ARUP

Cleanaway Operations Pty Ltd

Bromelton Energy and Resource Centre

Resource and Waste Management Technical Report

Reference: BERC-ARU-BNE-WEWM-RPT-0001

Rev C | 19 December 2025

Job number 293683-00

Arup Australia Pty Ltd | ABN 76 625 912 665

Arup Australia Pty Ltd
Level 26, 123 Albert Street
Brisbane City
QLD 4000
Australia
arup.com

ARUP

Document Verification

Project title	Bromelton Energy and Resource Centre
Document title	Resource and Waste Management Technical Report
Job number	293683-00
Document ref	BERC-ARU-BNE-WEWM-RPT-0001
File reference	

Revision	Date				
A	22 August 2025	**Filename**	BERC-ARU-BNE-WEWM-RPT-0001[A]		
		Description	Issue for Cleanaway		
			Prepared by	**Checked by**	**Approved by**
		Name	Trinity Schabe	Matt Glavina	Henry Moore
B	26 September 2025	**Filename**	BERC-ARU-BNE-WEWM-RPT-0001[B]		
		Description	Issue for Adequacy Review		
			Prepared by	**Checked by**	**Approved by**
		Name	Trinity Schabe	Matt Glavina	Anna Stewart
C	19 December 2025	**Filename**	BERC-ARU-BNE-WEWM-RPT-0001[C]		
		Description	Issue for Approval		
			Prepared by	**Checked by**	**Approved by**
		Name	Trinity Schabe	Matt Glavina	Anna Stewart
		Signature			

Issue Document Verification with Document ☑

Acknowledgement of Country

Arup acknowledges the Traditional Owners across all lands, waters and skies our firm may reach; we acknowledge their wisdom, resilience, and rich cultural heritage. We pay our respects to the Elders, past and present, and to all Aboriginal and Torres Strait Islander peoples.

'Continuing to Shift to shape an even better world' original artwork by Tarni O'Shea of Gilimbaa and updated by David Williams of Gilimbaa.

Contents

Tables

Figures

Abbreviations and glossary

Abbreviations	Definition
APCr	Air Pollution Control Residue
ASLP	Australian Standard Leaching Procedure
BA	Boiler Ash
BAT	Best Available Technology
BERC	Bromelton Energy and Resource Centre (the Project)
BREF	Best Available Techniques Reference Document
C&D	Construction and Demolition
C&I	Commercial and Industrial
COPC	Chemicals of Potential Concern
CWMP	Construction Waste Management Plan
CV	Calorific Value
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DETSI	Department of Environment, Tourism, Science and Innovation
EA	Environmental Authority
EfW	Energy from Waste
EOW	End of Waste
EP Act	*Environmental Protection Act 1994* (Qld)
ERA	Environmentally Relevant Activity
GPT	Gross Pollutant Trap
IBA	Incinerator Bottom Ash
IBAA	Incinerator Bottom Ash Aggregate
IED	Industrial Emissions Directive
MSW	Municipal Solid Waste
OEMP	Operational Environmental Management Plan
OWMP	Operational Waste Management Plan
PEF	Processed Engineered Fuel
PFAS	Per- and poly-fluoroalkyl substances
RDF	Refuse Derived Fuel
SDA	State Development Area
t	Tonnes
TCLP	Toxicity Characteristic Leaching Procedure
tpa	Tonnes per annum
WI	Waste Incineration

Abbreviations	Definition
WMRR	Waste Management and Resource Recovery Association of Australia
WT	Waste Treatment

Executive Summary

The Bromelton Energy and Resource Centre (BERC) (the Project) involves the construction and operation of an Energy from Waste (EfW) facility which will divert residual MSW, and residual C&I waste from landfill to recover energy. Additionally, metals will be recovered, and the bottom ash residues from the EfW process are planned to be utilised as an aggregate alternative in construction applications. The Project will generate waste from construction, commissioning and operational activities which will need to be managed to avoid environmental and human health impacts in accordance with relevant legislation, policies and guidelines including the *Environmental Protection (EP) Act 1994* and Environmental Protection (EP) Regulations 2019.

Waste classification

The development is anticipated to generate the following waste streams:

- Waste streams primarily generated during construction
- Residues generated from the thermal treatment process (Incinerator Bottom Ash (IBA) and Air Pollution Control residue (APCr))
- Waste streams primarily generated during operation (municipal-type waste)
- Waste streams primarily generated during operation (commercial-type waste).

Wastes that will be generated through construction, commissioning and operation have been identified and classified according to the Regulated Waste list in Schedule 9 Part 1 and Trackable Waste list in Schedule 11 of the Queensland EP Regulations. As residue material will be influenced by the makeup of the feedstock material the quality data (i.e. composition and characteristics) is not yet understood, data from international reference facilities has been obtained, assessed and compared to the Queensland waste disposal categories to inform preliminary categorisation of residue streams. Expected categorisation of thermal treatment residues are:

- Raw IBA is likely to be classified as Category 1 Regulated Waste
- Matured and processed Incineration Bottom Ash Aggregate (IBAA) is likely to be classified as Category 2 Regulated Waste unless an applicable End of Waste (EOW) Code is in place to facilitate reuse of this material, as is common best practice internationally.

