



Central Queensland Coal Project

Chapter 7 - Waste Management

Central Queensland Coal

CQC SEIS, Version 3

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Terms and Abbreviations

AS	Australian Standard
CHPP	Coal Handling and Preparation Plant
CQC	Central Queensland Coal
Cth	Commonwealth
DES	Queensland Department of Environment and Science
EA	Environmental Authority
EHP	(former) Queensland Department of Environment and Heritage Protection
EIS	Environmental Impact Statement
EP Act	<i>Environmental Protection Act 1994</i>
EP Regulation	Environmental Protection Regulation 2019
ERA	Environmentally Relevant Activities
EV	Environmental Value(s)
GOAL	Good Quality Agricultural Land
Kg/m ³	Kilograms per cubic metre
kl	kilolitre
km	Kilometre
LCR	Lakes Creek Road
LSC	Livingstone Shire Council
m	Metre(s)
m ³	Cubic metre
MIA	Mine Infrastructure Area
ML	Mining Lease
MI	Megalitre
MNES	Matters of National Environmental Significance
PDCA	Plan-Do-Check-Act
PPE	Personal Protective Equipment
RORO	Roll on Roll off
RRC	Rockhampton Regional Council
SEIS	Supplementary Environmental Impact Statement

STP	Sewage Treatment Plant
t	Tonne(s)
The Project	Central Queensland Coal Project
ToR	The Project Terms of Reference
WMP	Waste Management Plan
WRR Act	<i>Waste Reduction and Recycling Act 2011</i>

7 Waste Management

7.1 Introduction

This chapter identifies the anticipated wastes that are likely to be generated through the construction, operation and decommissioning phases of the Central Queensland Coal Project (the Project). It presents the technical details of waste treatment, proposed emissions, discharge and disposal criteria as well as measures to avoid, reduce, reuse, recycle and otherwise manage waste streams for the full lifecycle of the Project.

Waste streams from the Project will be either mineral or non-mineral wastes, and generally consist of gases (emissions from fuel burning equipment), liquids (waste oils, waste water from coal processing and ablutions), and solids (waste rock, coal rejects, construction, regulated and general waste). This chapter identifies the quantity and management of general, recyclable and regulated wastes. It focuses in more detail on the solid wastes generated throughout the construction, operation and decommissioning of the Project. The treatment and discharge criteria relevant to air emissions and wastewater are discussed in Chapter 12 – Air Quality and Chapter 9 – Surface Water, respectively.

Matters raised in submissions relating to Chapter 7 – Waste Management were focused on:

- the use of the St Lawrence waste transfer station
- bioremediation of hydrocarbon contaminated soils and
- the irrigation of accommodation camp Sewage Treatment Plant (STP) effluent waste.

The following sections provide additional information to the Environmental Impact Statement (EIS), in response to the submissions received from the Supplementary EIS (SEIS) (v2). Responses in relation to mineral wastes are discussed in Chapter 8 – Waste Rock and Rejects. Appendix A13 includes the full details of all submissions received for the EIS and Version 1 of the SEIS (v1). The submissions received relating to the SEIS version 2 are addressed in Chapter 3 of this SEIS (v3).

It is noted, however, that no submissions relating to waste management that required substantial changes to this chapter were received regarding SEIS v2.

7.1.1 Environmental Objectives and Outcomes

The environmental objectives and performance outcomes relevant to waste are provided in Schedule 8, Part 3, Division 1 of the Environmental Protection Regulation (2008) (EP Regulation). Objectives and outcomes for waste that are specific to the Project are given in Table 1 of the Project Terms of Reference (ToR). The overarching objective is to operate the Project so that any waste generated, transported, or received as part of the Project is managed in a way that protects all environmental values.

7.1.1.1 EP Regulation Environmental Objectives and Performance Outcomes

The environmental objectives and performance outcomes relating to waste outlined in the EP Regulation are:

7.1.1.1.1 Environmental Objective

Any waste generated, transported, or received as part of carrying out the activity is managed in a way that protects all environmental values.

7.1.1.1.2 Performance Outcomes

Both of the following apply:

1. waste generated, transported or received is managed in accordance with the waste and resource management hierarchy under the *Waste Reduction and Recycling Act 2011* (WRR Act) and
2. if waste is disposed of, it is disposed of in a way that prevents or minimises adverse effects on environmental values.

7.1.1.2 ToR Environmental Objectives and Outcomes relevant to the Project

The environmental objective and outcome for waste included in the Project ToR is:

- any waste generated, transported, or received as part of carrying out the activity is managed in a way that protects all environmental values.

7.1.2 Terms of reference addressed in this chapter

Table 7-1 summarises the requirements from the ToR for the Project relevant to this Chapter, and where they are addressed.

Table 7-1: ToR cross-reference

Terms of reference	Section of the SEIS
8.12 Waste management	
Conduct impact assessment in accordance with the EHP's EIS information guidelines—Waste management.	Noted
Describe all the expected waste streams from the proposed project activities during the construction, operational, rehabilitation and decommissioning phases of the project. Waste streams for resource projects would typically include: <ul style="list-style-type: none"> • waste rock • tailings and coarse rejects from mining and mineral processing • salt from petroleum and gas projects and • brackish, saline or mine affected water from all types of resource projects. 	Section 7.4 and Chapter 8 – Waste Rock and Rejects
Describe the quantity, and physical and chemical characteristics, hazard and toxicity of each significant waste, as well as any attributes that may affect its dispersal in the environment, and its associated risk of causing environmental harm.	Section 7.4 and Chapter 8 – Waste Rock and Rejects
Define and describe the objectives and practical measures for protecting or enhancing environmental values from impacts by wastes.	Sections 7.1.1, 7.7 and 7.8
Assess the proposed management measures against the preferred waste management hierarchy, namely: avoid waste generation, cleaner production, recycle, reuse, reprocess and reclaim, waste to energy, treatment, disposal. This includes the generation and storage of waste.	Sections 7.5
Describe how nominated quantitative standards and indicators may be achieved for waste management, and how the achievement of the objectives would be monitored, audited and managed.	Section 7.7
Detail waste management planning for the proposed project especially how measures have been applied to prevent or minimise environmental impacts due to waste at each stage of the project.	Section 7.7

Terms of reference	Section of the SEIS
Use a material/energy flow analysis to provide details of natural resource use efficiency (such as energy and water), integrated processing design, and any co-generation of power and by-product reuse.	Will be completed as part of the detailed design phase of the Project - Section 7.10
Identify the quantity, quality and location of all potential discharges of water and contaminants (including treated wastewater/sewage) by the Project. Describe whether the discharges would be from point sources (whether uncontrolled and controlled discharges) or diffuse sources (such as irrigation to land of treated wastewater/sewage effluent) and describe the receiving environment (such as land or surface waters).	Chapter 9 – Surface Water
Provide a risk assessment of the potential impacts on surface waters (in the near-field or far-field) due to any controlled or uncontrolled discharges from the site. The EIS should address the following matters with regard to every potential discharge of contaminated water: <ul style="list-style-type: none"> • Describe the circumstances in which controlled and uncontrolled discharges might occur. 	Chapter 9 – Surface Water
<ul style="list-style-type: none"> • Provide stream flow data and information on discharge water quality (including any potential variation in discharge water quality) that will be used in combination with proposed discharge rates to estimate in-stream dilution and water quality. Chemical and physical properties of any waste water (including concentrations of constituents) at the point of entering natural surface waters should be discussed along with toxicity of effluent constituents to human health, flora and fauna. 	Chapter 9 – Surface Water
<ul style="list-style-type: none"> • Provide an assessment of the available assimilative capacity of the receiving waters given existing background levels and other potential point source discharges in the catchment. Options for controlled discharge at times of natural stream flow should be investigated to ensure that adequate flushing of waste water is achieved. 	Chapter 9 – Surface Water
<ul style="list-style-type: none"> • Provide water quality limits that are appropriate to maintain background water quality and protect water uses. 	Chapter 9 – Surface Water
<ul style="list-style-type: none"> • Describe the necessary streamflow conditions in receiving waters under which controlled discharges will be allowed. 	Chapter 9 – Surface Water

