PEMBROKE

Olive Downs Coking Coal Project

Additional Information to the
Environmental Impact Statement

Appendix H

Waste Management Program

OLIVE DOWNS COKING COAL PROJECT

WASTE MANAGEMENT PROGRAM

Distribution Register

Section	Revision Number	Amendment	Distribution
All	WstMP-R01-A	Draft 1	IRC, OCG

MARCH 2019
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1 INTRODUCTION

The Olive Downs Coking Coal Project (the Project) is a metallurgical coal mine and associated infrastructure within the Bowen Basin, located approximately 40 kilometres south-east of Moranbah, Queensland (Figure 1).

The main activities associated with the development of the Project would include (Figure 2):

- Run-of-mine (ROM) coal production up to 20 million tonnes per annum (Mtpa) for up to approximately 79 years (commencing approximately 2020 or upon grant of all required approvals), including mining operations associated with:
  - development of the Olive Downs South domain open cut pits and waste rock emplacements within Mining Lease Applications (MLA) 700032 and MLA 700033, MLA 700035 and MLA 700036; and
  - development of the Willunga domain open cut pits and waste rock emplacements within MLA 700034.
- Installation and operation of on-site ROM coal handling and crushing facilities at Olive Downs South and Willunga domains, as well as the installation of a coal handling and preparation plant (CHPP) at the Olive Downs South domain to produce coking and pulverised coal inject coal products and thermal coal by-products.
- Construction of a new rail loop and rail spur line from the Norwich Park Branch Railway and rail-loadout facility including product coal stockpiles at the Olive Downs South domain for rail transport of product coal.
- Construction of a new water supply pipeline from the Eungella network to the mine infrastructure area at the Olive Downs South domain.
- Construction of an electricity transmission line from the Broadlea Substation to the mine infrastructure area at the Olive Downs South domain.
- Construction of access roads from Annandale Road and the Fitzroy Development Road to access the Olive Downs South and Willunga domains, respectively.

