15. Waste

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15.1 Introduction

15.1.1 Overview

This chapter sets out the key issues pertaining to waste generation and management during the construction and operation of the Lower Fitzroy River Infrastructure Project (Project). Waste management measures are identified to reduce or mitigate any potential impacts associated with waste generation. The assessment addresses Section 5.133 – 5.134 of the environmental impact statement terms of reference (ToR). A table cross-referencing the ToR requirements is provided in Appendix B. Contaminated land and the potential to contaminate land as a result of the Project is addressed in Chapter 5 Land. Management measures relating to waste are used to inform the environmental management plan (EMP) contained in Chapter 23 as applicable.

15.1.2 Methodology

The methodology for assessing the potential waste generation impacts associated with the Project included:

- A review of National, State and local regulatory frameworks relating to waste management
- A review of the waste streams generated by the Project. Waste streams were identified based on similar construction projects and operations
- Estimation of potential waste volumes associated with each waste stream
- Identification of waste management options in accordance with the waste management hierarchy (Section 15.1.3)
- Inclusion of waste management requirements in the EMP (Chapter 23).

15.1.3 Relevant legislation, policies and strategies

Legislation relevant to waste management is discussed in detail in Chapter 3 Legislation and project approvals, including the *Waste Reduction and Recycling Act 2011* (Qld) (WRR Act) that prescribes the waste and resource management hierarchy as follows:

- 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.

Policies and strategies relevant to waste management include the following.

- Commonwealth National Waste Policy.

  Australia's *National Waste Policy: Less Waste, More Resources* (EPHC 2009), seeks to reduce the impact to the environment from waste disposal. It also seeks to enhance, build on or complement existing policy and actions at all levels of government. This policy sets the direction for Australia over a 10 year period to produce less waste for disposal and manage waste as a resource to deliver economic, environmental and social benefits. The overall objectives of implementing the *National Waste Policy* are that all wastes, including hazardous wastes, are managed consistent with Australia's international obligations, and for the protection of human health and the environment. The policy also seeks to ensure that the risks associated with waste are understood and managed in the future to minimize intergenerational legacy issues.

- Commonwealth National Environmental Protection Measures (NEPMs).

  NEPMs are made under the *National Environment Protection Council Act 1994* (Cth). The following NEPMs are considered relevant to the management of Project waste:

  – National Environment Protection (Movement of Controlled Waste between States and Territories) Measure
  – National Environment Protection (National Pollutant Inventory) Measure
  – National Environment Protection (Used Packaging Materials) Measure.

  Implementation of NEPMs is largely handled by jurisdictional agencies at the Commonwealth and State levels of government. These jurisdictions are required to report annually to the National Environment Protection Council on the implementation of the NEPMs. As such, a number of Commonwealth and State waste management legislation and policies are made in accordance with NEPMs, including elements of the WRR Act.

- Queensland Waste Reduction and Recycling Strategy 2010 – 2020. (State of Queensland 2010).

  The *Waste Reduction and Recycling Strategy 2010 - 2020*, developed by the Queensland Government, provides a framework for sustainable waste management over a ten-year period. The general goals of the strategy are to:

  – Reduce waste
  – Optimise recovery and recycling
  – Develop sustainable waste industries and jobs.

  Waste management for the Project will align with the *Waste Reduction and Recycling Strategy 2010 - 2020*.

Further to national and State policies and strategies, local government requirements for waste management have been considered.

The Project (and in particular the weir sites themselves) is located within the jurisdiction of the Rockhampton Regional Council and Livingstone Regional Council (following de-amalgamation in January 2014) local government areas. The Rookwood Weir impoundment and the new bridge at Foleyvale Crossing are located within the Central Highland Regional Council local government area. Requirements of these local government's former planning schemes have been considered with regards to the Project waste management strategy.

