be minimal as most spoil, concrete, sleeper and ballast waste can be either reused onsite or sold on to other users.

Disposing materials to landfill rather than reusing or recycling increases raw material requirements on a global scale and reduces the operational life of local landfills. Opportunities should be explored in consultation with local authorities to help maintain those landfills used by the project, e.g. by transporting excess spoil to local landfills for use as a capping layer.

General Domestic Waste

General domestic waste from construction camps can be segregated and sorted into recyclable and non-recyclable waste streams. For this purpose, recycling facilities should be provided at each construction camp using colour-coded bins. Recyclable wastes can be taken to any of the surrounding council operated waste transfer stations listed in Table 9-4. Plastic recycling facilities are however only available in the major coastal cities of Gladstone, Rockhampton and Bundaberg.

Table 9-4: Local Recycling Facilities

Location	Glass	Cardboard/Paper	Aluminium cans
Banana landfill			✓
Baralaba landfill	✓		✓
Biloela transfer station	✓	✓	✓
Jambin transfer station	✓		✓
Moura transfer station	✓		✓
Thangool transfer station	✓		✓
Theodore landfill	✓		✓

Domestic waste from the construction camps and site offices that cannot be practicably reused or recycled can be taken to one of several local landfills within the region by a licensed contractor. Council-operated landfills are located at Banana, Baralaba, Cracow, Jambin, Moura, Theodore, Wowan and Wandoan. Appropriate odour management strategies will be in place at construction camps to ensure levels of odour are acceptable in accordance with the general environmental duty to

avoid causing an odour, which constitutes and environmental nuisance under s15 of the Environment Protection Act 1994.

Sewage and Domestic Wastewater

Temporary onsite sewage treatment plants may be built for each construction site so that sewage can be treated onsite to a level suitable for reuse, or at least to a level whereby discharge into the surrounding catchment will not cause any adverse downstream impacts. Each sewage facility should have a capacity of 70 kL/day. Reuse options for treated water include toilet flushing, watering of revegetated areas and dust reduction.

Table 9-5: Potential Management Measures for Solid Wastes

Waste	Management
Reusable	
Timber	• Contract sawmill to take good timber prior to construction.
Mulch	• Mulch cleared vegetation; • Stockpile for use on site or transport off site; • Use as a stabiliser on disturbed areas of the construction site; • Sell to a landscape supplier; and • Sell as biofuel.
Timber pallets and crates	• Stockpile on site for transport off site; • Return to manufacturer for reuse; and • If broken, may be disposed to landfill.
Topsoil	• Stockpile for use on site; and • Spread topsoil on areas adjacent the railway line to re-establish vegetation.
Spoil	• Stockpile for use on site or transport off site; • Use as topsoil on areas adjacent the railway line to re-establish vegetation; • Use in other developments that require fill; and • Sell to landscape supplier.
Concrete	• Crush and stockpile for use on site or transport off site; • Use as aggregate or drainage material; and • Sell to landscape supplier.
Sleepers	• Crush and stockpile for use on site or transport off site; • Use as aggregate or drainage material; and • Sell to landscape supplier.
Ballast	• Crush or leave whole and stockpile for use on site or transport off site; • Use on other construction projects; and • Sell to landscape supplier.
Recyclable	
Steel, cable, metal fittings, metal parts	• Store in a scrap metal skip for transport off site; and • Sell to scrap metal merchant.

Waste	Management
Tyres	• Stockpile in a concrete or compacted hardstand area with a bund for transport off site; and • Engage a licensed sub-contractor to collect and recycle tyres.
Batteries	• Stockpile in a covered concrete or compacted hardstand area with a bund for transport off site; and • Engage a licensed sub-contractor to collect and recycle batteries.
Empty fuel or chemical containers	• Store in accordance with label; or • Stockpile in a concrete or compacted hardstand area with a bund for transport off site; and • Engage a licensed sub-contractor to collect and recycle containers.
Waste paper	• Store in dedicated waste paper MGB for transport off site; and • Engage a licensed sub-contractor to collect and recycle waste paper.
Packaging	• Store in a commingled recyclables skip or MGB for transport off site; and • Engage a licensed sub-contractor to collect and recycle.
Used cartridges, toner, etc.	• Store in a dedicated MGB for transport off site; and • Deliver to Australia Post in Taroom or Moura for recycling.
Disposable	
Spill Cleanup Materials	• Store in dedicated MGB for contaminated material for transport off site; and • Engage a licensed sub-contractor to dispose of wastes in accordance with Queensland waste legislation.
Oily rags, used filters, etc.	• Store in dedicated MGB for contaminated material for transport off site; and • Engage a licensed sub-contractor to dispose of wastes in accordance with Queensland waste legislation.
Food Scraps	• Store in a general waste skip for transport off site; • Remove putrescibles wastes from site at weekly intervals as a minimum; and • Engage a licensed sub-contractor to dispose of wastes to a licensed landfill.
Non-recyclable packaging and office waste	• Store in a general waste skip for transport off site; and • Engage a licensed sub-contractor to dispose of wastes to a licensed landfill.