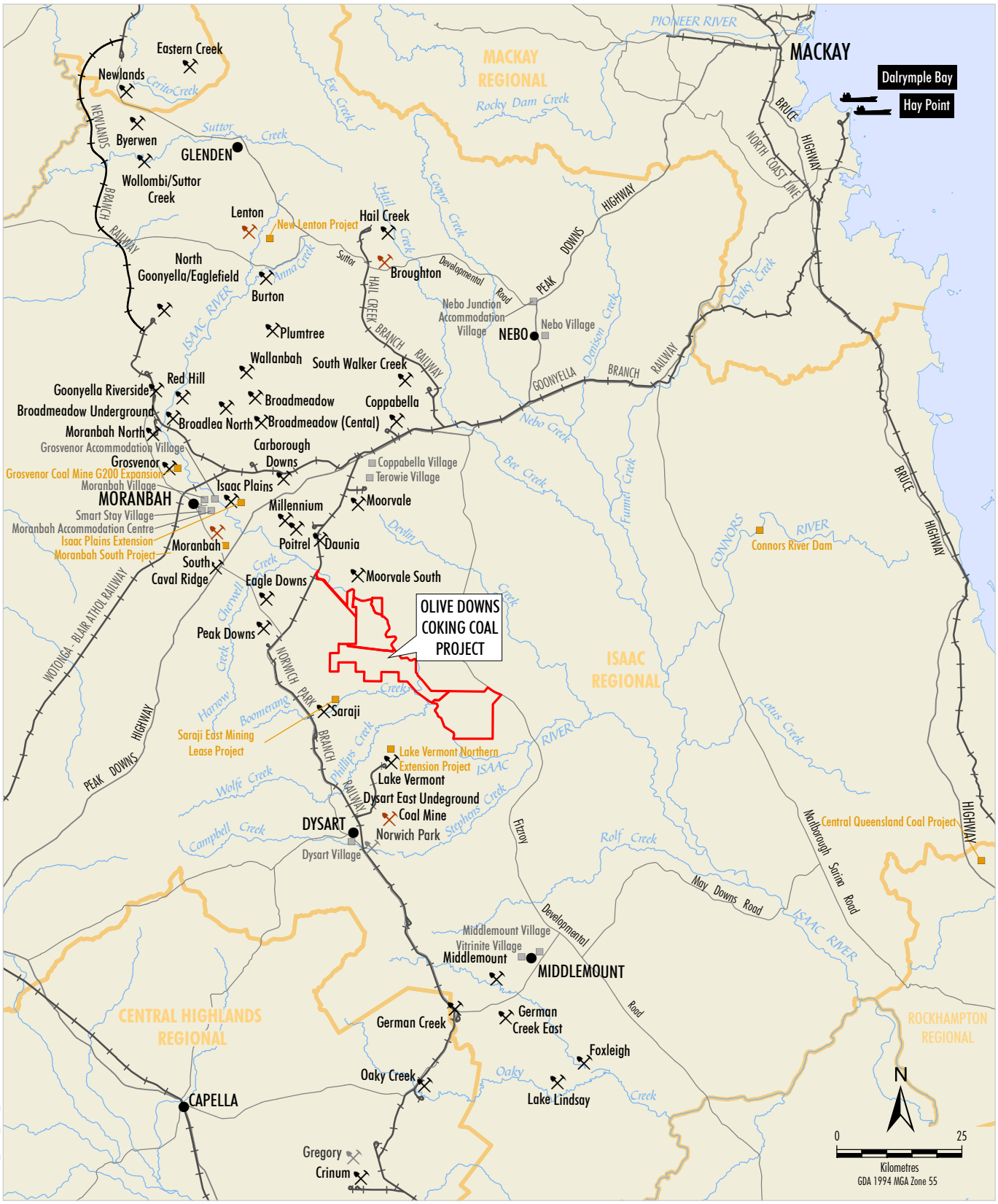
1.1 PURPOSE AND SCOPE

This Waste Management Program has been prepared for the Project to describe the procedures for the management of non-mineral waste generated during construction and operation of the mine.

The management of mineral waste (coarse and fine reject materials) generated by the Project is described in the Mineral Waste Management Plan.

This Waste Management Program has been prepared to:

- identify waste streams and monitor waste quantities generated by the Project;
- identify waste management measures to minimise waste generation; and
- ensure appropriate storage, handling and disposal of waste generated by the Project.



LEGEND

- Mining Lease Application Boundary
- Local Government Area
- Major Road
- Railway
- Port
- Approved/Operating Coal Mine
- Proposed Coal Mine
- Under Care and Maintenance
- Workforce Accommodation Facility
- Coordinated, Major and Other Relevant Project

Source: Geoscience Australia - Topographical Data 250K (2006); Department of Natural Resources and Mines (2016)

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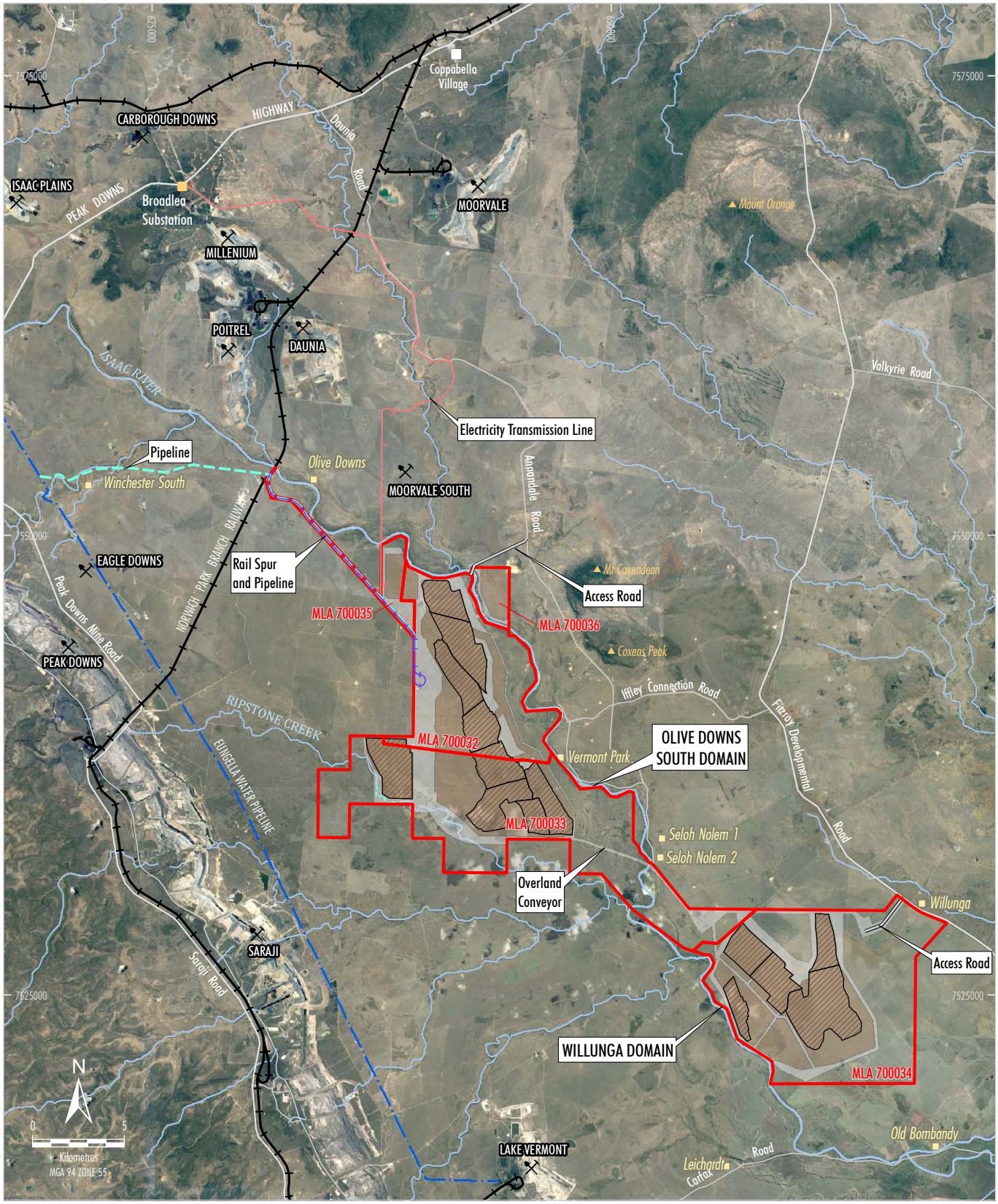
OLIVE DOWNS COKING COAL PROJECT