15.2 Project waste streams and associated impacts

15.2.1 Overview

This section outlines the solid and liquid waste streams associated with the Project and their potential impact on the local area's existing environmental, social and economic values. The identification of waste streams was based on the conceptual design of construction (including pre-construction activities) and operational phases. Decommissioning is also considered. Gaseous/atmospheric emissions including exhaust and fugitive emissions associated with the Project are discussed in Chapter 12 Air quality and Chapter 13 Greenhouse gas emissions. Detail on the transport, storage and handling of hazardous substances is provided in Chapter 20 Hazard and Risk. Management of contaminated land is described in Chapter 5 Land.

15.2.2 Construction related waste streams

Table 15-1 provides a summary of likely waste streams during construction activities, waste types, approximate quantities and potential impacts. No onsite workers' accommodation is proposed. Management strategies are discussed in Section 15.3.

15.2.3 Operation related waste streams

During the operational phase of the Project, waste generation would be primarily from maintenance services and site facilities. While there will be no permanent staff present on site during operations the main waste streams would be general waste from visiting staff and wastewater associated with this workforce. The volumes of these wastes would be minimal and managed by the operator.

15.2.4 Decommissioning related waste streams

During the decommissioning phase, the main waste streams will be building and demolition waste associated with the decommissioning of permanent infrastructure, plus general waste and wastewater associated with the workforce. The design life of the weir infrastructure is 100 years and as such prescriptive planning for decommissioning cannot be undertaken at present as best practice standards and legislative requirements are likely to change over the life of the Project.

Table 15-1 Construction waste streams

Activity	Waste generated	Approximate quantity	Potential impacts in the absence of mitigation measures
Vegetation clearing	Green waste	46 ha	Inappropriate management of green waste could result in the spread of weeds and increased fire risk. The potential impacts associated with the clearing of vegetation are discussed in Chapter 6 Flora.
Construction workers	Domestic waste such as food scraps, cardboard, glass, aluminium cans, plastics and packaging	Non-recyclable - minor Recyclable - minor	Poor management of general waste has the potential to impact the amenity of the site and its surrounds, increase hazards to human and ecological health, increase the fire hazard of the site and attract vermin, insects and pests.
	Wastewater (sewage and grey water)	2295 kL*	Onsite workers accommodation is not proposed therefore site facilities are limited to ablutions and wash down areas. Potential impacts which may arise from sewage effluent involve unpleasant odours and contamination of the surrounding environment due to leaks and / or its accidental release.
Construction building activities	Timber (pallets and off-cuts)	Minor	Inappropriate storage of building waste streams could result in the contamination of land and / or water which could result in site remediation requirements.
	Scrap metal	Minor	
	Concrete (primarily associated with removal of low level causeways at river crossings)	Nominally 500 m^3	
	General building material	Minor	
	Wastewater (runoff)	Minor	Waste water may be generated as stormwater runoff or during wash down activities at concrete batch plants. If not appropriately managed, this waste could impact surface water quality through increased turbidity and changes to pH.
Blasting (ammonium nitrate fuel oil, boosters and detonators)	Explosive waste - containers, caps, wires and packaging	Minor	Blasting would generate minor quantities of explosives waste.

Activity	Waste generated	Approximate quantity	Potential impacts in the absence of mitigation measures
Cleaning equipment and machinery	Wastewater (wash down) (may include regulated waste**)	Currently unknown, anticipated to be minor	Washing down equipment and / or machinery creates run off which may contain detergents, oils, sediments and seeds of weeds. Potential impacts which may arise from this include decreased water quality, the reduction in aquatic habitat values and the spread of invasive weeds.
Equipment and machinery maintenance	Regulated wastes such as hydrocarbon wastes including lubricants, oily waste waters and sludges	Currently unknown, anticipated to be minor	Hydrocarbon wastes are generally regulated. Impacts arising from hydrocarbon wastes may include contaminated water, soil and / or groundwater which may lead to consequential impacts to human health and ecological processes.
	Regulated waste – tyres and batteries	Anticipated to be minor	If inappropriately managed, waste tyres and batteries have the following potential impacts: • Creation of mosquito breeding habitat • Fire hazard and associated air toxins • Land contamination from lead acid vehicle battery discharge • Contribution to landfill.
Earthworks, hardstand and road construction	Excavated waste/spoil	10,000 m^3 (Eden Bann Weir) 350,000 m^3 (Rookwood Weir)^	Inappropriate management of excavated waste material could lead to high sediment loaded run off into waterways reducing the water quality and impacting ecological processes.
	Waste aggregate	1,410 bcm#	Waste aggregate, inappropriately managed, has the potential impact of sedimentation in waterways near the spoil area.

