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## WASTE MANAGEMENT

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SUPPLEMENTARY REPORT TO THE EIS

## Section 16 Waste Management

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## 16.1 Studies and Assessments Completed for the EIS

This section provides an overview of the waste management impact assessment completed for the EIS and the main conclusions from that assessment.

This waste impact assessment comprised the following:

- Review of Commonwealth, State and local legislation, policy and guidelines relevant to waste management through construction, operation and decommissioning phases of the Project;
- Identification of waste types generated from activities associated with the construction, operation and decommissioning of the Project, based on design information available at the time of the assessment, and quantities, based on information from Arrow's existing operations and expected types and quantities for the Project;
- Assessment to identify the likely impacts associated with waste streams generated during each phase of the Project; and
- Identification of management options for waste minimisation, management (e.g. handling, storage, collection, treatment, etc.) and disposal.

General and regulated waste generated over the life of the Project will be disposed of at licensed waste management facilities owned and operated by third parties. Licensed waste management facilities are defined as environmentally relevant activities (ERAs) and require approval under the *Environmental Protection Regulation 2008* (EP Regulation). Since submission of the EIS, the *Environmental Protection (Greentape Reduction) and Other Legislation Amendment Act 2012* (Greentape Reduction Act), which commenced in March 2013, has introduced an integrated environmental approval process for ERAs.

Potential waste management issues associated with Project activities include:

- Uncontrolled release of waste due to failure of waste storage or management systems could potentially result in soil and water contamination and impacts on visual amenity; and
- Controlled releases of waste to the environment (air, land, water), which could potentially lead to adverse health and ecological impacts.

The key environmental values that have the potential to be impacted by waste are:

- Life, health and wellbeing of people;
- Diversity of ecological processes and associated ecosystems; and
- Soils and land use capability, having regard to economic consideration; and management of finite natural resources.

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The potential impacts that are applicable to waste generation include:

- Wastage of raw materials (e.g. wastage of construction materials such as steel and concrete);
- Lost opportunity for resource re-use or recycling if product is disposed;
- Additional transport movements and fuel usage for cartage of waste;
- Consumption of landfill air space (for waste sent to landfill);
- Generation of additional landfill leachate and landfill gas to be managed (from waste sent to local landfills);
- Risks to human health or safety (e.g. dust, odour, exposure to hazardous substances); and
- Pollution of soil, groundwater, or surface water (through accidental spills or releases).

### 16.1.1 Environmental Protection Objectives

The environmental protection objectives relevant to waste management are:

- Comply with regulatory requirements and Arrow policy and procedures;
- Minimise the waste generated throughout the Project life;
- Maximise reuse and recycling of waste materials produced; and
- Store, handle, transport and dispose of waste in an environmentally responsible manner that does not cause harm or contamination to soil, air or water.

Avoidance, mitigation and management measures identified in the EIS were proposed in accordance with the preferred waste management hierarchy discussed in the Waste Management chapter (Section 28.2) of the EIS.

The following hierarchy of management options will apply to waste generated during Project activities:

- Source reduction: avoid or reduce practices that result in the generation of wastes;
- Reuse: where practical, reuse waste materials that are in their original form;
- Recycling: where practical, send waste to appropriate facilities to convert waste into other usable materials;
- Treatment: where waste can no longer be reused or recycled, make safe for disposal; and
- Disposal: disposal to appropriately licensed facilities.

## 16.2 Waste Disposal

Where reuse and recycling options are not available, general and regulated wastes will be removed to appropriately licensed waste disposal facilities. Regulated waste will be removed by a licensed waste transporter.

There are a number of licensed waste disposal facilities that currently exist across the Isaac, Central Highlands, Whitsundays and surrounding local government areas. Commercial waste processing facilities are also licensed to operate in the region.

Table 16-1 identifies the ERA which a waste disposal facility may be licensed to operate under the EP Regulation. Table 16-2 identifies, where applicable the waste types that may be accepted under an ERA. Table 16-3 provides a list of existing licensed waste management facilities near the Project.

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**Table 16-1 ERA and Associated Threshold for Waste Management Activities**

ERA	Threshold*	Threshold Description
8 Chemical Storage	1	Storing a total of 50 t or more of chemicals of dangerous goods class 1 or class 2, division 2.3 under waste type (1)(a).
	2	Storing 50 t or more of chemicals of dangerous goods class 6, division 6.1, under waste type (1)(b).
	3	Storing more than 500 m <sup>3</sup> of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3, under waste type (1)(c).
	4	Storing 200 t or more of chemicals that are solids or gases, other than chemicals mentioned in items 1 to 3, under waste type (1)(d).
	5	Storing 200 m <sup>3</sup> or more of chemicals that are liquids, other than chemicals mentioned in items 1 to 3, under waste type (1)(d).
55 Regulated Waste Recycling or Reprocessing	1	Carrying out the relevant activity if— a) the regulated waste is in a solid form or an aqueous solution or suspension; b) no more than 10 t of regulated waste is stored or processed at the facility in a day; and c) all liquid or solid waste generated from the activity is released to a local government's sewerage infrastructure or a facility mentioned in section 56, 58, 60 or 61.
	2	Otherwise carrying out the relevant activity.
56 Regulated Waste Storage	-	Receiving and storing regulated waste.
57 Regulated Waste Transport	1	Transporting tyres.
	2(a)	1 to 5 vehicles.
	2(b)	6 to 35 vehicles.
	2(c)	36 or more vehicles.
58 Regulated Waste Treatment	-	Operating a facility for receiving and treating regulated waste or contaminated soil to render the waste or soil non-hazardous or less hazardous.
60 Waste Disposal	1(a)	Operating a facility for disposing of, in a year, < 50,000 t of waste under subsection 1(a).
	1(b)	Operating a facility for disposing of, in a year, 50,000 t to 100,000 t of waste under subsection 1(a).
	1(c)	Operating a facility for disposing of, in a year, >100,000 t but not more than 200,000 t of waste under subsection 1(a).
	1(d)	Operating a facility for disposing of, in a year, >200,000 t of waste under subsection 1(a).
	2(a)	Operating a facility for disposing of, in a year >50 t to <2,000 t of waste under subsection 1(b).
	2(b)	Operating a facility for disposing of, in a year >2,000 t but <5,000 t of waste under subsection 1(b).