Terms of reference	Section of the SEIS
<p>Provide relevant information on existing and proposed sewage infrastructure (related to environmentally relevant activity (ERA) 63) by referring to relevant EHP policies and guidelines¹, depending on the proposed collection (sewer infrastructure), treatment of sewage, and proposed reuse/disposal of treated wastewater and sewage wastes generated. For activities associated with ERA 63, the EIS must include:</p> <ul style="list-style-type: none"> • the preferred location and capacity of the proposed sewage treatment plant (STP) system(s) with specific reference to the ‘daily peak design capacity’ of equivalent persons • inputs the STP would receive from the mine camp(s) (e.g. any infiltration of groundwater into the sewer collection system, trade waste from camp cafeteria), whether the effluent coming from the MIA would be contaminated with other industrial pollutants, and whether these contaminants would have any adverse effects on wastewater treatment • the expected effluent quality and quantity, and suitable calculations showing the volume of any wet weather storage(s) and area(s) for sustainable effluent irrigation based on the equivalent persons (EP) of the facility/ies and location of the irrigation area(s) • avoidance and mitigation measures associated with the generation, treatment and disposal/reuse of sewage generated and • identify any risks to the receiving environment including land and water quality. 	<p>No STP is proposed as part of the EIS – see Section 7.5.2.2</p>
<p>Identify beneficial use options under the <i>Waste Reduction and Recycling Act 2011</i> as per the relevant guidelines for irrigation, drilling mud, and associated water. The uses might include aquaculture, coal washing, dust suppression, construction, landscaping and revegetation, industrial and manufacturing operations, research and development and domestic, stock, stock intensive and incidental land management. If effluent is to be used for dust suppression or other uses, demonstrate that the water quality is appropriate for that use from an environmental and public health perspective.</p>	<p>There is no proposal or requirement to dispose of associated water as part of Project waste management</p>
<p>Provide maps and plans describing composting activities to produce a ‘soil conditioner’, identify any risks to the receiving environment, and any potential impacts on water quality or land and how these would be managed. Demonstrate that the composted material (as ‘soil conditioner’) is suitable for its intended use in any proposed rehabilitation by referring to appropriate guidelines and Australian Standards.</p>	<p>No composting is proposed as part of the Project</p>

7.1.3 Relevant Legislation and Policy Instruments

Legislation and policies relating to environmental management in Queensland are governed by several legislative acts, policies and guidelines which are described in Chapter 2 – Legislation and Approvals. Those with relevance to waste management are outlined in further detail below.

7.1.3.1 Environmental Protection Act 1994

The Environmental Protection Act 1994 (EP Act) defines waste as:

- anything, other than a resource approved under subsection (4), that is:
 - left over, or unwanted by-product, from an industrial, commercial, domestic or other activity

¹ <https://www.ehp.qld.gov.au/licences-permits/guidelines.html>

- surplus to the industrial, commercial, domestic or other activity generating the waste
- waste can be a gas, liquid, solid or energy, or a combination of any of them and
- a thing can be waste whether or not it is of value.

7.1.3.1.1 Environmental Protection Regulation 2019 and Environmental Protection (Regulated Waste) Amendment Regulation 2018

Schedule 19 of the Environmental Protection Regulation 2019 (EP Regulation) defines 'general waste' as waste other than regulated waste. Regulated waste is a commercial and industrial waste listed in Chapter 5, Part 1, Division 1 defines and includes:

- for an element, any chemical compound containing the element and
- anything that contains residues of the waste.

The Environmental Protection (Regulated Waste) Amendment Regulation 2018 (which commenced on 4 February 2019) introduced a new risk-based waste classification framework and regulated waste is now classified as:

- Category 1 regulated waste (highest risk)
- Category 2 regulated waste (moderate risk) or
- Not-regulated waste / general waste (lowest risk).

Schedule 9 of the EP Regulation provides a list of regulated wastes and their default category (1 or 2), wastes that are not regulated waste, and categorisation thresholds for solid and liquid tested waste.

Regulated waste requires a higher level of management reflecting the potential level of risks from this type of waste on human health or the environment. The Regulated Waste Classification and Waste-related Environmentally Relevant Activity (ERA) regulations are used to identify and appropriately manage the risks associated with various wastes and associated waste management activities.

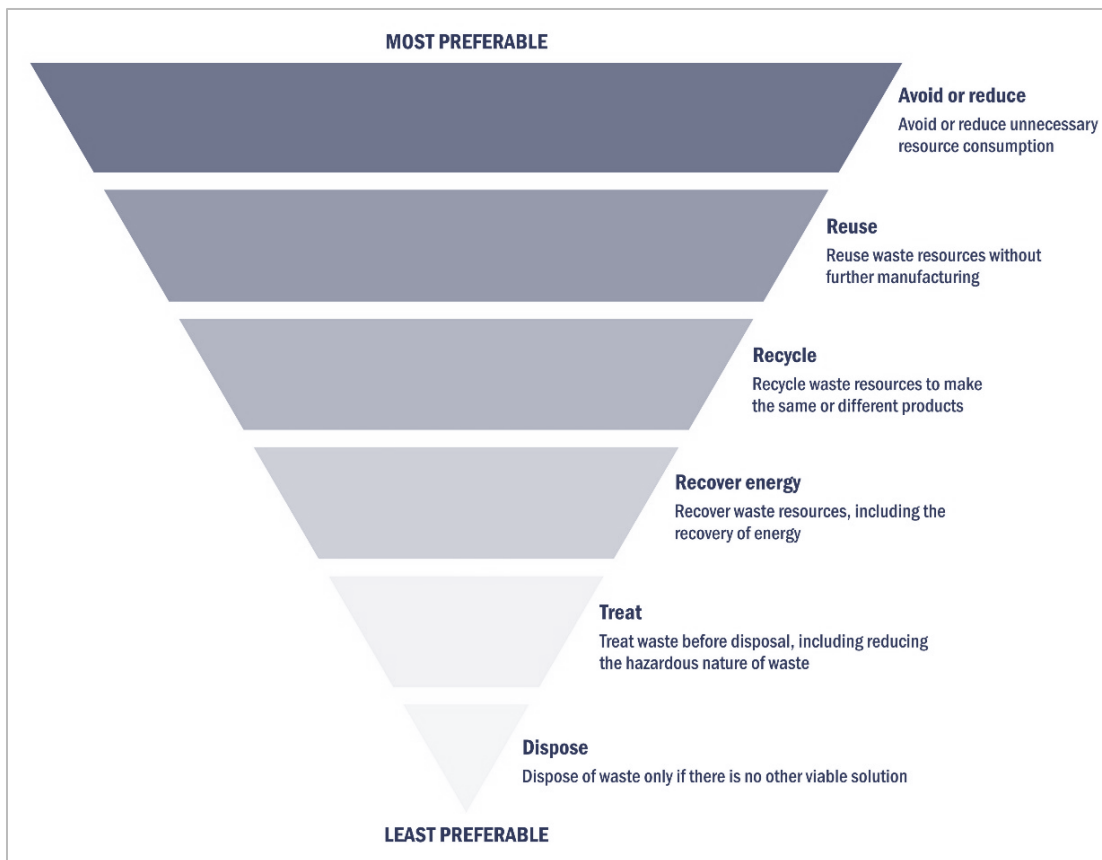
The EP Regulation controls regulated waste transportation through a prescribed waste tracking system. The waste generator, waste transporter and waste receiver all have certain obligations that are set out under the EP Regulation and on the prescribed forms.

The Environmental Protection (Air) Policy 2019 and Environmental Protection (Water and Wetland Biodiversity) Policy 2019 which are subsidiary to the EP Act also set out criteria for air quality and water quality which are applicable to the quality of emissions to air and water discharged by the Project.

7.1.3.2 Waste Reduction and Recycling Act 2011 and Regulation

The WRR Act prioritises waste management practices to achieve the best possible environmental outcome via the waste and resource management hierarchy. The waste and resource management hierarchy sets up a framework from the most preferred alternative: waste avoidance through reuse, recycling, and energy recovery, with waste disposal being the least preferred as shown in Figure 7-1 (EHP 2014). The WRR Act governs the beneficial reuse of wastes, which includes coal seam water produced as part of the coal seam gas activities or the reuse of bio-solids. It is often not necessary for wastes other than regulated wastes to have an approval to be reused. The WRR Act also establishes in law the polluter pays principle, the user pays principle, the

proximity principle and product stewardship principle, all of which provide for sustainable waste management.



Source: EHP 2014

Figure 7-1: Waste and resource management hierarchy

7.1.3.3 Guidelines, Policies and Strategies

- The Commonwealth National Waste Policy 2018 gives direction for Australia’s waste management and resource recovery and promotes product stewardship, packaging covenant as well as specific schemes, including the National Tyre Product Stewardship Scheme 2014 and the Television and Computer Recycling Scheme 2011. Waste treatment and management has been developed in line with these schemes and Central Queensland Coal (CQC) as stakeholder in the tyre supply chain will consider applying to become a participant in the voluntary Tyre Product Stewardship Scheme.
- The National Environment Protection (Used Packaging Materials) Measure 2011 (Cth) supports the operation of the Australian Packaging Covenant, which is a co-regulatory arrangement between all levels of government and industry to manage the environmental impacts of packaging.
- The Queensland Waste Avoidance and Resource Productivity Strategy (2014 to 2024) (EHP 2014) sets out progress measures for Queensland to reduce the rate of waste generation over the next 10 years. The strategy focuses on avoiding unnecessary consumption and waste generation, adopting innovative resource recovery approaches, and managing all products and materials as valuable and finite resources. The ‘Final Review Report’ for the strategy was released in January 2019 (DES 2019).