*Based on water usage of 25 L/person/day for onsite activities such as ablutions. Assumes 612 working days per year over 2 years (150 persons)

** As listed in Schedule 7 of the Environmental Protection Regulation 2008

^Based on wastage of between five per cent and ten 20 per cent

#Based on 1 per cent wastage rate of estimated quantity at Eden Bann Weir (53,300 bcm) and Rookwood Weir (87,700 bcm)

15.3 Waste management

15.3.1 Waste Management Plan

A Waste Management Plan (as part of the EMP (Chapter 23)) will be developed for the Project prior to the commencement of construction. The Waste Management Plan would apply over the life of the Project and would be an active document to be updated accordingly to reflect best practice, relevant legislation, policy and guidelines. The main objective of the plan would be to minimise the direct and indirect potential impacts to human health and the environmental, social and economic values of the Project area. The Waste Management Plan would address:

- The identification of waste streams
- The appropriate transport, storage and disposal of waste streams
- The training of site personal on procedures developed concerning the transport, storage and disposal of waste streams
- The monitoring and auditing of waste streams against the Waste Management Plan to ensure the objectives of the plan are being met.

15.3.2 Waste management measures

The general management of site waste would be in accordance with the waste reduction hierarchy (Section 15.1.3). The following general management measures will be implemented:

- Waste will not be stored on land outside of the construction area
- Non-regulated waste will be separated into recycling (various), industrial and general receptacles
- All waste receptacles will be covered to prevent water infiltration and wind from causing litter
- All rubbish and other refuse that may potentially attract vermin, insects and pests (food scraps) should be appropriately disposed of in sturdy waste disposal receptacles that are frequently emptied
- Supply, storage and transport of hazardous substances will be regulated with appropriate forms and comply with relevant guidelines and Australian Standards (Chapter 20 Hazards and risk) to prevent release of hazardous substances resulting in contaminated water, soil and / or groundwater
- Regulated waste will be collected and removed by a specialised licensed waste contractor and tracking of this waste will take place using a Waste Tracking Register
- Spill clean-up material (used for fuel and/or chemical spills) and contaminated soil is to be stored and disposed of appropriately through a licensed contractor
- Waste streams with the potential for recycling will be reused on site or removed off site by a licensed contractor to a licensed recycling plant
- Waste streams that cannot be recycled will be removed off site to a licensed waste disposal facility, by a licensed contractor
- Removal of all construction waste streams will be undertaken once works have been completed.

Additional waste management measures for the waste streams identified in Table 15-1 are provided in Table 15-2.

Table 15-2 Waste management measures

Waste generated	Management strategy
Green waste	**Avoid/minimise:** Minimise clearing requirements where practicable. **Reuse:** "Habitat" green waste will be saved and placed on site to provide fauna habitat on completion of construction works. **Recycle:** Remaining green waste not suitable for habitat will be chipped, mulched and stockpiled to be reused during progressive rehabilitation, erosion control and revegetation works. **Dispose:** Green waste containing weeds will be stockpiled separately and appropriately disposed of by a licensed contractor.
Domestic waste	**Recycle:** Individual, labelled waste receptacles for sorting of waste into recycling (various) to be removed from site by a licenced contractor. **Dispose:** General waste that cannot be recycled will be removed offsite to a licensed waste disposal facility, by a licensed contractor.
Wastewater (sewage and grey water)	**Avoid/minimise:** It is not proposed to establish onsite construction workers accommodation. Site facilities are limited to ablution facilities. **Dispose:** An adequate number of mobile ablution facilities will be provided onsite and emptied regularly by a licensed contractor.
Timber (pallets and off-cuts) Scrap metal Concrete General building material	**Avoid/minimise**: Promote the efficient use of resources through procurement planning and ordering materials as close as possible to required quantity to avoid oversupply. **Reuse**: Materials will be stockpiled onsite for reuse where suitable, for example concrete used as fill or road material. **Recycle**: Stockpile for offsite reprocessing, reuse or recycling by licenced contractor. **Dispose**: If no higher order options are viable (due to material type or lack of available services) dispose to offsite landfill via licenced contractor.
Wastewater (stormwater runoff)	**Avoid:** Areas such as concrete batch plants will be bunded to divert clean water. This will avoid the generation of contaminated stormwater runoff. **Reuse:** Where runoff waste water is captured it will be treated prior to release. Reuse water for dust suppression or at wash down facility.
Explosive waste - containers, caps, wires and packaging	**Avoid/minimise:** Promote the efficient use of resources through procurement planning and ordering explosives as close as possible to required quantity to avoid oversupply. **Dispose:** Explosives cannot be disposed to landfill. Cardboard packaging contaminated with residual explosives cannot be recycled. Materials (including packaging) may need to be burnt or detonated by authorised personnel or licensed contractor. Explosive materials and packaging will be managed in accordance with *AS2187.2-2006 Explosives Storage, Transport and Use.*