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ERA	Threshold*	Threshold Description
60 Waste Disposal	2(c)	Operating a facility for disposing of, in a year >5,000 t but not more than 10,000 t of waste under subsection 1(b).
	2(d)	Operating a facility for disposing of, in a year >10,000 t but not more than 20,000 t of waste under subsection 1(b).
	2(e)	Operating a facility for disposing of, in a year >20,000 t but not more than 50,000 t of waste under subsection 1(b).
	2(f)	Operating a facility for disposing of, in a year >50,000 t but not more than 100,000 t of waste under subsection 1(b).
	2(g)	Operating a facility for disposing of, in a year >100,000 t but not more than 200,000 t of waste under subsection 1(b).
	2(h)	Operating a facility for disposing of, in a year >200,000 t of waste under subsection 1(b).
61 Waste Incineration and Thermal Treatment	1	Incinerating waste vegetation, clean paper or cardboard.
	2	Incinerating or thermally treating, in a year, the following quantity of general waste— a) less than 5,000 t; and b) 5,000 t or more.
	3	Incinerating or thermally treating— a) clinical waste or quarantine waste; and b) other regulated waste.

\*The threshold number refers to the EP Regulation, Schedule 2, threshold within which the relevant activity may be carried out under the licensed ERA.

**Table 16-2 ERA Subsection and Waste Accepted**

ERA	Waste Accepted	Description
60	1(a)	Operating a facility for disposing of— <ul style="list-style-type: none"> <li>• Only regulated waste; or</li> <li>• Regulated waste and any, or any combination, of the following— <ul style="list-style-type: none"> <li>— general waste;</li> <li>— limited regulated waste; and</li> <li>— if the facility is in a scheduled area—no more than 5 t of untreated clinical waste in a year.</li> </ul> </li> </ul>
	1(b)	Operating a facility for disposing of, in a year, 50 t or more of waste consisting of— <ul style="list-style-type: none"> <li>• Only general waste; or</li> <li>• General waste and either, or a combination, of the following— <ul style="list-style-type: none"> <li>— a quantity of limited regulated waste that is no more than 10% of the total amount of waste received at the facility in a year; and</li> <li>— if the facility is in a scheduled area—no more than 5 t of untreated clinical waste.</li> </ul> </li> </ul>

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ERA	Waste Accepted	Description
8	(1)	<p>Chemical storage (the relevant activity) consists of storing -</p> <ul style="list-style-type: none"> <li>• 50 t or more of chemicals of dangerous goods class 1 or class 2, division 2.3 in containers of at least 10 m<sup>3</sup>; or</li> <li>• 50 t or more of chemicals of dangerous goods class 6, division 6.1 in containers capable of holding at least 900 kg of the chemicals; or</li> <li>• More than 500 m<sup>3</sup> of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3; or</li> <li>• The following quantities of other chemicals in containers of at least 10 m<sup>3</sup> - <ul style="list-style-type: none"> <li>— 200 t or more, if they are solids or gases; and</li> <li>— 200 m<sup>3</sup> or more, if they are liquids.</li> </ul> </li> </ul>
	(2)	<p>However, the relevant activity does not include—</p> <ul style="list-style-type: none"> <li>• in-transit storage of chemicals; or</li> <li>• storing chemicals for carrying out an activity under section 7; or</li> <li>• transporting petroleum under the <i>Petroleum Act 1923</i> or the <i>Petroleum and Gas (Production and Safety) Act 2004</i>; or</li> <li>• carrying out an activity to which section 55, 56, 57 or 58 applies.</li> </ul>

**Table 16-3 Existing Licensed Waste Management Facilities near the Project area**

Operator	Facility Name	ERA	Threshold	Waste Accepted
Barcaldine Regional Council	Jericho General Waste Disposal	60	2(c)	1(b)
	Alpha General Waste Disposal	60	2(b)	1(b)
	Jericho General Waste Disposal	60	2(b)	1(b)
Central Highlands Regional Council	Blackwater Landfill	60	2(b)	1(b)
	Bluff Landfill	60	2(a)	1(b)
	Bogantungan Landfill	60	2(a)	1(b)
	Capella Landfill	60	2(a)	1(b)
	Dingo Waste Disposal	60	2(a)	1(b)
	Landfill Duaringa	60	2(a)	1(b)
	Emerald Regulated Waste Storage	56	-	-
	Emerald Landfill (Lochlees )	56	-	-
		60	2(d)	1(b)
	Rolleston Landfill	60	1(a)	1(a)
		60	2(b)	1(b)
	Rubyvale- Sapphire Road Landfill	60	2(a)	1(b)
	Springsure Landfill	60	2(b)	1(b)
		60	1(a)	1(a)
	Tieri WTS and Landfill	60	2(b)	1(b)
Willow Gemfields Landfill	60	2(a)	1(b)	