Regional Location

Figure 1



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LEGEND

- Mining Lease Application Boundary
- Approved/Operating Coal Mine
- Dwelling
- Eungella Pipeline Network
- Railway
- Proposed Access Road
- Proposed Electricity Transmission Line
- Proposed Rail
- Proposed Water Pipeline
- Proposed Creek Diversion
- Open Cut Pit Extent
- Out-of-Pit and In-Pit Waste Rock Emplacement
- Infrastructure Area

Source: Geoscience Australia - Topographical Data 250K (2006)
Queensland Department of Natural Resources and Mines (2016)
Orthophotography: Google Image (2016)

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OLIVE DOWNS COKING COAL PROJECT

Project General Arrangement

Figure 2

The management of waste (non-mineral) across the Project is governed by Queensland legislation, including:

- *Environmental Protection Act 1994* (EP Act);
- *Environmental Protection Regulation 2008* (EP Regulation);
- *Waste Reduction and Recycling Act 2011* (WRR Act); and
- *Waste Reduction and Recycling Regulation 2011* (WRR Regulation).

The objective of the EP Act is to protect Queensland environment while allowing for development that improves the total quality of life in a way that maintains ecological processes. The EP Regulation prescribes the detail for processes contained in the EP Act.

The WRR Act contains a suite of measures to reduce waste generation and landfill disposal and encourage recycling. The legislation:

- modernises waste management and resource recovery practices in Queensland;
- promotes waste avoidance and reduction; and
- encourages resource recovery and efficiency.

In particular, the WRR Act describes the waste and resource management hierarchy, which lists the preferred order in which waste and resource management operations should be considered. The waste and resource management hierarchy is discussed further in Section 4.1.

The WRR Regulation provides details about the processes contained in the WRR Act.

This Waste Management Program has been prepared in consultation with the Isaac Regional Council (IRC).

1.2 ENVIRONMENTAL OBJECTIVES AND PERFORMANCE OUTCOMES

In accordance with Part 3, Table 1 of the EP Regulation, the environmental objective for waste management at the Project is that any waste transported, generated or received as part of carrying out the Project is managed in a way that protects all environmental values. The Project would achieve this environmental objective through the following performance outcomes:

- waste generated, transported or received is managed in accordance with the waste and resource management hierarchy in the WRR Act;
- if waste is disposed of, it is disposed of in a way that prevents or minimises adverse effects on environmental values.

1.3 STRUCTURE OF THE WASTE MANAGEMENT PLAN

The remainder of the Waste Management Program is structured as follows:

- Section 2 describes the review and update of this Waste Management Program.
- Section 3 describes the sources of waste that will be generated by the Project.
- Section 4 describes waste management at the Project.
- Section 5 describes waste monitoring and tracking.

2 REVIEW AND UPDATE

This Waste Management Program would be reviewed every two years and updated if necessary, to ensure it is updated on a regular basis and incorporate relevant measures to improve environmental performance.

The Waste Management Program would also be reviewed within three months of an Environmental Authority amendment and updated if necessary.

The revision status of this Waste Management Program is indicated on the title page.

3 SOURCES OF WASTES

The EP Act defines 'waste' as anything that is:

> *left over, or unwanted by-product, from an industrial, commercial, domestic or other activity; or surplus to the industrial, commercial, domestic or other activity generating the waste*.

Section 65 of the EP Regulation states:

(1) Regulated waste is waste that—

(a) is commercial or industrial waste, whether or not it has been immobilised or treated; and

(b) is of a type, or contains a constituent of a type, mentioned in schedule 7, part 1.

(2) Waste prescribed under subsection (1) includes—

(a) for an element—any chemical compound containing the element; and
(b) anything that contains residues of the waste.

(3) However, waste is not regulated waste if it is mentioned in schedule 7, part 2.

The EP Regulation lists 71 waste items as regulated waste, including items such as asbestos, waste from surface treatment of metals or plastics, clinical waste and waste that is contaminated with chemicals. Regulated waste requires specific controls for its handling, transport and disposal.