- The Queensland Waste Management and Resource Recovery Strategy was adopted in July 2019. The strategy focuses on transitioning to the principles of a circular economy to help retain the value of material in the economy for as long as possible. It provides a framework to enable growth of the recycling and resource recovery sector, and reduce the amount of waste produced, and disposed of, by business, industry and households. It sets a series of progressive targets for waste reduction and resource recovery to 2050.
- DES' Application Requirements for Activities with Waste Impacts (ESR/2015/1836) guideline outlines the required information for wastes produced by Environmentally Relevant Activities (ERAs), such as mining. Information requirements within this guideline have been addressed with this chapter.
- The Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) (NRMMC 2006) provides guidance on how such recycling can be safely and sustainably achieved within industry through the application of a risk management framework.
- The Guidelines for Sewerage Systems Biosolids Management (NRMMC 2004) provides guidance on the management and reuse of bio-solids.

7.2 Methods

This waste assessment was based on desktop research and includes the Project footprint for each of the construction, operation and decommissioning phases. The main desktop methods used for the assessment of potential waste generation and management are:

- a review of the Commonwealth and State regulatory framework relating to waste classification and management
- review of available design documentation and
- investigations into local waste transport, treatment and disposal facilities and capacities.

To identify the anticipated waste quantities from the Project, information from other mining related EIS's and waste tracking registers from similar coal mining projects were analysed. The anticipated waste quantities have been determined by comparing the annual waste output of each of the following projects to the processes and scale of the proposed Project:

- Hillalong coal project
- Byerwen coal mine and
- Caval Ridge coal mine.

7.3 Description of Environmental Values

The EP Act defines environmental values (EVs) as a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety, or otherwise declared under an environmental protection policy or regulation. EVs which may be potentially impacted by incorrect waste management include:

- visual amenity – through unsightly waste storage areas or litter
- land – contamination of areas used for grazing and good quality agricultural land values

- surface water (including environmental aquatic health and recreational values) – through contamination
- groundwater (including stock and domestic users) – through contamination
- ecological values (including native wildlife and surrounding vegetation) – through contamination, ingestion, fire or spread of weeds and pests
- health and safety of the community – through hygiene problems caused through poor waste management of effluents and medical wastes and
- regional waste management – landfill capacity and waste transfer services.

Each EV is described in more detail below.

7.3.1 Visual Amenity

The visual amenity assessment considered the visual catchment of the Project where the Project could reasonably be seen. Zones of theoretical visibility (using a bare earth landscape with consideration of human visibility extent and elevation data) were modelled for Ogmoo township, seven inhabited and four uninhabited homesteads and the Tooloombah Creek Service Station. In these cases, there is low sensitivity to public visual amenity and it is unlikely any waste storage areas within the Project would be visible to any public vantage point.

The Project will be highly visible in both directions from the Bruce Highway. The waste facilities are unlikely to be visible to the public due to the vegetation corridor that will be retained adjacent to the Bruce Highway and further, the positioning of the waste facilities on the opposite side of the pits to the Bruce Highway.

The results of the visual amenity assessment are presented in more detail within Chapter 5 – Land.

7.3.2 Land

Wastes have the potential to cause contamination of soils. A detailed field soil survey undertaken by CDM Smith found the dominant soil types to be dermosols, sodosols, rudosols and kandosols. Cattle grazing is the principal agricultural industry in the broader area and parts of the Project area are mapped good quality agricultural land (GQAL). Mine activities and associated infrastructure has been positioned to avoid disturbance to mapped GQAL. These land values are discussed in detail within Chapter 5 – Land. Any major contamination from waste storage onsite has the potential to degrade these values through reducing the land's functionality for grazing and agricultural use. No non-mineral waste will be permanently disposed on site, which reduces the risk of contaminants affecting the quality of land.

7.3.3 Surface Water

There are two water courses that bound the Project area, Tooloombah Creek and Deep Creek. These watercourses are situated outside the Project area however, several of their tributary drainage features reside within. These drainage features are minor and do not continually contain water. Stream flow is seasonal and directly following rainfall events. Project surface infrastructure is predominantly located within the Deep Creek catchment, except for a small section of the levee, where the proposed Dam 1 spillway is located, and the north-west portion of Dam 1. Further details about surface water features are discussed in Chapter 9 – Surface Water. Waste and its

storage could impact surface water values through contaminant releases or non-biodegradable objects finding their way into watercourses.

7.3.4 Air Quality

The existing air quality is influenced by dust arising from natural sources such as wind erosion of soils, and fires. The closest existing industry on the National Pollutant database is over 60 km to the southwest (Brolga Mine near Canoona, and Kunwarara Magnesite Mine).

Other than vegetative wastes, no burning of other waste types is anticipated by the Project, meaning toxic fumes associated with this activity will not be generated that could affect sensitive receptors. Dust emissions are not predicted to affect any sensitive receptors either. The potential impacts to the air environment are discussed in more detail within Chapter 12 – Air Quality.

7.3.5 Groundwater

At the regional scale, the Styx River basin contains usable groundwater supplies in shallow water-table aquifers that are hosted in the unconsolidated Cenozoic surface deposits, particularly within the alluvial infill sediments associated with surface drainage, and within fractured and weathered zones of outcropping Cretaceous rocks (Styx Basin) and older Permian rocks (Back Creek Group, Lizzie Creek Volcanics Group and Connors Volcanic Group), although these are often saline. The deeper sediments underlying the Cenozoic surface deposits and below the zone of surface fracturing and weathering have much lower permeability and are not known to yield useable groundwater supplies.

Shallow unconfined groundwater flow in Cenozoic sediments and fractured and weathered rocks within Styx River Basin is driven by diffuse groundwater recharge from rainfall within the basin. The water table slopes generally toward the ocean but locally follows topographic relief, with depth to water table from ground surface typically in the range 2 to 15 m in existing groundwater bores dependent on location. Most groundwater discharge is thought to occur by evapotranspiration from topographic lows, particularly along valleys of the surface drainage network, including evaporation of surface pools and bank seepage, and transpiration by riparian vegetation communities that access groundwater within their root zones. The main processes for interaction between groundwater and surface water are episodic groundwater recharge along flowing watercourses during wet conditions, and groundwater discharge to watercourses that intersect the water table during dry conditions.

Groundwater salinity ranges from fresh to brackish. Groundwater use in the area is generally limited to stock watering, with some domestic use. Stygofauna have been recorded within some groundwater bores constructed within the alluvial aquifer associated with the Styx River and located more than 8 km away from the Project boundary.

The potential exists for the groundwater quality to be altered by any accidental release of contaminants to shallow groundwater. This may be caused by unintended spillages of fuels, leakage of sewage effluent, mobilisation of surface contaminants by stormwater (and subsequent recharge) and seepage of contaminants from temporary waste storages. These activities have the potential to locally degrade groundwater quality if not properly managed. Details of the existing groundwater environment is provided in Chapter 10 – Groundwater.

7.3.6 Ecology

Vegetation within the Project area and immediate surrounds comprises heavily disturbed habitats that have previously undergone significant clearing for cattle production. Where this habitat occurs north of the Bruce Highway it is often dominated by patches of regrowth Brigalow. There are substantial areas of less disturbed eucalypt woodland and smaller pockets of relatively closed canopy (open forest) vegetation generally with a dense weedy shrub layer. These are largely associated with the creek systems adjacent to the Mining Lease (ML) boundary.

Waste may impact on ecological values through litter or by causing an increase in pest and feral animals if waste areas and food stores are not properly managed. Measures to prevent waste impacts on ecological values will be required. Chapters 14 – Terrestrial Ecology and Chapter 15 – Aquatic Ecology provide detailed environmental descriptions of flora and fauna values and Matters of National Environmental Significance are outlined in Chapter 16 – MNES.

7.3.7 Regional Landfill Capacity and Waste Transfer Services

In these rural areas, landowners are responsible for the management and disposal of their own waste and any waste associated with their agricultural activities. Given the type and scale of the proposed mining activities, base load waste generation will ultimately increase relative to current outputs.

The Livingstone Shire Council (LSC) area has one landfill facility located at Yeppoon, approximately 160 km from the Project. The Rockhampton Regional Council (RRC) operates the Lakes Creek Road (LCR) Landfill which is approximately 135 km from the mine (see Figure 7-2).

The nearest transfer and / or bin stations to the Project are located at Ogmoo and Marlborough (see Figure 7-2). The Ogmoo Bin Station receives general domestic waste, greenwaste and light metals. The Marlborough Waste Transfer Station receives general domestic waste, greenwaste, light metals, tyres, batteries (lead acid), waste oils and filters. However, these facilities will not be used by the project. Since the release of the EIS, CQC has determined that when options for onsite reuse, recycle or disposal of wastes are considered unfeasible, wastes will be transported by licenced contractors to appropriately licensed waste management facilities.