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Operator	Facility Name	ERA	Threshold	Waste Accepted
JJ Richards (Clermont)	JJ Richards	56	-	-
		8	3(1)	-
Charters Towers Regional Council	Ravenswood Landfill	75	2(b)	1(b)
	Pentland Landfill	60	2(b)	1(b)
	Greenvale Landfill	60	2(b)	1(b)
	Mingela Landfill	60	2(b)	1(b)
	Homestead Landfill	60	2(b)	1(b)
	Balfes Creek Landfill	60	2(b)	1(b)
	Herveys Range Landfill	60	2(b)	1(b)
Transpacific Pty Ltd (Yatala)	Transpacific Liquid Or Hazardous Waste	55	2	Saline effluent and residues from reverse osmosis and desalination plants.
		56	-	-
		58	-	Regulated waste or contaminated soil.
		61	3(a)	Clinical waste or quarantine waste.
Isaac Regional Council	Carmila Resource Recovery Centre	60	2(a)	1(b)
	Clermont Resource Recovery Centre	56	-	-
	Dysart Resource Recovery Centre	60	2(a)	1(b)
	Glenden Resource Recovery Centre	60	2(b)	1(b)
	Greenhill Resource Recovery Centre	60	2(a)	1(b)
	Middlemount Resource Recovery Centre	60	2(a)	1(b)
	Nebo Resource Recovery Centre	60	2(b)	1(b)
	St Lawrence Resource Recovery Centre	60	2(a)	1(b)
	Clermont Landfill	60	2(b)	1(b)
		56	-	-
	Moranbah Landfill	60	2(c)	1(b)
		6	-	-
	Clermont Works Depot	56	-	-
	Moranbah Works Depot	56	-	-
Transpacific Pty Ltd (Crestmead)	Transpacific Liquid Or Hazardous Waste	55	1	-
		56	1	-
NQ Resource Recovery	Hogan's Paget Waste	55	2	-

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Operator	Facility Name	ERA	Threshold	Waste Accepted
Pty Ltd (Paget)	Management Centre	8	-	-
Transpacific Pty Ltd (Narangba)	Transpacific Liquid Or Hazardous Waste	55	-	Saline effluent and residues.
Rockhampton Regional Council	Res 215, Showground Road, Mt Morgan	60	1(a)	1(a)
	Gracemere Waste Management Facility	60	2(c)	1(b)
	Rockhampton - Lakes Creek Road Waste Management Facility	60	2(f)	1(b)
	Yeppoon Waste Management Facility	60	2(d)	1(b)
	Alton Downs Waste Management Facility	60	2(a)	1(b)
	Bouldercombe Waste Management Facility	60	2(a)	1(b)
	Mt Morgan Waste Management Facility	60	2(b)	1(b)
Townsville City Council	Stuart Landfill	60	1(c)	1(a)
	Jensen Road Landfill	60	2(f)	1(b) and up to 10% of regulated waste
	Picnic Bay Landfill	60	2(c)	1(b) and up to 10% of regulated waste
	Majors Creek Landfill	60	2(a)	1(b)
	Hervey Range Road Landfill	60	2(f)	1(b) and up to 10% of regulated waste
North West Services Pty Ltd	Kelsey Creek Landfill	60	2(e)	1(b)
		60	1(a)	1(a) including tank sludge and residue, grease interceptor trap effluent and residue, filter cake sludge and residue, asbestos and contaminated soils.
Whitsundays Regional Council	Bowen Landfill (Lot 22 on HR944)	60	2(e)	1(b)
		60	1(a)	1(a) including asbestos, tyres, food processing waste (liquid prohibited), grease interceptor trap effluent and residues, clinical and related wastes and solid pharmaceutical products.
	Lot 4 on SM61	60	2(a)	1(b)
	Lot 1 on PER2630	60	2(b)	1(b)



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Stuart Landfill in Townsville is licensed to receive up to 200,000 tonnes per year of regulated waste or a combination of regulated waste and general waste. Subject to further discussions with Stuart Landfill this facility may be suitable to receive the residual regulated and general waste streams from the Project.

There are waste disposal facilities located closer to the Project area licensed to receive up to 50,000 tonnes of regulated waste, including:

- Rolleston Landfill, Central Highlands Regional Council;
- Springsure Landfill, Central Highlands Regional Council;
- Kelsey Creek Road Landfill, Whitsunday Regional Council; and
- Bowen Landfill, Whitsunday Regional Council.

These sites may be preferable subject to their ability to accept the types and quantities of waste generated from the Project. Arrow will enter into negotiations with the relevant operators to identify that adequate landfill facilities are available to take the Project's waste.

### 16.3 Development of Alternative Landfill Site

An alternative option for disposal of waste generated by the Project is third party development and operation of a new engineered landfill (on tenure or nearby) to accept residual waste, potentially including regulated waste streams from the Project.

It should be noted that disposal of the waste salt concentrate to landfill is not expected to commence until approximately 30 years after commencing water production. Arrow expects a third party landfill operator will take advantage of the commercial opportunity to develop and operate a suitable Regulated Waste Facility local to Arrow water treatment facilities (WTFs).

### 16.4 Waste Management Measures

Typical waste streams and projected quantities of waste to be generated by the Project are shown in Table 16-4. The long term waste management strategy for the Project is to dispose of waste in accordance with the preferred waste management hierarchy, discussed in the Waste Management chapter (Section 28.2) of the EIS.

Based on this hierarchy the proposed methods of management and disposal have been identified for each waste stream identified over the life of the Project. It should be noted that the Project configuration has changed since the preparation of the EIS, including removal of the terminology for integrated processing facilities (IPF) and the WTFs will be co-located at the central gas processing facilities (CGPFs). Although the configuration of the Project has changed, the overall volume of waste generated has remained the same. The type, quantity and management of wastes are indicative estimates, as the detailed design and execution plans are to be completed prior to construction.