Table 9-6: Potential Management Measures for Liquid Wastes

Waste	Management
Reusable	
Stormwater runoff, process and vehicle wash water	• Develop a Drainage, Sediment and Erosion Control Plan and Stormwater Management Plan for the capture and treatment of site runoff water (see Section 6.1.9); • Use for dust suppression; and • Use for vegetation establishment.
Recyclable	
Oils, fuel, lubricants, hydraulic fluids, etc.	• Store in accordance with label; or • Stockpile in a concrete or compacted hardstand area with a bund for transport off site; and • Engage a licensed sub-contractor to collect and recycle liquids.
Disposable	
Sewage	• For remote day-camp sites: store in holding tanks for transport off site and engage a licensed sub-contractor to collect and dispose liquid to a licensed treatment facility; and • For main camp sites: treat onsite with appropriately sized sewage treatment plants.

9.2.3 Onsite Waste Storage and Treatment

The following waste storage and treatment measures will be included in the EMP, as a minimum:

- All waste storage sites are to be located on high ground, above high water levels;
- Uncontaminated soil stockpiles are to be placed and maintained in accordance with the relevant Erosion and Sediment Control Plan for that site and those sedimentation and runoff mitigation measures outlined in Table 6-10;
- Contaminated soil stockpiles are to be handled and stored in accordance with the relevant Site Management Plan/Remedial Action Plan as outlined in Table 4-7. Onsite treatment rather than offsite disposal is preferred, however, this will be dependent on the type and severity of contamination (see Section 4.4 for more detail);
- Hazardous materials are to be handled and stored in accordance with the mitigation measures and relevant standards outlined in Table 4-8. This includes the requirement to store hazardous materials in accordance with AS 1940 and 3780 and to maintain Material Safety Data Sheets (MSDS) for all hazardous material stored onsite (a MSDS contains human and ecological toxicity information that is essential to understand when evaluating spill response);
- Cement waste (solid and liquid components) are to be stored and treated in accordance with those measures outlined in Table 6-8;
- Sedimentation ponds are to be constructed and maintained in accordance with the *Soil Erosion and Sediment Control Guidelines for Queensland Construction Sites* (1996 or later, if available at time of construction);

- All trackable wastes, including contaminated soil, effluent, lead acid batteries, oil and grease and used spill absorbent material, are to be removed from site and disposed of by a waste transporter and receiver licensed through the Queensland EPA to handle that particular type of waste. Copies of all Waste Transport Certificates are to be kept by the Construction Contractor for a period of five years in accordance with Schedule 2 of the *Environmental Protection (Waste Management) Regulation* 2000; and
- Sewage from the main construction camps will be treated onsite to a level suitable for reuse, or at least to a level whereby discharge into the surrounding catchment will not cause any adverse downstream impacts.

9.2.4 Waste Management Plan

Waste Management Plans (WMP) should be developed for construction, operation/maintenance and decommissioning of the Project. The WMP should be developed in consideration of the Waste Management Hierarchy (as described in Section 9.2.2) and should detail wastes, temporary storage, treatment and disposal. It should also identify the individual waste management responsibilities of personnel.

The purpose of the WMP is also to set out a strategy for the control of contaminants into the environment. As shown in Table 9-2, the uncontrolled release of waste products has the potential to cause direct harm to the receiving environment. Management measures for the control and disposal of contaminated material as set out in Table 9-5 and Table 9-6 will be implemented through the EMP (refer to Section 18).