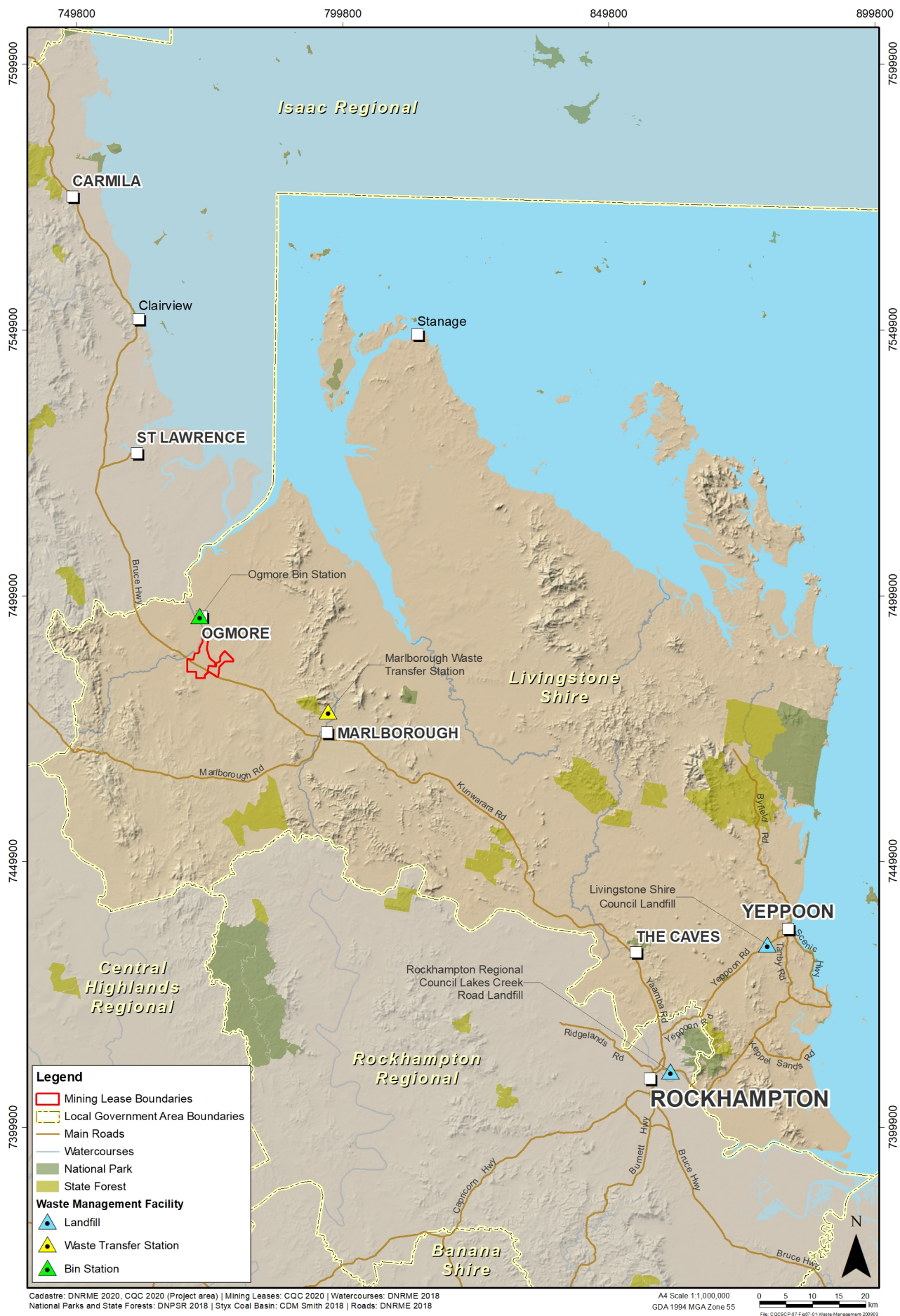


Figure 7-2: Waste management facilities

7.4 Description of Anticipated Wastes

The waste streams and quantities in this assessment have been based on the activities described in Chapter 1 – Introduction and Project Description. The waste streams anticipated to be generated during construction, operation and decommissioning of the Project are provided in Table 7-2. A schematic identifying the stage in which the waste streams are generated during the construction and operational phases is at Figure 7-3.

Table 7-2: Anticipated waste materials

Waste stream	Source
General and Recyclable Waste	
Green waste	Vegetation waste generated from site clearing and maintenance activities including trees, shrubs and grasses.
Building and construction waste	Surplus construction materials such as steel, timber, concrete, metal offcuts and plastic.
Domestic waste	General waste from workforce including food waste and other organic waste and recyclables.
Commercial and office waste	Waste stationary, paper, cartridges, packaging, office equipment and computers from business and administrative activities.
Regulated Waste	
Regulated waste	Waste from procurement, operation and maintenance of vehicles, plant and equipment including tyres, batteries, hazardous waste, oils, lubricants, fuels and hydraulic fluid.
Clinical waste	First aid and medical wastes.

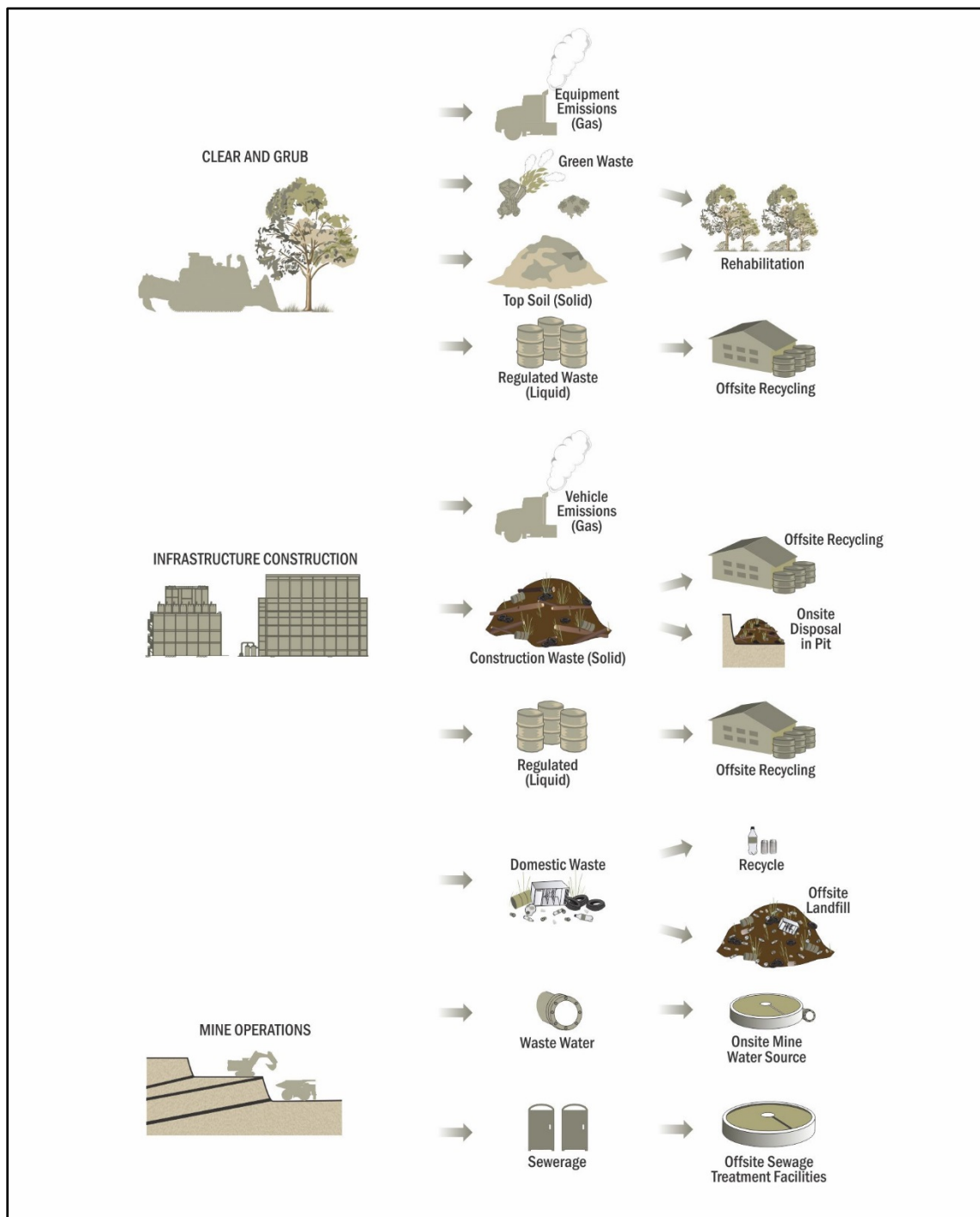


Figure 7-3: Waste streams from the Project

7.4.1 Project Waste Inventory

Based on the identified waste sources and a review of the activities expected throughout the construction, operation and decommissioning phases of the Project, a waste inventory and potential disposal options for the waste streams is provided in Table 7-3.