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**Table 16-4 Estimated Waste Generated and Proposed Management Strategies**

Waste type	Class	Estimated Quantity	Management Measure
<b>Construction of wells</b>			
Cleared vegetation	Recyclable waste	10 m <sup>3</sup> per well	Land holders to be consulted and best practices implemented such as: use in progressive rehabilitation; respreading over disturbed land to minimise erosion; or, left onsite for habitat use. Where practicable remove material from site and reuse in other areas [B406].
Soil	General waste	2 m <sup>3</sup> per well	Construction of production wells: Soil to be stockpiled and used for rehabilitation onsite. Stockpiles will be located away from water sources and in clear areas, and stabilised for the duration of the activity [B407].
Reverse osmosis (RO) water filters and filter media containing solids not removed in upstream filtration processes.	Regulated waste	30 m <sup>3</sup> per year	Construction of production wells: RO water filters and filter media disposed to appropriate licensed landfill [B408].
<ul style="list-style-type: none"> <li>• Drill cuttings;</li> <li>• Drill fluid additives: clay stabilisers, cement additives, disinfectant, viscosifier, foaming agent and fluid loss prevention; and.</li> <li>• Residual muds.</li> </ul>	Recyclable and/or Regulated waste	10 m <sup>3</sup> to 75 m <sup>3</sup> per well	<p>Drilling fluids will typically be removed by tanker or vacuum truck either for direct re-use, or recycling. Where reuse or recycling of drilling fluids is not practical, fluids may be managed onsite, or taken to a licensed disposal facility. Drill cuttings will be reused or recycled wherever possible, with direct disposal to licenced landfill only undertaken where no other practical alternative exists.</p> <p>Any onsite management of residual drilling material will utilise methods that are in accordance with environmental authority conditions.</p>
Soil contaminated with oil or chemicals	Regulated waste	30 m <sup>3</sup> per year	Construction of wells: Soil contaminated with oil or chemicals will be taken to a licensed waste processing facility for recycling or disposal [B412].
<ul style="list-style-type: none"> <li>• Used lubricating oil and filters; and</li> <li>• Unused or spent chemicals.</li> </ul>	Regulated waste	25 drums per year	Recycled where possible and transported by a licensed contractor to an appropriately licensed waste facility for disposal [B413].
Empty drums and containers	Regulated waste	25 drums per year	Recycled where possible, or taken to an appropriately licensed waste facility [B414].

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Waste type	Class	Estimated Quantity	Management Measure
Hard waste, including excess concrete, wood pallets, scrap metal, other packaging materials.	General waste	0.5 m <sup>3</sup> per well	Taken to an appropriately licensed waste processing facility for recycling or disposal [B415].
Spent and unused solvents, paints and paint wastes.	Regulated waste	Residual	Transported to an appropriately licensed waste facility [B416].
Acids and caustics	Regulated waste	Residual	Collected and disposed of at licenced / authorised waste facilities [B417].
Paper and cardboard	Recyclable waste	More than 1 t annually	Reused or recycled, where practical [B418].
General waste from workers' accommodation areas.	General waste	More than 1 t annually	Recycled or reused where practical and transported to a licensed waste facility [B419].
Air emissions, including nitrogen oxide, sulphur dioxide, carbon monoxide, particulate matter.	Air emissions	See the Air Quality chapter (Section 5) of the SREIS	Select equipment with consideration for low emissions to air (NO <sub>x</sub> , SO <sub>x</sub> ), high energy efficiency and fuel efficiency [B004].
<b>Construction and operation of facilities, gas and water gathering system</b>			
<ul style="list-style-type: none"> <li>Cleared vegetation for low pressure gathering line; and</li> <li>Cleared vegetation for medium-pressure pipeline.</li> </ul>	Recyclable waste	150 m <sup>3</sup> per well	Land holders to be consulted and best practices implemented such as: use in progressive rehabilitation; respreading over disturbed land to minimise erosion; or, left onsite for habitat use. Where practicable remove material from site and reuse in other areas [B406].
Grey water (contaminated stormwater runoff)	Recyclable or Regulated waste	30 million litres per day (max)	Construction and operation of facilities, gas and water gathering system: Grey water shall be either collected and treated onsite or transported offsite to a municipal treatment facility [B420].

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Waste type	Class	Estimated Quantity	Management Measure
Hydrostatic test water	Recyclable or Regulated waste	100 ML per gas field	Construction and operation of facilities, gas and water gathering system: Hydrostatic test water shall be reused, or, at the end of its useful life, collected in segregated storage for removal to a licenced facility for processing [B423].
Used chemicals and oils	Regulated waste	450 kg per day	Used lubricating oil and filters and unused or spent chemicals to be recycled where possible and transported by a licensed contractor to an appropriately licensed waste facility for disposal [B413].
Scrap swarf (high-definition polyethylene fillings).	Recyclable waste	2.8 t per gathering network per year	Scrap swarf (high-definition polyethylene fillings) to be reused or recycled where possible, or taken to an offsite licensed waste facility [B425].
Debris from blow out (cleaning) of pipes.	Regulated waste	3 t per year	Debris from blow out (cleaning) of pipes to be stored in a sealed container in a bunded area or will remain in drilling pit before being transported to a licensed waste facility [B426].
<ul style="list-style-type: none"> <li>Unused composite pipe; and</li> <li>Unused high density polyethylene (HDPE).</li> </ul>	Recyclable waste	80 m of various diameter (110-455 mm) per well	Unused composite pipe and unused high definition polyethylene to be recycled where possible or disposed to an offsite licensed waste facility [B427].
Air emissions (e.g. exhaust fumes and dust) from engines, vehicles and construction activities.	Air emissions	See the Air Quality chapter (Section 5) of the SREIS	Select equipment with consideration for low emissions to air (NO <sub>x</sub> , SO <sub>x</sub> ), high energy efficiency and fuel efficiency [B004]. Implement dust suppression measures for roads and construction sites to ensure that dust does not cause a nuisance [B014].
Membrane modules	Regulated waste	2 every 3 years	Membrane modules to be collected and disposed of in an offsite regulated waste facility [B428].
Lead acid batteries	Regulated waste	4 per FCF 18 per CGPF	Lead acid batteries to be recycled or transported to an offsite regulated facility [B429].
Concrete waste	Inert waste	100 t per FCF 700 t per CGPF	Concrete waste to be reused or recycled where possible [B430].