General waste is waste that is not classified as regulated waste or recyclable waste.

Recyclable waste is able to be reconditioned, reprocessed or reused.

General, recyclable and regulated wastes generated by the Project will include the following:

- refurbishable items;
- green waste;
- scrap metal;
- personal protective equipment (PPE);
- air filters;
- timber and wooden pallets;
- waste oils;
- engine oil/fuel filters;
- empty waste oil containers;
- hydrocarbon contaminated material;
- waste greases;
- paints;
- miscellaneous chemicals;
- batteries;
- ozone depleting substances; and
- tyres.

A description of waste streams generated during each stage of the Project is provided in Sections 3.1 to 3.3.

3.1 CONSTRUCTION

The predominant waste streams likely to be produced during the construction phase of the Project include general waste (i.e. non-Class 1, 2 and 5 plastics, food scraps), recyclable wastes (i.e. Class 1, 2 and 5 plastics, scrap steel, etc.), refurbishable items (i.e. pipes, fittings, etc.), waste oils/grease (from machinery and vehicle maintenance), sewage (from offices and workshops) and tyres (from light and heavy vehicles). The management strategies for these waste streams are outlined in Section 4.1.

It is anticipated that construction of the Project components to support the planned maximum Stage 1 production rate would take approximately 18 to 24 months upon grant of all required approvals. Further, construction stages (i.e. Willunga domain construction and Olive Downs South domain peak production construction) are predicted to produce similar volumes and types of waste. During this time a number of materials will be brought to and stored on-site.

Until the sewage treatment plants are operational (Section 3.2), sewage from temporary ablution blocks (to be used during the construction phase) would be pumped by a licensed contractor and transported to a sewage treatment plant.

3.2 OPERATION

The waste produced during the operations phase of the Project will be similar to those produced during construction with generally increased quantities.

The operations phase of the Project will result in the largest quantity of regulated wastes of all three phases (construction, operations and decommissioning). The predominant regulated wastes that will be produced during operations will include waste oils, empty waste oil containers, waste grease, and sewage. The management strategies for these waste streams are outlined in Section 4.2.

Two containerised sewage treatment plants will be located on-site within the Olive Downs South and Willunga domain mine infrastructure areas to treat all sewage produced at the Project. The sewage treatment plants have been designed as moving bed bioreactor (MBBR) systems. Raw sewage will be pumped to balance chambers in the sewage treatment plant bioreactor vessels which would provide buffer capacity during peak inflow periods, enabling the plants to process influent at steady treatment process flow rates. Influent from the balance chambers will be delivered to the MBBR chambers, where biological treatment would take place. Aeration will be achieved by a series of diaphragm aeration blowers. Following the MBBR chambers, effluent will pass to secondary clarification chambers for suspended solids removal. Clarified effluent will then be delivered to disinfection/effluent storage tanks ready for discharge to the wet weather irrigation storage tanks which will have a capacity of 260 kilolitres (KL) each.

Waste sludge will be pumped to storage tanks before being pumped out and transported off-site by a licensed contractor to a licensed disposal facility.

The effluent disposal systems will discharge through an irrigation system. The irrigation areas are located within Project mining tenements and have been designed with prescribed setback distances, but strategically positioned beyond the extent of the 1:1000 annual exceedance probability flood event to reduce the potential for dispersion off-site.

The irrigation areas have been positioned to optimise exposure to sunlight and wind, increasing the rate of evapotranspiration. Evapotranspiration increases the operational capacity of the irrigation system, minimising the potential for pooling and runoff of effluent.

Other design parameters considered for the design of the irrigation system, include selection of irrigation areas with soils that exhibit low potential for erosion and increased drainage capacity. These design parameters would optimise the operation of the irrigation systems and reduce potential for dispersion off-site.

The location of the irrigation areas also considered the proximity to existing groundwater users to reduce potential of effluent seepage to groundwater sources.

3.3 DECOMMISSIONING

Infrastructure at the Project will be decommissioned in accordance with the Rehabilitation and Mine Closure Plan to be developed for the Project and would, in general, be dismantled or demolished and removed. Where possible, decommissioning would be phased throughout the life of the Project. During decommissioning, all efforts would be made to follow the waste and resource management hierarchy using waste disposal as a last option. Areas of potential contamination will be investigated and managed/remediated if required.

3.4 WASTE INVENTORY

Table 1 identifies the significant waste streams expected to be produced for the construction and operational phases of the Project. Estimated quantities listed for each waste are on an annual basis and were predicted based on Pembroke Olive Downs Pty Ltd's (Pembroke's) experience and the amount of waste produced at similar sized coal mine operations in Queensland.

Table 1 also describes the attributes of the waste stream that influence the potential for dispersion. Pembroke would manage the waste streams to reduce the potential for dispersion.

Table 1 also provides a qualitative risk ranking associated with the relevant waste stream. A preliminary risk assessment for the Project was conducted (Pembroke, 2018) and includes preventative and mitigating measures for potentially hazardous waste streams.