The waste estimates included in this inventory are only preliminary and are based on current best estimates for the Project. As such, this inventory will be reviewed following detailed design and during the Project construction and operational phases.

Table 7-3: Waste inventory, characterisation and management methods

Waste category	Source	Project phase and estimated quantities (per annum)			Management methods
		Construction	Operation	Decommissioning	
General Waste					
Green waste	Clearing of vegetation	Minimal – restricted to non-woody vegetation	Negligible	N/A	Onsite reuse - Mulching of waste vegetation / timber by reuse onsite during rehabilitation. Burning of vegetation may be considered if retention is considered an unacceptable fire risk.
General waste* - food scraps, packaging waste non-regulated general waste. non-recyclable plastics and timber	Kitchenettes, administration areas and workshop	<100 t	<100 t	35 t	Offsite disposal - Stored onsite in sealed green bins for transportation to offsite municipal landfill.
Recyclable waste - aluminium cans, glass, paper hand towel, cardboard, used paper, plastic drink bottles, packing materials	Kitchenettes, administration areas and workshop	<30 t	<100 t	<10 t	Offsite recycle / disposal - For materials not able to be recycled, store in allocated waste disposal bins for collection by a licensed waste contractor for disposal at a licensed facility.
Scrap metal - steel, copper, brass, cast iron, stainless, aluminium, wire and any other ferrous or non-ferrous metal item	Equipment not suitable to be reconditioned	<50 t	< 50 t	> 500 t	Offsite recycle / disposal - For materials not able to be recycled, store in allocated waste disposal bins for collection by a licensed waste contractor for disposal at a licensed facility.
Personal Protective Equipment (PPE) and other small items*	Operational activities	<1 t / 5 m ³	<1 t / 5 m ³	<1 t / 5 m ³	Onsite reuse - Routine checks on PPE for damages and / or faults. Reuse water coolers and other equipment that is not deemed damaged and unusable. Offsite Recycle - A licensed contractor will transport plastic or glass items offsite to a recycling facility. Offsite dispose - Only sufficiently used / damaged PPE is disposed of where possible. Waste that cannot be recycled will be disposed offsite in a municipal landfill.

Waste category	Source	Project phase and estimated quantities (per annum)			Management methods
		Construction	Operation	Decommissioning	
Air filters*	Maintenance of vehicles and machinery at workshops	<1 t / 5 m ³	<1 t / 5 m ³	<1 t / 5 m ³	Offsite disposal - Air filters will be temporarily stored in the appropriate air filter skip / bin. Final disposal will be offsite from a licensed contractor to a regulated waste station.
Refurbishable items* hoses, cables and pipe work, scrap metal, plastic manifolds, couplings, conveyor rollers and other plastic waste	Operational activities	<1 t / 5 m ³	<5 t / 25 m ³	500 t	Onsite reuse - Excess waste (material that has not been used during construction) will be stored in the workshop or storage shed for future use (for example for maintenance or servicing). Offsite recycle / dispose - Other items (not deemed usable) will be temporarily stored in their designated area / skip / bin for recycling or disposal at a landfill or licenced facility.
Timber pallets*	Workshop and administration areas	<5 t / 25 m ³	<1 t / 5 m ³	<1 t / 5 m ³	Offsite recycle - Those that are recyclable are returned to the supplier. Offsite dispose - Any unserviceable pallets will be sent to general offsite landfill.
Regulated Waste					
Waste oils and grease	Machinery maintenance, interceptors within Mine Infrastructure Area (MIA) and workshops	<50 kl	<700 kl	<50 kl	Offsite recycle / disposal – Collected and stored in tanks or appropriately sealed containers within dedicated bunded areas for removal and recycling/disposal by licensed waste contractor with vacuum truck (licensed contractor). All sewage waste will be routinely removed offsite by truck to be disposed of at an approved facility.
Fuel filters	Machinery maintenance and workshop	<15 t	<60 t	<1 t	Offsite disposal - Transportations off-site by a licensed regulated waste transporter. Disposal of waste will be to a regulated waste receiver.

Waste category	Source	Project phase and estimated quantities (per annum)			Management methods
		Construction	Operation	Decommissioning	
Tyres	Tyres from light and heavy vehicles	<40 t	<150 t	<5 t	Offsite recycle - Tyres will be transported off-site to supplier.
Oily water	Wash pads, workshop, refuelling station, wash downs and fuel farm	<100 kl	<200 kl	<50 kl	Offsite recycle / disposal - Removed by vacuum truck by licensed contractor for recycling or disposal at licensed facility.
Sewage effluent	Construction and administration offices	<20 MI	<20 MI	< 20 MI	Offsite disposal – All sewage effluent waste will be taken offsite for treatment by licensed contractors.
Clinical waste	First aid and medical administration	<0.01 t	<0.01 t	<0.01 t	Offsite disposal – Clinical waste will be stored in yellow labelled receptacles and removed by licensed contractor to a medical waste facility for treatment and disposal.
Chemical containers / drums	Administration area and other surface facilities	<2 t	<4 t	N/A	Offsite recycle - Containers and drums to be emptied of contents sealed and stored in a designated area for collection by licensed contractor, for transport and recycling off-site.
Miscellaneous chemicals (various surplus / miscellaneous chemicals such as coolant, solvents, sealants)	Surface activities and administration areas	<2 kl	<5 kl	<1 kl	Offsite recover / dispose - Oily rags and oil spill kit materials will be collected within regulated waste wheelie / industrial bins, before being transported by a licensed waste transport contractor to a licensed waste disposal facility for energy recovery and / or disposal.
Contaminated soil	Spills	100 m ³ / 120 t	100 m ³ / 120 t	500 m ³ / 600 t	Onsite remediation or disposal within mine pit.

Waste category	Source	Project phase and estimated quantities (per annum)			Management methods
		Construction	Operation	Decommissioning	
Vehicle batteries – lead acid	Vehicle maintenance	<1 t / 4 m ³ (2 pallets)	<2 t / 8 m ³	<1 t / 4 m ³ (2 pallets)	Offsite recycle / dispose - Stored onsite in designated area within weatherproof battery storage containers. Licensed contractor to collect and transport offsite for recycling.
All other miscellaneous oily / hydrocarbon wastes - oily rags, materials from oil / fuel spillage clean ups*	Maintenance and mine pit activities and spill clean ups	<1 t	<1 t	<1 t	Offsite Recover / Dispose - Materials will be stored within designated bins for collection by licensed contractor and transported to a licensed waste disposal facility for energy recovery and / or disposal.
Paints* (Dried paint containers)	Workshop and maintenance activities	<1 t / 4 m ³	<1 t / 4 m ³	N/A	Offsite Dispose - Sealed and disposed of with other general waste in dedicated storage bins for collection and disposal off-site.

*The volumes included in this table are representative of uncompacted solid waste (that is 200 kg/m³) a typical landfill should achieve a compaction rate of approximately 800 kg/m³.

7.4.2 Decommissioning

Prior to decommissioning, consultation with stakeholders will be conducted to assess future uses of mine infrastructure, equipment, services and land. Mine equipment, infrastructure and services which are not subject to established agreements for future use will be taken out of service, removed from site and the disturbed area will be rehabilitated (See Chapter 11 – Rehabilitation and Decommissioning).

7.5 Waste Management

Appropriate waste management measures will be implemented throughout the construction, operation and decommissioning phases of the Project. This will be underpinned by the early identification of predicted waste streams and their quantities, so that mitigation and management measures aimed at reducing social, economic and environmental impacts can be effectively implemented.

There are three main waste streams: process, general and regulated. Outlined below is the Project strategy for managing these wastes.

7.5.1 General Non-Mineral and Recyclable Waste

General waste will be managed using the following processes in line with the waste management hierarchy.

7.5.1.1 Waste Minimisation Processes

Where possible, Central Queensland Coal will purchase recyclable materials, reuse and recycle generated waste material. Purchasing and procurement policies will ensure that packing is one consideration in the supplier selection process amongst other criteria where feasible and economically competitive. The purchasing of products in bulk will also be undertaken to minimise individual packaging, particularly for cleaning products, containers, and food and snacks within the kitchen facilities.

CQC anticipates that in line with other mining operations, the biggest contributors to general waste from work fronts are drink bottles and disposal lunch containers. CQC will create a culture of waste minimisation through education, issuing and / or encouraging reusable drink and food containers, as well as minimising the availability of plastic bottles and food containers. Water refill stations will be provided through the work locations and accommodation areas.