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Waste type	Class	Estimated Quantity	Management Measure
Cut and fill materials from dams	Inert waste	Nil (all to be used)	If the cut and fill materials from dams is contaminated, soils will be managed in accordance with the Draft Contaminated Land Guideline 1998 or updated versions thereof as described in Section Z.4.2 of the Draft EM Plan [B364].
Domestic wastes such as general wastes (office consumables, paper, plastic, glass, etc.), kitchen refuse, garden waste, packing waste (cardboard, plastic, wood pallets, etc.).	General waste	Unknown (dependent on domestic activity)	Domestic wastes such as general wastes (office consumables, paper, plastic, glass, etc.), kitchen refuse, garden waste, packing waste (cardboard, plastic, wood pallets, etc.) to be reused or recycled where possible. Otherwise transported offsite to a licensed waste disposal facility [B431].
Empty drums and containers	Regulated waste	115 drums per year per facility	Empty drums and containers to be recycled where possible, or taken to an appropriately licensed waste facility [B414].
Wooden pallets, formwork	Recyclable waste	26 m <sup>3</sup> per FCF 190 m <sup>3</sup> per CGPF	Wooden pallets, formwork to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility [B432].
Glass, reinforced plastic pipe offcuts	Recyclable waste	6 t per FCF 10 t per CGPF	Glass, reinforced plastic pipe offcuts to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility [B433].
Oily rags and sorbents	Regulated waste	Approximately 0.5 t per year	Oily rags and sorbents to be transported offsite to a regulated waste disposal facility [B434].
Packaging materials (cardboard, styrofoam, plastic wrappers, bunting, lining, end caps, containers).	Recyclable waste	150 m <sup>3</sup> per FCF 1,275 m <sup>3</sup> per CGPF	Packaging materials (cardboard, styrofoam, plastic wrappers, bunting, lining, end caps, containers) to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility [B435].
Plastic pipe offcuts / scrap, electric cable waste.	General or recyclable waste	9 t per FCF 35 t per CGPF	Plastic pipe offcuts / scrap, electric cable waste to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility [B436].
Spent filter media bulk bags	General waste	Less than 1 t annually	Spent filter media bulk bags to be transported offsite to a regulated waste disposal facility [B437].
Steel offcuts and scrap metal	Recyclable waste	16 t per FCF 230 t per CGPF	Steel offcuts and scrap metal to be reused or recycled, were practical [B438].

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Waste type	Class	Estimated Quantity	Management Measure
Waste salt concentrate (solid product resulting from solar evaporation of RO brine).	Regulated waste	18,000 t per year average 45,000 t peak year	Waste salt concentrate (solid product resulting from solar evaporation of RO brine) shall be transported offsite to a regulated waste disposal facility [B439].
Salt precipitation waste product	Regulated waste	2,220 t per year average	Waste salt concentrate (solid product resulting from solar evaporation of RO brine) shall be transported offsite to a regulated waste disposal facility [B439].
Rubber and tyres	Recyclable waste	6 pick-ups yearly for a 35 TJ/d facility	Rubber and tyres to be reused where possible. Collected for removal by licensed transporter for processing at a licensed facility for recycling or disposal [B440].
Anti-seize compounds	Regulated waste	6 empty tins per FCF 35 per CGPF	Anti-seize compounds to be collected and disposed of in regulated waste facilities [B441].
Domestic cleaning products	Regulated waste	12 small empty containers per FCF 70 per CGPF	Domestic cleaning products to be collected and disposed of in regulated waste facilities [B442].
Fuels	Regulated waste	Residual	Fuels to be reused, recycled or collected and disposed of in regulated waste facilities [B443].
Greases and oils	Regulated waste	50 L per FCF 370 L per CGPF	Greases and oils to be reused, recycled or collected and disposed of in regulated waste facilities [B444].
Triethylene glycol	Regulated waste	10 m <sup>3</sup> per IPF	Triethylene glycol to be reused or collected and disposed of in a regulated waste facility [B445].

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Waste type	Class	Estimated Quantity	Management Measure
Contaminated stormwater runoff	Potentially containing high TSS or hydro-carbons	Unknown (dependent on final design and rainfall)	Contaminated stormwater runoff to be collected and treated within the wastewater treatment system [B446].
Lube oil	Regulated waste	Engines: 750 L every 3,000 hours each Lubrication oil from compressors 20 L/d	Lube oil to be collected and disposed of in an offsite regulated waste facility [B447].
Oil entrained in the compression process	Regulated waste	30 t maximum per year	Oil entrained in the compression process to be reused, recycled or collected and disposed of in regulated waste facilities [B448].
Paint waste	Regulated waste	12 tins per FCF 70 per CGPF	Paint waste to be collected and stored onsite for reuse, where possible, or transported offsite to a licensed regulated waste facility [B449].
Reverse osmosis treatment chemicals	Regulated waste	Less than 1,000 L per CGPF	Reverse osmosis treatment chemicals to be collected, piped and stored in a suitable dam [B450].
Waste or wash out liquids	Regulated waste	2 m <sup>3</sup> per FCF 5 m <sup>3</sup> per CGPF	Waste or wash out liquids to be reused or removed by licensed tanker or carrier to a licensed commercial waste facility [B451].
Wastewater (sewage)	Regulated waste	5 ML per 8 month period for each FCF 24 ML per year for each CGPF	Wastewater (sewage) to be collected and transported offsite to a municipal treatment facility or treated onsite [B452].