Pembroke will accurately monitor and record all waste streams generated by the Project. Waste monitoring is described in Section 5.

Table 1
Estimated Maximum Wastes Produced by the Project (per annum)

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Attributes that may Affect Dispersal	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operations				
General and Recyclable Wastes								
General waste (i.e. food scraps, non-Class 1 [PET], 2 [HDPE] and 5 [PP plastics])	Solid	Kitchenettes, crib rooms, administration areas, workshop, etc.	1,500 m^3	2,500 m^3	Putrescible and attractive to fauna	Low	Stored on-site in bins for regular transport off-site by a licensed waste transport contractor to a licensed landfill (g).	General waste would be transported off-site by a licenced waste contractor to an approved landfill (excluding Dysart).
Recyclable waste (i.e. aluminium, steel cans, Class 1, 2 and 5 plastics, paper towels, paper and cardboard)	Solid	Kitchenettes, crib rooms, administration areas, workshop etc.	430 m^3	1,200 m^3	Small in size and light in weight	Low	Stored on-site in bins for regular transport off-site by a licensed waste transport contractor for recycling (d). Confidential papers would be segregated into locked paper bins for shredding and recycling (d).	Recyclable waste would be transported off-site by a licenced recycling contractor to an approved recycling facility outside the Isaac Regional local government area.
Refurbishable items (i.e. pipe work and associated components and fittings, wing nuts, conveyor rollers and belt)	Solid	CHPP and workshops	<15 t	<40 t	Rust formation	Low	Items would be stockpiled within a designated area. If condition is acceptable, items would be reused directly (c). Where items are at the end of their life, they would be collected and disposed of as appropriate (g). Where items are contaminated with hydrocarbons, they would be managed as regulated waste.	If disposal off-site is required, refurbishable items would be disposed of by a licenced waste contractor to an approved waste facility.
Green waste (i.e. grass, cleared timber and weeds)	Solid	Clearing of vegetation	210 ha#	210 ha#	Attractive to fauna	Low	Mulched and/or placed in timber stacks for reuse on-site during rehabilitation (c). Waste vegetation would be burned where appropriate (g).	Green waste would be disposed of within the approved ML areas.

Table 1 (Continued)
Estimated Maximum Wastes Produced by the Project (per annum)

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Attributes that may Affect Dispersal	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operations				
Scrap metal (i.e. stainless steel, aluminium and any item considered to be metal [ferrous or non-ferrous] including machine and vehicle parts)	Solid	Construction activities, infrastructure maintenance and workshops	150 m^3	200 m^3	Rust formation	Low	Smaller items would be placed in scrap metal skips for collection by a licensed contractor. Larger items would be left in an accessible location where specific collection arrangements can be made. All grease and oils are to be removed prior to placement in skips. A licensed contractor would remove all scrap metals for segregation at a licensed recycling facility (d).	Scrap metal would be disposed of by a licensed contractor to an approved recycling facility.
PPE and other small items (i.e. gloves, hard hats, safety glasses and face masks)	Solid	Bathhouse and contractor facilities	<60 kg	<120 kg	Light weight and small in size	Low	Equipment that is not deemed damaged would be reused (c). Only sufficiently used/damaged PPE would be disposed of (g).	Where PPE is required to be disposed of, it would be transported off-site by a licenced waste contractor to an approved landfill.
Air filters (i.e. engine air filters)	Solid	Vehicle and machinery maintenance at workshops	<2 t	<2 t	N/A	Low	Air filters would be temporarily stored in the appropriate air filter skip/bin. Final disposal would be off-site (g).	Air filters would be transported off-site by a licenced waste contractor to an approved landfill.
Timber/wooden pallets (i.e. reusable pallets)	Solid	Workshop and administration areas	<2 t	<2 t	N/A	Low	Pallets that are reusable would be returned to the supplier (c). The remainder would be sent to general waste (g).	Pallets that are not re-usable would be transported off-site by a licenced waste contractor to an approved landfill.

Table 1 (Continued)
Estimated Maximum Wastes Produced by the Project (per annum)