7.5.1.1.1 Onsite Reuse

CQC will reuse green waste onsite for mulching, to be used for landscaping and rehabilitation. Excess material that has not been used during construction will be stored in the workshop or storage shed for future use (for example for maintenance or servicing). No waste will be burnt.

7.5.1.1.2 Waste Separation and Storage

To efficiently manage waste streams, solid waste will be separated before transportation to the appropriate facility. Co-mingled recycle and general waste bins will be strategically located around site to enable easy segregation and recycling at the point of use or waste stream generation.

The locations for waste separation and storage include the:

- Coal Handling and Preparation Plant (CHPP)
- Mine Infrastructure Area workshops and
- Administration facility.

Waste storage areas will involve a purpose built bunded waste station on a concrete pad with concrete wing walls and clearly identifiable waste skips or bins. Separate waste bins for general waste, cardboard, scrap metal and comingled recycling will be provided. Purpose-built waste stations will be constructed to enable segregation of dry waste types for collection and ease of disposal. As required, skips will be removed from site by licensed contractors for reuse, recycling or disposal off-lease. These approaches will maximise the potential for successful reuse and recycling of generated waste streams.

7.5.1.1.3 Waste Treatment

Depending on the type and quantity of waste requiring disposal, waste management facilities at Yeppoon and Rockhampton would potentially be used due to their proximity to the Project area, the type of waste they will accept and their waste capacities. Based on the waste estimates in Section 7.4.1, the planned life of the Project (approximately 18 years combined for construction and operation and three years for final rehabilitation and decommissioning) and the typical compaction rates in a mine, the Project is anticipated to generate a total of approximately 322 tonnes of solid general waste material destined for recovery or disposal. The Project is anticipated to directly account for 0.3% of the total annual landfill capacity for the region. The existing landfill facilities have sufficient capacity to dispose of the waste generated over the Project lifespan.

7.5.2 Regulated Waste

The regulated waste expected to be generated by the Project would predominantly consist of effluent, waste oils and chemicals. The following management techniques will be implemented.

7.5.2.1 Waste Minimisation

To minimise or potentially eliminate the production of some regulated waste streams, careful Project planning will be undertaken to:

- use biodegradable and nonhazardous materials where options available
- increase the efficiency in the use of chemicals
- improve the maintenance and operation of equipment and
- return excess materials such as drums, buckets and used chemical containers to the supplier or other local users for reuse where possible.

7.5.2.2 Sewage Treatment

No Sewage treatment plant is proposed for the initial stages of the Project. Portable toilet facilities will be used on site until such time that permanent facilities are constructed. All sewage and septic waste will be removed by licenced contractors to suitable licenced facilities (in the Rockhampton region) for treatment. Consequently, there is no requirement to irrigate effluent water and CQC will not be seeking approval for an irrigation area as part of the EIS process.

The additional accommodation facilities being developed by the Marlborough Caravan Park is outside of this EIS process and approval is being sought by the owners through the LSC planning regime.

7.5.2.3 Bioremediation of Hydrocarbons

The Project will establish a bio-remediation pad within the Mining Lease (ML) for any hydrocarbon contaminated soils requiring remediation. A location for a bioremediation pad will be determined should the need for remediation arise. The remediation pad will be constructed with an impermeable base layer to prevent leaching and be suitably bunded to contain runoff and prevent ingress of clean water. Water from the bioremediation area will be captured and returned to a licenced facility for treatment.

Should onsite treatment of contaminated soil be necessary, CQC will consult DES in regard to amending the Site Specific EA to include ERA 60(1)(a) Waste disposal - operating a facility for disposing of less than 50,000t per year of limited regulated waste and general waste.

7.5.2.4 Storage and Separation

Designated regulated waste storage areas will be planned and constructed across the site in accordance with the Waste Management Plan. Regulated waste storage will be required at both MIAs and administration facilities.

Waste oils and chemicals will be separated and stored for offsite treatment and recycling. Any hazardous waste storage areas will be locked to prevent unauthorised access. Spill containment material and spill kits will be in areas where liquid waste is stored and handled. Training in spill response will be conducted for all relevant employees. Used oil will be decanted into a large bunded container or stored within the original drums that the oil was purchased in within a bunded area.

Waste will be safely stored (even if only temporary) on-site according to the waste stream characteristics, whilst taking into consideration public health, hygiene and safety standards of site personnel. For example, flammable material or combustible liquid wastes will be stored in facilities designed to meet the Australian Standard (AS) 1940-2017: The Storage and Handling of Flammable and Combustible Liquids Guideline (Standards Australia 2017).

7.5.3 Waste Transport

Wastes will be transported to licensed waste management facilities when options for onsite reuse or recycling are considered unfeasible.

The anticipated waste volumes would require approximately 600 loads over the 20-year mine life. Due to the frequency requirements to remove waste this will typically be two to three heavy vehicle movements per month whilst mining is occurring, dropping to once a month during year 19 – year 24 whilst rehabilitation works are occurring. There are several existing licenced operators

(Cleanaway and Toxfree) servicing the Project area. Individual fees for contaminated and regulated wastes are applied. The ultimate disposal location is generally dependant on the contractor engaged as some operate their own landfill and resource recovery centres.

7.5.3.1 Vehicles, Tanks and Containers

The industrial waste storage containers will be provided by the licensed waste transport contractor and will be appropriate for the required transport. It is envisioned the following containers and vehicles will be used for waste storage and transportation:

- liquid wastes (effluent, grease trap, oily water) - will be removed using liquid vacuum tankers
- co-mingled recycling - front lift industrial bins and the loose waste removed using a front lift truck
- scrap metals - Marrel skip bin or roll on roll off (RORO) skip bin which are removed within the skip on the Marrel truck or RORO truck
- timber - Marrel skip bin or RORO skip bin which are removed within the skip on the Marrel truck or RORO truck
- general waste - front lift industrial bins and the loose waste removed using a front lift truck and
- construction / demolition / industrial / mining wastes - Marrel skip bin or RORO skip bin which are removed within the skip on the Marrel truck or RORO truck.

The waste contractor will hold appropriate EAs for the transport of waste and as such is expected to have appropriate designed vehicles, tanks and containers used to transport the proposed waste that are fit for the purpose. Skip bins and other containers used to transport the wastes are provided by the contractor with the appropriate colouring and labelling to identify the waste stream for the container.

The Waste Management Plan (WMP) will be developed with the waste transporter prior to service, to identify the types and compositions of wastes. This will ensure the vehicles are suitable for the waste to be conveyed and contain required signage for any hazardous materials (corrosive, flammable and toxic).

7.5.3.2 Regulated Waste Tracking

Regulated waste may be trackable waste under the EP Regulation. Generators, transporters and receivers of trackable waste are required to keep records and give information about the trackable waste, including providing information about the waste and its transportation to the regulator.

The EP Regulation requires the tracking of 'trackable wastes' listed in Schedule 11. Trackable waste produced by the project includes:

- oil and water mixtures or emulsions, or hydrocarbons and water mixtures or emulsions
- grease trap waste
- septic tank sludge and
- tyres.

Under the EP Regulation, waste handlers must submit waste tracking information when transporting regulated waste or waste residues.

Any commercial entity transporting the waste must hold an EA which allows them to conduct the environmentally relevant activity (ERA) 57 for waste transport, and submit prescribed forms for each load.

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

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

The relevant DES forms will be completed in line with the requirement under EP Regulation. The nominated waste contractor will be required to provide a monthly tracking spreadsheet outlining all the above with the end disposal details.

7.6 Minimisation and Cleaner Technology Options

7.6.1 Cleaner Production

Cleaner production principles provide for the implementation of practices that increase efficiency and performance while reducing impacts to the environment and supporting the goals of sustainable development. Cleaner production and eco-efficiency are practical and effective ways for more efficient use of the materials and energy employed, while minimising the generation of wastes and emissions. The Project's WMP aligns with cleaner production principles that ultimately aim to reduce the quantity of waste generated because of the Project. By reducing resource consumption and waste production, cleaner production can decrease potential adverse impacts while reducing the cost of production.

Implementing cleaner production requires an assessment (and subsequent re-assessment) of inputs, production processes, pollution and wastes outputs from production and the consumption and disposal of products. Ongoing measurements will indicate the effectiveness of good housekeeping practices, process changes, design changes and new technologies. Generally cleaner production techniques can be implemented through:

- Good housekeeping – changes in operational procedures and management allow for the elimination of waste and emission generation. Examples include spill prevention and improved instruction of workers and training.
- Product modifications – change the product characteristics, such as shape and material composition. The lifetime of the new product is, for example, extended, the product is easier to repair, or the manufacturing of the product is less polluting.