Waste generated	Management strategy
Wastewater (washdown)	**Avoid:** Areas will be bunded to divert clean water. This will avoid the generation of contaminated stormwater runoff. **Treat**: Wash down water and entrained contaminants will be captured and treated at the wash down facility. Treatment will consist of hydrocarbon separation. **Reuse**: Treated wash down water will be reused in subsequent wash down activities at the wash down facility. **Dispose:** The waste emulsion from wastewater treatment at the wash down facility will be appropriately stored within a bunded area and will be disposed of by a licensed contractor.
Regulate wastes (for example: hydrocarbon wastes including lubricants, oily waste waters and sludges; tyres; and batteries)	**Avoid:** Vehicles and equipment will be serviced regularly and maintained in a good condition. Only minor or emergency repair work to be undertaken on site. **Storage:** Regulated waste will be stored in containers and bunded areas as appropriate and in accordance with relevant Australian Standards. **Dispose:** Regulated waste will be collected and removed by a specialised licensed waste contractor and tracking of this waste will take place using a Waste Tracking Register.
Excavated waste/spoil and waste aggregate	**Avoid:** Avoid excavating excess materials. **Reuse:** Excavated material will be reused onsite as backfill or to widen embankments. Spoil surplus materials will be utilised by filling gully areas to create useful works areas and as road base material. Spoil surplus will be reused to contour and reshape landforms during rehabilitation and restoration at weir sites. **Dispose:** Surplus soil that cannot be reused (expected to be minor) will be transported offsite to an approved landfill site 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.

15.3.3 Waste disposal

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

- Rockhampton Lakes Creek Road Waste Management Facility (landfill): General household waste, recyclables (glass, cardboard, paper, plastic, aluminium cans, steel cans), timber, light metal, green waste, construction and demolition waste, inert waste (soil, concrete, reinforcing steel mix), vehicle batteries and tyres
- Gracemere Waste Management Facility (landfill): General waste, recyclables (glass, cardboard, paper, plastic, aluminium cans, steel cans), timber, motor oil, green waste, construction and demolition waste, Inert waste (concrete, reinforcing steel mix), vehicle batteries and tyres
- Duaringa Transfer Station: Domestic waste only.

Consultation with Rockhampton Regional Council indicated that suitable operators exist in Rockhampton capable of receiving wastewater and waste maintenance fluid from the Project. Consultation with an operator indicated that the volumes of waste expected from the Project would be within the capacity of their Rockhampton facility.

15.4 Summary

Waste will be generated during the construction and operation of the Project. The waste management hierarchy for the Project 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 reporting and management of waste streams associated with the Project would be undertaken in accordance with the Waste Management Plan. The Waste Management Plan would be an active document to be updated accordingly to reflect best practice, relevant legislation, policy and guidelines. It is expected that the Project generated waste would be able to be managed at a suitably located off-site waste disposal and recycling facility managed by the Rockhampton Regional Council, or by a licensed waste contractor as appropriate depending on the waste type.