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Attributes that may Affect Dispersal	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operations				
Mine affected water	Liquid	Any water that has been used or potentially contaminated by mining operations, including mine runoff water, groundwater seepage into pit, or water that has been used at the CHPP	Refer to Appendix E of the draft EIS for mine affected water volumes.	Refer to Appendix E of the draft EIS for mine affected water volumes.	Liquid	Low	Mine affected water would be reused (c) for dust suppression and construction and/or road maintenance around the Project. Discharge to the Isaac River would be subject to meeting water quality release limits specified in an EA for the Project. Further water management strategies are discussed in Sections 4.2, 4.3 and Appendix E of the draft EIS.	N/A
Regulated								
Waste oils	Liquid	Machinery and vehicle maintenance and workshop	400 kL	1,400 kL	Liquid	Medium	Collection and storage for transport by a licensed regulated waste contractor to a regulated waste receiver for reuse (c) or recycling (d).	Waste oils would be recycled by a licenced regulated waste contractor.
Engine oil/fuel filters	Solid/Liquid	Vehicle and machinery maintenance at workshop	4,000	12,000	Liquid contents	Medium	Collection and storage in sealed oil filter disposal pod. Transportation by a licensed regulated waste contractor to a licensed regulated waste receiver for treatment (solvent wash) to recover oil (c) or recycling (d).	Engine oil/fuel filters would be recycled by a licenced regulated waste contractor.
Waste grease (i.e. from machinery)	Liquid	Workshop, large machinery maintenance	<100 kL	<200 kL	Liquid	Medium	Stored in tanks or appropriately sealed containers in a designated bunded area. Transported by a licensed regulated waste contractor to a licensed regulated waste receiver for, recycling (d).	Waste grease would be recycled by a licenced regulated waste contractor.

Table 1 (Continued)
Estimated Maximum Wastes Produced by the Project (per annum)

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Attributes that may Affect Dispersal	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operations				
Sewage	Liquid	Offices and workshops	<100 kL	<120 kL	Liquid	Medium	During construction there would be temporary ablution blocks which would not be connected to a sewage system and would require pumping out by licensed contractor. Once the sewage treatment plants are operational, within the mine infrastructure areas, the effluent would be treated by a package sewage treatment plant (f) and disposed via irrigation or reused within the site water management system.	Sewage would be transported off-site by a licenced contractor to disposal at a licenced facility during construction. Once the Project is operational, sewage would be treated and treated effluent disposed in the designated effluent irrigation areas. Solids from the sewage treatment plants would be collected by a licenced contractor and disposed at an IRC sewage treatment plant.
Empty waste oil containers	Solid	Workshop	<4 t	<10 t	N/A	Medium	All drums would be segregated and sealed prior to collection by a licensed regulated waste contractor and transported to a licensed waste receiver where drums and containers would be rinsed and recycled (d).	Empty waste oil containers would be recycled by a licenced regulated waste contractor.

Table 1 (Continued)
Estimated Maximum Wastes Produced by the Project (per annum)

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Attributes that may Affect Dispersal	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operations				
Paints (i.e. general paint, air dried insulating varnish)	Liquid/Gas	Industrial area infrastructure and workshop	<1 t	<1 t	Liquid	Medium	Transported to a designated sealed and bunded area for collection by a licensed regulated waste contractor and transported to a licensed regulated waste receiver for treatment (f) and disposal (g).	Empty waste oil containers would be recycled by a licenced regulated waste contractor.
Hydrocarbon contaminated material (i.e. oily rags)	Solid/Liquid	Workshop servicing trucks and light/heavy vehicles	<4 t	12 t	Liquid contents	Medium	Collection and storage in regulated sealed disposal bin. Transported by a licensed regulated waste contractor to a licensed regulated waste receiver for appropriate disposal (g).	Hydrocarbon contaminated materials would be disposed off-site by a licenced regulated waste contractor to an approved licenced facility.
Miscellaneous chemicals (i.e. engine coolant, solvents, sealants, etc.)	Liquid/Gas	Workshop and administration	20 kL	50 kL	Liquid	Medium	Transported to a designated sealed and bunded area for collection by a licensed regulated waste contractor and transported to a licensed regulated waste receiver for treatment and disposal (g).	Miscellaneous chemicals would be disposed off-site by a licenced regulated waste contractor to an approved licenced facility.
Batteries (i.e. dry cell, gel cell, lead acid)	Solid	Operation of portable electrical equipment (radios, phones, etc.) within the workshop and other areas	<1 t	<1 t	Liquid contents	Medium	Segregation and storage within dedicated containers in battery storage area for collection by a licensed regulated waste transport contractor to a licensed regulated waste facility for recycling (d) or disposal (g).	Batteries would be disposed off-site by a licenced regulated waste contractor to an approved licenced facility.

Table 1 (Continued)
Estimated Maximum Wastes Produced by the Project (per annum)

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Attributes that may Affect Dispersal	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operations				
Ozone depleting substance (i.e. refrigerants and air conditioning substances)	Liquid/Gas	Air conditioning units, fridges and cars throughout site	200 kg	800 kg	Liquid/Fumes	High	Ozone depleting substances would be contained at the source in cylinders and returned to the supplier for reuse and recycling (c)(d).	Ozone depleting substances would be recycled by a licenced regulated waste contractor.
Tyres (i.e. light and heavy vehicle tyres)	Solid	Tyres from light and heavy vehicles	180	280	N/A	Low	Segregation and storage in a designated area with no grass or other flammable material within a 10 m radius. Tyres would be transported off-site to a supplier for re-treading where practicable (c) or disposed on-site in a designated tyre disposal area in the backfilled pit (g).	Tyres would be disposed of within the approved ML areas.