- Input substitution – this refers to the use of less polluting raw and adjunct materials and the use of process auxiliaries (such as lubricants and coolants) with a longer service lifetime.
- Technology modifications – this includes improving process automation, process optimisation, equipment redesign and process substitution.
- Closed loop recycling – recycling can occur through the reclamation from a production process that would otherwise be disposed of as waste and using it as an input in the same production process. This could take place through reuse as raw material, recovery of materials or other application.

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

- Selecting the best available, but most practical coal extraction and processing technology to ensure appropriate energy intensity and production efficiency. The Project will be one of a few in Australia to use filter press technology to treat tailings waste. This significantly reduces the water usage associated with coal washing as tailings are dewatered and decant water is reused.
- Selecting durable plant and equipment throughout the Project lifecycle to minimise the purchase of new plant and equipment.
- Selecting the most appropriate processes during operation and maintenance, such as the reuse of runoff for dust suppression, and the treatment of effluent for reuse as process water.
- Undertaking material lifecycle and energy lifecycle assessments to determine the most energy efficient building and infrastructure materials.
- Recycling of materials such as glass, paper, cardboard and timber.
- Recycling of effluent wastewater for process reuse throughout the Project.

7.6.2 Natural Resource Use Efficiency

To maximise natural resource use efficiency and minimise waste production the following will be implemented within the Project area where feasible:

- cleared vegetation (green waste) during construction to be used for rehabilitation
- water demand to be minimised through onsite recycling of effluent and higher recovery rates from use of filter press technology in coal processing
- overburden and waste rock to be reused in land stability and contouring to minimise landscape and visual amenity impacts and
- disturbed areas will be progressively rehabilitated as soon as feasible.

7.6.3 Waste Avoidance

To minimise or potentially eliminate the production of some waste streams, Project planning will be undertaken to:

- substitute inputs for activities that generate waste
- increase the efficiency in the use of raw material, energy, water or land
- redesign processes or products
- improve the maintenance and operation of equipment

- minimise the amount of material brought onsite, which will not only satisfy the waste management objectives, but also reduce costs associated with the project
- purchase in bulk where appropriate and practicable to reduce the amount of packaging waste and costs and
- return excess materials such as drums, buckets and used chemical containers to the supplier or other local users for reuse where possible.

7.6.4 Waste Recycling Markets

All waste streams will be separated in the waste station onsite for subsequent reuse or recycling where appropriate. The recycling of waste is driven by the economic feasibility to treat and market the product. Current market demands for recyclable waste products and opportunities to minimise the waste to landfill are discussed in Table 7-4.

Table 7-4: Market demand for waste

Waste	Marketability	Potential customers
Scrap metal	Scrap metal is any product that contains metal that is capable of being recycled from previous consumption or product manufacturing. Unlike waste, scrap metal has monetary value.	Sims Metals / JJ Richards / Cleanaway.
Paper and cardboard waste	Paper and cardboard can be recycled into other products such as packaging, toilet paper and egg cartons. Every year around 3.5 million tonnes of paper and cardboard is used in Australia (Planet Ark 2015).	Bundaberg paper and cardboard recyclers, NQ Cardboard in Townsville or Visy Recycling in Brisbane.
Waste oils	The Gladstone oil re-refinery is the only plant in Queensland and expected to process 100 per cent of Queensland waste lube oil (Southern Oil 2020).	JJ Richards and Southern Oil – Gladstone Facility.
Lead acid batteries	Recycling is the only safe solution for lead acid batteries.	Numerous battery recyclers throughout Queensland.
Decommissioned equipment	Depending on the pricing cycle of the resource sector and needs of other operations, the demand is anticipated to be medium to high for the resale of operating mining equipment. Scrapping and recycling opportunities would be considered for non-operating equipment or equipment with little resale opportunity.	Other mining operations and supporting services. Scrap material merchants throughout Queensland and broader Australia.

The Project will contract a principal waste service provider who will be licensed to remove all waste streams, the fate of the material will be discussed with the contractor to ensure recycling opportunities are being embraced within the current market.

7.7 Potential Impacts and Mitigation Measures

Wastes generated by the Project have the potential to impact upon the environmental values described in Section 7.5 if they are not appropriately managed. The potential impacts from the Project waste include:

- increase in pest numbers
- human health impacts

- visual amenity of the surrounding area
- emission of toxic gasses if fire occurs in waste storage area
- degradation of the habitat value
- potential to encourage pest and weed establishment
- potential contamination of soil and water because of accidental spill or leaks from hazardous storage locations and
- decrease in downstream water quality.

The management measures to reduce the potential impacts will be addressed in the WMP. Further details of the management measures are discussed in the following sections.

7.7.1 Cumulative Waste Impacts

The increase in general waste volume associated with the Project is predicted to be low when compared to the total volume of waste disposed within the existing LSC and RRC waste management facilities.

At the time of writing SEIS v2, the RRC confirmed the Lakes Creek Road received approximately 82,000 t of waste per annum - a breakdown is provided in Table 7-5. This landfill is undergoing redesign and will increase the current operational life by 30 – 35 years, with an annual capacity of 100,000 t per annum. The anticipated volume of waste that will be taken to landfill will fit within the current capacity of the landfill.

Table 7-5: Waste type and volume – Lakes Creek Road landfill

Waste Type	Volume (per annum)
Commercial	30,000
Domestic	25,000
Green	15,000
Self-haul	7,000
Construction and demolition	5,000
Total	82,000

At the time of writing SEIS v2, the LSC landfill received 25,000 t of waste per annum. Council confirmed that the current cell has capacity through to 2022/23 and that a new cell will be developed to receive waste at the end of operational life of the existing cell. At the volumes anticipated to be generated from the Project, the current capacities of the existing cell would not be exceeded.

As commercial waste transport operators will be engaged, there is opportunity to aggregate recycling loads to Rockhampton and Gladstone or other recycling plants with the other regional mine operators to minimise the number and frequency of heavy vehicle movements required. Notwithstanding this, Central Queensland Coal will cooperate with the LSC and RRC waste stations to develop a sustainable and sufficient annual volume of waste (all types) that can be transported to each waste management site.

7.7.2 Waste Management Plan

CQC have prepared a draft Environmental Management Plan (EMP) for construction and operation of the Project. The draft EMP is contained in Appendix 12 and has been developed to manage and mitigate potential environmental impacts, and to assist Central Queensland Coal to comply with relevant environmental approvals and permit conditions. The draft EMP has been prepared in general accordance with the Commonwealth Environmental Management Plan Guidelines (Commonwealth of Australia 2014) and is modelled on the AS/NZS ISO 14001 (Standards Australia 2016) Plan-Do-Check-Act (PDCA) continual improvement model.

Appendix C of the draft EMP provides a WMP for non-mineral wastes. However, this is high-level at this stage and will be updated following project approval to reflect the Environmental Authority Conditions.

CQC will update the WMP for non-mineral wastes prior to the construction of the Project. The WMP will:

- identify all waste streams and volumes of each waste stream
- describe the management and control of construction and operational activities to ensure that all parties involved are aware of their environmental obligations in relation to waste management
- address all waste related environmental aspects and impacts for each phase of the project and
- incorporate best management practice and mitigation measures into all project activities and to consider sustainable management principles and opportunities where appropriate.

The WMP will be developed in consultation with the nominated waste contractor to allow a review of possible recycling opportunities available to the Project. The Plan will adhere to all local, State and Commonwealth regulations in relation to the handling, processing, recycling, transport and dumping of all waste streams which may be generated. The WMP will also include measures designed to comply with the relevant industry standards and will be designed in response to the predicted impacts with detailed design measures to address localised impacts where necessary. Mitigation measures may include change in work procedures and practices, physical interventions to separate or buffer specific areas from predicted impacts, physical relocation of affected parties for agreed periods of time.

The WMP will contain a program and procedure for ongoing monitoring of effectiveness of the controls and mitigation measures. Monitoring may include a range of activities such as sampling of specified parameters, visual inspections, recording of events and communication.

A separate Mineral Waste Management Plan has been developed at a high-level (see Appendix 12 – draft EMP) and will be updated post approval to reflect the Environmental Authority Conditions. The Mineral Waste Management Plan will specifically guide and manage the ex-pit and in-pit disposal of mining wastes (i.e. overburden, coarse and fine rejects).

7.7.3 Waste Monitoring

To ensure that the Project's WMP is continually updated and implemented throughout the entire Project lifecycle, waste monitoring and auditing will be undertaken. The purpose of monitoring waste management activities and outcomes onsite include the following:

- obtaining baseline data so waste generation and subsequent potential risks can be analysed

- monitoring to ensure compliance with the regulatory and project framework. monitoring will also reduce the potential for harm to the environment and
- collation of data to enable continuous improvement in carrying out the WMP.

The methods used and frequency of these audits will be defined in the Project's WMP and will be reviewed regularly as the Project progresses to ensure they are appropriate to Project staging.