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Waste type	Class	Estimated Quantity	Management Measure
<b>Decommissioning and rehabilitation</b>			
Construction debris, contaminated soil, sludge	Regulated waste	100 m <sup>3</sup>	Construction debris, chemical / oil contaminated soil and sludge to be recycled or reused where possible or taken to an offsite licensed waste facility [B454].
Electrical cables	Regulated or recyclable waste	Unknown (final design not available)	Electrical cables to be abandoned or stored for recycling or reused where possible, or taken to an offsite licensed waste facility [B455].
Fencing	General or recyclable waste	Unknown (final design not available)	Fencing to be left in consultation with landowners or stored for reuse (some excess pipe is maintained for future maintenance and repair requirements) or collected for disposal to licensed landfill [B456].
Gas compressors	Recyclable waste	Up to 130 varying sized units	Gas compressors, low pressure high-density polyethylene gas pipelines, medium pressure gas pipelines, production well heads, power generators, pumps, sewage treatment plant and tanks and storage tanks to be abandoned or stored for reuse (some excess pipe is maintained for future maintenance and repair requirements), or collected for disposal to licensed landfill [B457].
Low pressure HDPE gas pipelines	Recyclable waste	Unknown (final design not available)	
Medium pressure gas pipelines	Recyclable waste	Unknown (final numbers not available)	
Well heads	Recyclable waste	Up to 4,000	
Power generators	Recyclable or regulated waste	Up to 110 varying sized units but potentially less	
Pumps	Recyclable	Several hundred	



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Waste type	Class	Estimated Quantity	Management Measure
Sewage treatment plant and tanks	Recyclable	Unknown (final design not available)	
Storage tanks	Recyclable	Several hundred	

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It is intended that the majority of waste materials generated from the Project will be managed, as described in the Waste Management chapter (Section 28.4) of the EIS.

Arrow committed to implement a number of avoidance, mitigation and management measures to reduce impacts on values in the Project development area. The commitments pertaining to waste management presented in the EIS are listed in Table 16-5.

Revised commitments are presented below in Table 16-6. This update has resulted from changes made to the project description since the EIS was finalised and the decision to further clarify the intent of a commitment (e.g. through the consolidation of similar commitments to avoid inconsistent wording).

A full list of Project commitments, including those that remain unchanged from the EIS, and details of those that have changed, are included in the Commitments Update (Appendix O) of this SREIS.

**Table 16-5 Waste Commitments as Presented in the EIS**

No.	Commitment
B004	Select equipment with consideration for low emissions to air (NO <sub>x</sub> , SO <sub>x</sub> ), high energy efficiency and fuel efficiency.
B014	Implement dust suppression measures for roads and construction sites to ensure that dust does not cause a nuisance.
B207	A Water Management Plan, Erosion and Sediment Control Plan, and Waste Management Plan will be designed to avoid or minimise the potential impacts of Project.
B364	If the cut and fill materials from dams is contaminated, soils will be excavated and treated and disposed of as described in the draft EM Plan (Appendix Z, Section Z.4.2) of the EIS.
B384	Solid wastes, chemicals and other wastes to be disposed or recycled at appropriate facilities in accordance with legislative requirements and the <i>Arrow Waste Management Procedure</i> (Arrow, 2012).
B385	Continuous improvement of the volume of waste generated per unit measure for each activity, with respect to proportion disposed of and proportion reused and recycled.
B386	Operations and Projects must understand their legislative requirements as they relate to waste management and update the Health, Safety and Environment compliance register as appropriate.
B387	Personnel shall be trained and competent to undertake waste identification, segregation, storage and disposal activities.
B388	An environmental awareness program for personnel and contractors associated with equipment or procedures specific to waste, will be conducted prior to and during activities, to discuss environmental impacts and proposed management measures to reduce waste impacts.
B389	Operations and Projects will evaluate the types and quantities of waste to be generated.
B390	Sites will develop a plan that considers minimisation, storage, segregation, treatment, reuse, recycling and disposal. This plan will be a standalone document or part of a broader Operational EM Plan.
B391	Onsite waste storage areas will be developed in accordance with industry practice and relevant waste management regulations.
B392	Procure materials in bulk where practicable to minimise containers and movement of material
B393	Provide training in the principles of the waste hierarchy will be provided to personnel handling wastes on a regular basis.
B394	As far as practical, facilities will be designed using modular components that provide the ability to reconfigure to meet site requirements and relocate facilities during the Project life to accommodate changing Project needs.