* In consideration of potential hazards, toxicity and dispersal mechanisms.

^ Waste Management Hierarchy as defined in section 9 of the WRR Act: (c) waste reuse; (d) waste recycling; (f) treat waste before disposal; (g) waste disposal. The measures identified above will be implemented only once waste avoidance and reduction measures have been exhausted.

The average annual disturbance of land (i.e. green waste) assuming the life of the Project is 79 years.

PET = Polyethylene terephthalate

HDPE = High-density polyethylene

PP = Polypropylene

m^3 = cubic metres

t = tonnes

ha = hectares

kg = kilograms

EIS = Environmental Impact Statement

EA = Environmental Authority

m = metres

4 WASTE MANAGEMENT

4.1 WASTE AND RESOURCE MANAGEMENT HIERARCHY

The WRR Act defines the waste and resource management hierarchy as the following precepts, listed in the preferred order in which waste and resource management operations should be considered:

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

Pembroke will implement a waste hierarchy consistent with the WRR Act waste and resource management hierarchy to manage Project waste generation.

4.1.1 Avoidance and Reduction

Pembroke will endeavour to use products that generate minimal waste and avoid excess use through mistreatment or oversupply of products.

Where possible, raw materials would be delivered in bulk form. Where bulk delivery is not feasible, consideration shall be given to the purchase of products based on minimalist packaging and use of biodegradable materials. Pembroke would also consider the use of alternative products to ensure that unnecessary waste is not produced.

4.1.2 Reuse

Consideration of the ability of materials to be reused will be given during the procurement process. For example, reusable towels and more durable materials that do not require as frequent replacement would be investigated.

Pembroke will request that suppliers reuse packaging materials such as pallets, drums and plastic and metal containers where practicable.

Pembroke will also reuse waste water generated onsite (through the CHPP and treated effluent from the sewage treatment plants).

4.1.3 Recycle

Procurement of goods would also consider recycled alternatives such as recycled paper, timber products, printer cartridges etc. Pembroke would engage the services of licenced recycling contractors to recycle regulated wastes such as waste oils, filters and batteries.

Recyclable wastes would be separated and stored on-site prior to collection by licenced contractors.

4.1.4 Recover

Due to the nature of the Project, limited opportunities for the recovery of waste or energy. Notwithstanding, the Project, in particular the CHPP and water recovery/reuse system has been designed to recover as much water as possible and be energy efficient.

4.1.5 Treat

Sewage would be treated in on-site sewage treatment plants and the treated effluent would be irrigated in dedicated irrigation areas. The waste sludge would be collected by a licenced contractor for off-site disposal at a licenced facility.

4.1.6 Dispose

Before disposing of waste to landfill, the following procedure would be implemented:

- consider re-use and recycling that may be practicable;
- where practicable, require consumable suppliers to collect and recycle the waste product; and
- consider off-site recycling services that may be available.

Disposal is the least preferred option in the hierarchy and should be carefully managed to minimise negative environmental consequences.

Off-site disposal options are described in Section 4.4.

4.2 REGULATED AND TRACKABLE WASTE

In accordance with the EP Regulation, waste handlers are required to submit waste tracking information to the Department of Environment and Science (DES) when they transport regulated wastes that are mentioned in Schedule 2E of the EP Regulation (known as trackable wastes). The waste tracking system allows DES to track regulated wastes from the source through to the recycling/treatment/disposal location.

As a ‘waste generator’ Pembroke would record the information about the trackable waste and give the information to the waste transporter. Pembroke would submit the waste tracking certificates to DES as required.

4.3 COLLECTION AND STORAGE

Designated waste collection areas have been included in the design of the Olive Downs South and Willunga domain infrastructure areas.

Waste produced at the Project operations would be collected and transported to the mine infrastructure areas where:

- waste would be segregated into general waste, recyclable waste and hazardous waste;
- general waste would be collected in bins;
- waste oils, chemicals, batteries and other hazardous or regulated substances would be stored in bunded areas or on bunded pallets;

- recyclable waste would be separated and stored for collection; and
- scrap tyres would be stockpiled in accordance with Department of Environment and Heritage Protection (DEHP) Operational Policy *Disposal and Storage of scrap tyres at mine sites* (DEHP, 2014). To minimise the risk of fire, tyre stockpiles would be:
  - less than 3 m high and 200 m^2 in area;
  - more than 10 m from any other tyre storage area; and
  - more than a 10 m radius from any grass.

Different forms of waste (i.e. metals, paper, oils, batteries, general waste, etc.) would be stored on-site according to waste stream, taking into consideration public health, hygiene and safety standards. For example, flammable material or combustible liquid wastes would be stored in facilities designed to meet the Australian Standard 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids*.

Bins located within offices and workshops would be appropriately labelled to avoid cross-contamination and ensure separation of different waste streams. Also, bins would be emptied regularly into the relevant skip to keep vermin and pest numbers to a minimum.