7.7.3.1 General and Recyclable Waste

The management measures to be implemented for general and recyclable waste will be to:

- implement and maintain a waste stream inventory identifying the type, classification, storage, transport and disposal requirements for the waste
- inspect waste storage locations to ensure waste management measures are being adhered to and
- provide training in the principles of the waste hierarchy to personnel handling wastes on a regular basis.

7.7.3.2 Regulated Waste

The management measures to be implemented for regulated waste will be to:

- implement and maintain a waste tracking system and
- inspect waste storage locations to ensure management measures are being adhered to.

7.7.4 Social Responsibility

CQC will carry out waste management in a manner that will have the most benefit to minimising impacts on local community resources. This includes:

- liaison with the waste contractors, LSC, RRC and other relevant groups to determine existing and future capacities and accepted waste types of landfills, and where required assist with the planning of expansion and upgrade of landfills to ensure wastes generated from the Project can be accommodated
- when sourcing waste contractors, some preference will be given to businesses employing sustainable waste management practices, amongst other selection criteria and
- CQC will work with local businesses so that they can take advantage of opportunities for reuse and recycling.

7.8 Qualitative Risk Assessment

Potential impacts from waste generation during the construction and operation phases are presented in Table 7-6 along with the relevant mitigation measures. The impact assessment is based on the risk prior to mitigation and is defined as Extreme, High, Medium or Low based on the following:

- Extreme – Works are not to proceed. Activity or process must be revised to reduce the risk.
- High – Works must not proceed until suitable mitigation measures have been adopted to minimise the risk.
- Medium – Acceptable with formal review. Documented action plan to manage risk is required.
- Low – Acceptable with review.

Table 7-6: Qualitative risk assessment

Hazard and mechanism	Potential Impacts	Potential risk	Mitigation measures	Residual risk
General Waste				
Inappropriate storage and disposal of putrescibles waste	<ul style="list-style-type: none"> Increase in pest numbers and Human health affected. 	Medium	<ul style="list-style-type: none"> All construction and operation waste storages must be designed to minimise exposure to waste and any health impacts from the waste Correct disposal of waste products in sealed skip bins Regular collection and disposal offsite by licenced waste transfer services and Regular inspection, maintenance and cleaning of waste storage areas. 	Low
Traffic accident from increased traffic from waste transport	There is likely to be one to two heavy vehicle movements per fortnight to remove waste offsite. The increased traffic because of waste transport is expected to be negligible.	Low	As such, mitigation measures proposed in Chapter 6 – Traffic and Transport will be sufficient to mitigate the potential risk of collision associated with waste transport.	Low
Reduction in visual amenity of surrounding area	<p>It is not anticipated that the visual amenity of the surrounding area will be significantly impacted by waste storages.</p> <p>The nearest homestead is unlikely to have a line of sight to waste storage areas within on the Project area.</p>	Low	<ul style="list-style-type: none"> General housekeeping maintained and regular collection service to ensure there is no overflow of bins and Spare receptacles kept in the event of a collection failure. 	Low
Fire from poorly managed waste storage	A fire in the waste storage area could result in health impacts from the emission of toxic gases, damage to surrounding infrastructure and place the safety of workers in danger from smoke inhalation or burns.	Low	<ul style="list-style-type: none"> Management measures such as an Emergency Response Plan will be developed manage onsite fires appropriately (if they occur), and offsite impacts are unlikely. Waste segregation and dedicated bunded waste storage areas. Emergency Response Team trained in Fire Fighting Procedures 	Low

Hazard and mechanism	Potential Impacts	Potential risk	Mitigation measures	Residual risk
			<ul style="list-style-type: none"> • Firefighting equipment near any flammable or combustible waste material, that is used cooking oils and waste oils and • Smoking areas will be provided with specific butt bins. 	
Litter diminishing ecological value of this habitat	Litter and waste can blow or be spread into habitat areas, this causes injury risks to animals and degrades the habitat value. This can generate from waste storage areas or human disposal from work areas or vehicles. Waste management areas will be within areas that are already cleared for the construction site.	Low	<ul style="list-style-type: none"> • Training and education on litter and waste management and • Regular checks surrounding work sites and main trafficable roads for levels of litter and clean ups if required. 	Low
Introduction and dispersal of pests and weed species	Waste storages and disposal sites have the potential to encourage pest and weed establishment.	Low	A range of measures will be developed to monitor and manage pest and weed densities throughout the site. Refer to Chapter 17 - Biosecurity.	Low
Increased pressure on existing waste infrastructure	All waste disposed offsite will be at disposal locations that are already established and have capacity to receive such waste. Central Queensland Coal will endeavour to reduce offsite waste disposal, using measures outlined in Section 7.7.	Low	Waste disposed at local facilities will be subject to the disposal fees to assist council or private operators managing infrastructure capacity.	Low
Regulated wastes				
Contamination and adverse impacts from liquid wastes	Liquid hazardous wastes have the potential to spill or leak from storages and cause contamination.	Medium	<ul style="list-style-type: none"> • Specific waste bins and bunding will be used to isolate waste liquids, chemicals and hazardous wastes • Minimal quantities will be kept on site • Empty drums and other storage containers will be stored sealed and in bunded areas • Containers will be reused or recycled where possible • An inventory of safety data sheets for hazards substances will be maintained 	Low

Hazard and mechanism	Potential Impacts	Potential risk	Mitigation measures	Residual risk
			<ul style="list-style-type: none"> Licensed contracts will be engaged to regularly remove waste to the appropriate facility and Spill kits will be available close to areas where chemicals are being used or kept. 	
Surface water and groundwater contamination	There is potential for surface water contamination due to poor housekeeping of waste storage areas.	Low	Waste storage areas are bunded and sealed with drainage of the area through a grease trap. All wastes will be stored within bunded areas to prevent contamination of surface water overland flows.	Low
Process waste				
Mine affected water discharges	Changes the Deep Creek and Tooloombah Creek and downstream water quality.	Medium	<ul style="list-style-type: none"> Flood water management strategy including in-pit emergency storage Annual mine water balance preparation for wet seasons and Water quality monitoring pre, during and post discharges. 	Low

7.9 Conclusion

Waste will be generated throughout the construction, operation and decommissioning phases of the Project and have the potential to impact the existing environmental values and human health.

For general and recyclable waste, it is estimated that a total volume of 151 tonnes per annum of solid waste will require offsite disposal and 127 tonnes per annum of solid waste can be recycled during the construction period. Annually during the operational period 383 tonnes of solid waste will require disposal and 317 tonnes of solid waste can be recycled. This will be removed from site by a licensed contractor and Central Queensland Coal will work with the contractor to adopt sustainable reuse and the reprocessing of marketed recyclable wastes. The closest local municipal landfill is located at Rockhampton. The RRC has confirmed the current annual and long-term capacities of the landfill can receive general waste for the duration of operations. Cumulative impacts are anticipated to be low and within current capacity of the existing landfill operations.

Regulated wastes produced include sewage sludge, oils and chemical waste which will also be stored in designated areas and segregated in clearly labelled containers. Regulated wastes will be removed by the licensed contractor and oils recycled using the Gladstone lube oil recycling plant. Sewage effluent waste will be taken by licenced contractor to Rockhampton for disposal.

Waste management and mitigation measures put forward in this assessment reduce the impacts resulting from uncontrolled releases via methods such as bunding, containing and segregating potentially hazardous and odorous wastes. Management measures also aim to reduce pressures on existing land fill locations via implementing the waste management hierarchy (avoid, reduce, reuse, recycle, recover, treat and dispose).

7.10 Commitments

In relation to managing waste, CQCs commitments are provided in Table 7-7.

Table 7-7: Commitments – Waste Management

Commitment
Develop and implement the Project Waste Management Plan using the principles of the waste management hierarchy, for the construction, operational and decommissioning phases of the Project. This will incorporate storage, handling, management and disposal of all Project waste streams, including regulated wastes.
Use a material/energy flow analysis to provide details of natural resource use efficiency (such as energy and water), integrated processing design, and any co-generation of power and by-product reuse.
Implement and maintain a waste tracking system.
Cooperate with the LSC and RRC waste stations to develop a sustainable and sufficient annual volume of waste (all types) that can be transported to each waste management site.
Purchase recyclable materials, reuse and recycle generated waste material, where possible.
Create a culture of waste minimisation through education, and encouraging reusable drink and food containers, as well as minimising the availability of disposable plastic bottles and food containers.
Carry out waste management in a manner that will have the most benefit to minimising impacts on local community resources.
Work with local businesses so that they can take advantage of opportunities for reuse and recycling.
Work with the contractor to adopt sustainable reuse and the reprocessing of marketed recyclable wastes.
Wastes from the operation of the water treatment plant will be disposed of offsite at a licenced facility by a licenced contractor.