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No.	Commitment
B395	Waste will only be disposed of in appropriate, approved disposal sites using approved methods and contractors. Waste tracking records will be maintained, in line with legal requirements.
B396	Appropriate domestic waste storage facilities will be provided at designated work sites to assist in segregation of waste.
B397	Contaminated soil or groundwater that cannot be avoided will be managed through quantification of the type, severity and extent of contamination, and remediated or managed in accordance with the Queensland Government's Draft Guidelines for the Assessment and Management of Contaminated Land 1998.
B398	Liquid waste generated (other than CSG water and sewage) will be stored and periodically removed for disposal or recycling. All waste drilling fluids resulting from drilling activities will be contained in properly lined dams or storage tanks prior to re-use, recycling, treatment or disposal. Putrescible solid waste will be stored in covered containers to prevent odours, public health hazards and access by fauna.
B399	Wastewater (sewage) to be collected and transported offsite to a municipal treatment facility or treated onsite.
B400	In the majority of cases, both non-hazardous and hazardous wastes will be transported off-site for appropriate disposal. Non-hazardous may be removed from site by either Arrow staff or a contracted waste collector. These wastes should be kept segregated during transport, and disposed of at the appropriate facility.
B401	Hazardous and/or regulated wastes must be removed by a company that holds a current certification / licence, issued by the administering government authority to undertake removal of that particular waste. Arrow staff and contractors must always check the currency of the waste contractor's certification. Arrow staff and contractors also have duty of care to ensure that the disposal facility is also suitably licensed to receive the particular hazardous or regulated waste.
B402	Regulated wastes will be handled, stored and disposed of in accordance with relevant standards and the EP (Waste Management) Regulation. The storage of flammable and combustible liquids will be in accordance with the AS 1940: 2004 <i>The Storage and Handling of Flammable and Combustible Liquids</i> and other relevant dangerous goods standards.
B403	Spill containment material and spill kits will be placed at designated locations. Spill response procedures will be developed and published in the Emergency Response Plan and all relevant personnel will be required to undergo spill containment and response training.
B404	Where possible, fluids will be re-used from well to well, or treated at a centralised facility for re-use; only in instances where it is not suitable for re-use or treatment, will it be disposed of at licensed facilities.
B405	Surface tank / skip storage will be provided to contain drill cuttings, drilling fluids and cement returns to minimise contamination when drilling in high quality agricultural areas.
B406	Land holders to be consulted and best practices implemented for cleared vegetation such as: use in progressive rehabilitation; respreading over disturbed land to minimise erosion; or, left onsite for habitat use. Where practicable remove material from site and reuse in other areas.
B407	Soil to be stockpiled and used for rehabilitation onsite. Stockpiles will be located away from water sources and in clear areas.
B408	CSG water, contaminated soils, water filters and filter media containing solids not removed in upstream filtration processes to be disposed to an appropriately licensed landfill.
B409	Drilling fluids will typically be removed by tanker or vacuum truck either for direct re-use, or to an authorised treatment facility prior to reuse or recycling. Where reuse or recycling of drilling fluids is not practical fluids may be taken to a licensed disposal facility as a least preferred option. Drill cuttings will be reused or recycled wherever possible, with direct disposal to licenced landfill only undertaken where no other practical alternative exists.
B410	Waste solids will be treated and reused where possible or disposed to landfill.
B411	Drill fluids will be reused or recycled where possible.

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No.	Commitment
B412	Soil contaminated with oil or chemicals is to be left in situ or taken to a licensed waste processing facility for recycling or disposal.
B413	Used lubricating oil and filters and/or unused or spent chemicals shall be recycled where possible and transported by a licensed contractor to an appropriately licensed waste facility for disposal.
B414	Empty drums and containers shall be recycled where possible, or taken to an appropriately licensed waste facility.
B415	Hard waste, including excess concrete, wood pallets, scrap metal, other packaging materials shall be taken to an appropriately licensed waste processing facility for recycling or disposal.
B416	Spent and unused solvents, paints and paint wastes shall be transported to an appropriately licensed waste facility.
B417	Acids and caustics shall be collected and disposed of at licensed / authorised waste facilities.
B418	Paper and cardboard shall be reused or recycled, where practical.
B419	General waste from workers' accommodation areas shall be recycled or reused where practical and transported to a licensed waste facility.
B420	Grey water (contaminated stormwater runoff) to be either collected for treatment onsite, or transported offsite to a municipal treatment facility.
B421	In instances where material and land conditions are suitable, drill cuttings may be reused by mixing with soil, aggregate or organic material for soil stabilisation or as soil conditioner to assist in the process of site rehabilitation. Where on-site re-use is not a suitable option, drill cuttings will be beneficially reused (e.g. in composting, fill material, construction material), and will only be sent for direct disposal to offsite landfill facilities where no other practical option exists.
B422	Waste that cannot be reused onsite will be removed to an appropriate licensed facility. As with the wells, waste liquids will be removed by a tanker for treatment at a nearby CGPF.
B423	Hydrostatic test water to be reused in other areas or disposed of through the CSG water management system.
B424	Used chemicals and oils to be recycled where possible, or taken to an offsite licensed waste facility.
B425	Scrap swarf (high-definition polyethylene fillings) to be reused or recycled where possible, or taken to an offsite licensed waste facility.
B426	Debris from blow out (cleaning) of pipes to be stored in a sealed container in a bunded area or will remain in drilling pit before being transported to a licensed waste facility.
B427	Unused composite pipe and/or unused high definition polyethylene to be recycled where possible or disposed to an offsite licensed waste facility.
B428	Membrane modules to be collected and disposed of in an offsite regulated waste facility.
B429	Lead acid batteries to be recycled or transported to an offsite regulated facility.
B430	Concrete waste to be reused or recycled where possible.
B431	Domestic wastes such as general wastes (office consumables, paper, plastic, glass, etc.), kitchen refuse, garden waste, packing waste (cardboard, plastic, wood pallets, etc.) to be reused or recycled where possible. Otherwise transported offsite to a licensed waste disposal facility.
B432	Wooden pallets, formwork to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility.
B433	Glass, reinforced plastic pipe offcuts to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility.
B434	Oily rags and sorbents shall be transported offsite to a regulated waste disposal facility.
B435	Packaging materials (cardboard, styrofoam, plastic wrappers, bunting, lining, end caps, containers) to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility.