As stated above, Pembroke would develop a Waste Management Plan which would be implemented at the Project.

Hazardous waste would be stored in a separate storage area to ensure that all hazardous waste is managed to prevent environmental harm.

4.4 OFF-SITE DISPOSAL

The IRC operates nine waste service facilities across the IRC local government area. These facilities include six resource recovery centres (RRC) at Moranbah, Clermont, Dysart, Middlemount, Glenden and St Lawrence and three refuse transfer stations (RTS). IRC is proposing to convert the Middlemount and St Lawrence RTSs to RRCs (IRC, 2016).

The IRC has recently upgraded the Moranbah RRC through the development of a new landfill cell.

It is understood that the Clermont RRC is one of the largest facilities and the IRC has identified opportunities to expand the facility. The IRC has acknowledged the Clermont RRC may require expansion to accommodate waste from the yet to be developed Carmichael Coal Mine (IRC, 2016).

IRC (2016) has also identified that the Dysart RRC has significant unused areas and has recently undergone upgrades to the transfer station and weighbridge infrastructure. IRC has indicated that the Dysart RRC does not currently have sufficient capacity to handle general waste from the Project. Until such time as its capacity is increased, Pembroke commits to not disposing of general waste generated by the Project at the Dysart RRC.

Pembroke will continue to engage with the IRC regarding waste disposal options. It is anticipated that waste generated at the Project that requires off-site disposal will either be transferred to the Dysart, Moranbah or Clermont RRCs. If capacity at these facilities is unavailable or an agreement with IRC for waste disposal cannot be reached, waste from the Project could be disposed within landfill sites in the Mackay Regional Council (e.g. disposal within the Hogan's Pocket Landfill, via the Paget Waste Management Centre). The Hogan's Pocket Landfill is estimated to have capacity until approximately 2050 (Mackay Regional Council, 2014).

4.5 CLEANER PRODUCTION

Cleaner production means the continuous application of an integrated preventative environmental strategy to processes, products and services to increase efficiency and reduce risks to people and the environment.

Cleaner production techniques could be implemented during all phases of the Project through:

- 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.
- Product selection: Wherever practicable, non-hazardous products are selected in preference to hazardous materials.
- Improved operation and maintenance: This involves the selection and use of the most appropriate and practicable fixed and mobile equipment for use in coal extraction, transportation and processing, and high levels of maintenance to ensure items are operating efficiently.
- Reuse of resources: Resources that would otherwise be classified as wastes (e.g. wooden pallets, cleared vegetative material, waste water, metals) are reused on-site.
- Technology modifications: This includes improving process automation, process optimisation, equipment redesign and process substitution.
- Closed-loop recycling: Where a product is recycled and used again in the same form (e.g. wooden pallets).

Pembroke would contribute to cleaner production outcomes by applying the following aspects to the Project:

- limiting the extent of ground to be disturbed during construction and operations (i.e. minimising the disturbance footprint of the Project);
- selecting the most efficient and practical coal extraction and processing technology to ensure the appropriate energy intensity and production efficiency;
- selecting the most efficient and productive machinery and equipment throughout the life of the Project to minimise the purchase of machinery and equipment;
- selecting the most appropriate processes during operation and maintenance, such as the reuse of runoff for dust suppression, and the recycling of effluent from the sewage treatment plant for reuse or irrigation; and
- recycling appropriate materials (i.e. glass, paper, cardboard, timber and Class, 1, 2 and 5 plastics).

5 WASTE MONITORING AND AUDITING

The waste streams, quantities produced and implemented management practices would be recorded by Pembroke over the life of the Project. The following activities would be undertaken during the auditing of waste production and management:

- assessment of the wastes being produced compared to the predicted waste streams and quantities (Table 1);
- identify potential improvement in waste management practices (including establishment of reduced waste targets where possible);
- monthly inspection reports about waste storage systems and transportation would be prepared and sent to the senior management team;
- inspections of the waste storage areas would occur on a regular basis to ensure that all waste is appropriately stored and separated;
- monitor the implementation and success of this Waste Management Program; and
- monitor compliance with relevant legislation.

Employees would be required to notify employers within 24 hours of becoming aware of an incident that has potential to cause, or threaten to cause, material or serious environmental harm. This notification would be delivered verbally or in writing in accordance with the 2016 DEHP guideline *The duty to notify of environmental harm*.

6 REFERENCES

Department of Environment and Heritage Protection (2014) *Operational Policy – Disposal and Storage of scrap tyres at mine sites*.

Department of Environment and Heritage Protection (2016) *The duty to notify of environmental harm.*

Isaac Regional Council (2016) *Waste Reduction and Recycling Plan*.

Mackay Regional Council (2014) *Waste Management Strategic Plan 2014-2018.*

Pembroke Resources (2018) *Olive Downs Coking Coal Project EIS.*