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No.	Commitment
B436	Plastic pipe offcuts / scrap, electric cable waste to be reused or recycled where possible, otherwise transported offsite to a regulated waste disposal facility.
B437	Spent filter media bulk bags to be transported offsite to a regulated waste disposal facility.
B438	Steel offcuts and scrap metal to be reused or recycled, where practical.
B439	Crystallised salt to be transported offsite to a regulated waste disposal facility.
B440	Rubber and tyres to be reused where possible. Collected for removal by licensed transporter for processing at a licensed facility for recycling or disposal.
B441	Anti-seize compounds to be collected and disposed of in regulated waste facilities.
B442	Domestic cleaning products to be collected and disposed of in regulated waste facilities.
B443	Fuels to be reused, recycled or collected and disposed of in regulated waste facilities.
B444	Greases and oils to be reused, recycled or collected and disposed of in regulated waste facilities.
B445	Triethylene glycol to be reused or collected and disposed of in a regulated waste facility.
B446	Contaminated stormwater runoff to be collected and treated within the wastewater treatment system.
B447	Lube oil to be collected and disposed of in an offsite regulated waste facility.
B448	Oil entrained in the compression process to be reused, recycled or collected and disposed of in regulated waste facilities.
B449	Paint waste to be collected and stored onsite for reuse, where possible, or transported offsite to a licensed regulated waste facility.
B450	Reverse osmosis treatment chemicals to be collected, piped and stored in a suitable dam.
B451	Waste or wash out liquids to be reused or removed by licensed tanker or carrier to a licensed commercial waste facility.
B452	Wastewater (sewage) will be collected and transported offsite to a municipal treatment facility or treated onsite.
B453	A specific waste management plan to be developed to guide waste management during decommissioning.
B454	Construction debris, chemical / oil contaminated soil and/or sludge to be recycled or reused where possible or taken to an offsite licensed waste facility.
B455	Electrical cables to be abandoned or stored for recycling or reused where possible, or taken to an offsite licensed waste facility.
B456	Fencing to be left in consultation with landowners or stored for reuse (some excess fence is retained for future maintenance and repair requirements) or collected for disposal to licensed landfill.
B457	Gas compressors, low pressure high-density polyethylene gas pipelines, medium pressure gas pipelines, production well heads, power generators, pumps, sewage treatment plant and tanks and storage tanks to be abandoned or stored for reuse (some excess pipe is maintained for future maintenance and repair requirements), or collected for disposal to licensed landfill.
B458	Onsite waste monitoring and auditing procedures will be developed.
B459	In compliance with the legislative requirements on the movement of trackable waste within, into or out of Queensland under Part 4 of the EP (Waste Management) Regulation, all waste produced during the construction, operation and abandonment phases of the Project will be recorded and tracked.
B460	Monthly waste generation and management performance shall be benchmarked against that of other facilities and those within the same industry reported to the Department Manager, and used to promote continual improvement.
B461	Inspection and monitoring of avoidance, mitigation and management measures will be implemented to ensure the residual impacts continue to be low throughout the lifetime of the Project.
B462	Inspection will be undertaken regularly to ensure mitigation measures are effective and to intervene

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No.	Commitment
	early, rather than monitor or inspect the effect of the impact.
B463	Maintain a waste stream inventory identifying the type, classification, storage, transport and disposal requirements for the waste.
B464	Inspect waste storage locations to ensure waste management measures are being adhered to.
B465	Maintain a waste tracking system.

**Table 16-6 Revised Waste Commitments**

No.	Revised Commitment	Rationale
B364	If the cut and fill materials from dams is contaminated, soils will be managed in accordance with the Draft Contaminated Land Guideline 1998 or updated versions thereof as described in Section Z.4.2. of the Draft EM Plan.	Amended to clarify intent
B395	Waste will only be disposed of in appropriate, approved disposal sites using approved methods and contractors. Regulated waste tracking records will be maintained, in line with legal requirements.	Amended to clarify intent
B398	Liquid waste generated (other than CSG water and sewage) will be stored and periodically removed for disposal or recycling. All waste drilling fluids resulting from drilling activities will be contained in dams or storage tanks lined as appropriate, prior to re-use, recycling, treatment or disposal. Putrescible solid waste will be stored in covered containers to prevent odours, public health hazards and access by fauna.	Amended to clarify intent
B404	Where possible, fluids will be re-used from well to well, or treated at a centralised facility for re-use; only in instances where it is not suitable for re-use or treatment, it will be disposed of at licensed facilities.	Amended to clarify intent
B407	Construction of production wells: Soil to be stockpiled and used for rehabilitation onsite. Stockpiles will be located away from water sources and in clear areas, and stabilised for the duration of the activity.	Amended to clarify intent
B408	Construction of production wells: RO water filters and filter media disposed to appropriate licensed landfill	Amended to clarify intent
B409	Construction of wells: Drilling fluids will typically be removed by tanker or vacuum truck either for direct re-use, or to an authorised treatment facility prior to reuse or recycling. Where reuse or recycling of drilling fluids is not practical, fluids may be managed onsite, or taken to a licensed disposal facility as a least preferred option. Drill cuttings will be reused or recycled wherever possible, with direct disposal to licenced landfill only undertaken where no other practical alternative exists. Any onsite management of residual drilling material will utilise methods that are in accordance with environmental authority conditions.	Amended to clarify intent
B412	Construction of wells: Soil contaminated with oil or chemicals will be taken to a licensed waste processing facility for recycling or disposal.	Amended to clarify intent
B420	Construction and operation of facilities, gas and water gathering system: Grey water shall be either collected and treated onsite or transported offsite to a municipal treatment facility.	Amended to clarify intent
B423	Construction and operation of facilities, gas and water gathering system: Hydrostatic test water shall be reused, or, at the end of its useful life, collected in segregated storage for removal to a licenced facility for processing.	Amended to clarify intent
B439	Construction and operation of facilities, gas and water gathering system: Waste salt concentrate (solid product resulting from solar evaporation of RO brine) shall be transported offsite to a regulated waste disposal facility.	Amended to clarify intent

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No.	Revised Commitment	Rationale
B465	Maintain a regulated waste tracking system, as required.	Amended to clarify intent