Note: Obtaining an EOW Code for IBAA will be critical to the development and financing of any EfW facility in Queensland. Potential IBAA offtake customers and their product quality requirements must be identified. It is understood that an EOW application for IBAA reuse is already being progressed by others.

- Raw APCr is likely to be classified as Category 1 Regulated Waste
- Immobilised APCr is likely to be classified as Category 2 Regulated Waste.

Potential impacts

An assessment has been undertaken to identify potential impacts related to generation, storage and handling of waste materials. The key potential impacts identified include:

- Escape of waste (including thermal treatment residues) or runoff from waste (leachate), impacting the adjacent environment (land, waterways, groundwater)
- Disposal of valuable resources to landfill.

A range of measures have been proposed to mitigate the risks identified that will be implemented throughout the Project development including planning and design, construction, and operation. The

control measures identified at this stage represent reasonable steps to avoid and minimise impacts to human health and the environment so far as reasonably practicable.

Management pathways

To maximise diversion of waste from landfill and resource recovery, waste generated through construction, commissioning and operation of the facility will be managed in accordance with the waste hierarchy. Any waste material generated will be stored, handled and transported to a suitable processing or disposal facility. The key management measures identified include:

Construction waste management:

- Waste generation will be avoided or minimised through appropriate planning and design
- Waste materials generated during construction will be reused in construction where appropriate
- Source separation of recyclable materials from residual waste.

Operational waste management:

- An Operational Waste Management Plan (OWMP) will be developed to identify a suitable waste management strategy including appropriate storage and servicing arrangements
- Waste generation will be avoided, where possible
- Source separation of recyclable materials
- Residual waste materials to be processed through the EfW operation.

Residual waste management:

- IBA will undergo maturation, processing and metals recovery on-site, producing IBAA
- IBAA will preferentially be reused as a construction aggregate (noting approval will need to be obtained to confirm the end-of-waste reuse status for the IBAA, and market development will need to be undertaken to enable this reuse pathway). As a short term contingency (e.g., during commissioning) or if off-specification, if removed from site, it will be disposed of to landfill
- APCr will be stabilised on-site through solidification with cement and water before disposal to landfill. At this stage an alternative commercially proven treatment process to produce a commercial product that is not classified as a waste (i.e., has EOW reuse status) is not available, however Cleanaway will continue to investigate methods for increased resource recovery from the APCr stream throughout design and operation.

Wastewater management:

- Stormwater will be collected and processed through the on-site stormwater management system designed to an appropriate event size and to meet all relevant discharge quality requirements
- Greywater generated from on-site staff and visitor amenities will be segregated and managed separately from sewage wastewater to facilitate reuse of greywater. Greywater will be stored in tanks and may be reused within the process as recycled water
- Residual wastewater will be managed through an on-site treatment system for collection and transport off-site once septic systems become full.

Key opportunities

Opportunities for the facility to manage process waste in line with the waste hierarchy include:

- Recovery of construction spoil – to be reused onsite, where possible

- Designing the BERC EfW process for zero process wastewater discharge, thus avoiding disposal of process wastewater
- From the IBA stream:
  - Recovery of ferrous and non-ferrous metals for recycling
  - Reuse of IBBA as a construction aggregate under a future EOW code
- Source separation of recyclable materials generated in construction and operation (in offices/visitor and education centre)
- Containment, classification and correct identification of non-recyclable wastes, including reportable regulated wastes, to ensure that these can be correctly treated and disposed of by waste contractors
- Segregation of greywater and non-process wastewater generated from onsite staff amenities to facilitate further reuse opportunities
- Further investigation is required to consider potential reuse of greywater for onsite landscape irrigation.

1. Introduction

1.1 Purpose of this Assessment

The scope of this report covers waste and process residues generated by the facility during construction, commissioning and operation.

This report does not address waste inputs (feedstock). Assessment of feedstock for the operation of the facility considering, characterisation, quantity modelling, transport, handling and processing is discussed in the Planning Report, and related appendices.

The operation of the facility will generate various waste streams from construction activities and operational use, including:

- Residues from the EfW process
- Construction waste (e.g., spoil from earthworks and site clearing)
- Operational waste from staff amenity spaces.

This report describes the type and classification of waste generated during normal operation and waste management approaches during construction and operation of the Project. This report also outlines Cleanaway's commitments to support resource recovery by planning for on-site separation of recoverable materials for high-value recycling off-site. Detailed waste management provisions for site construction and operation will be documented in a Construction Waste Management Plan (CWMP) and in an OWMP respectively following detailed design.

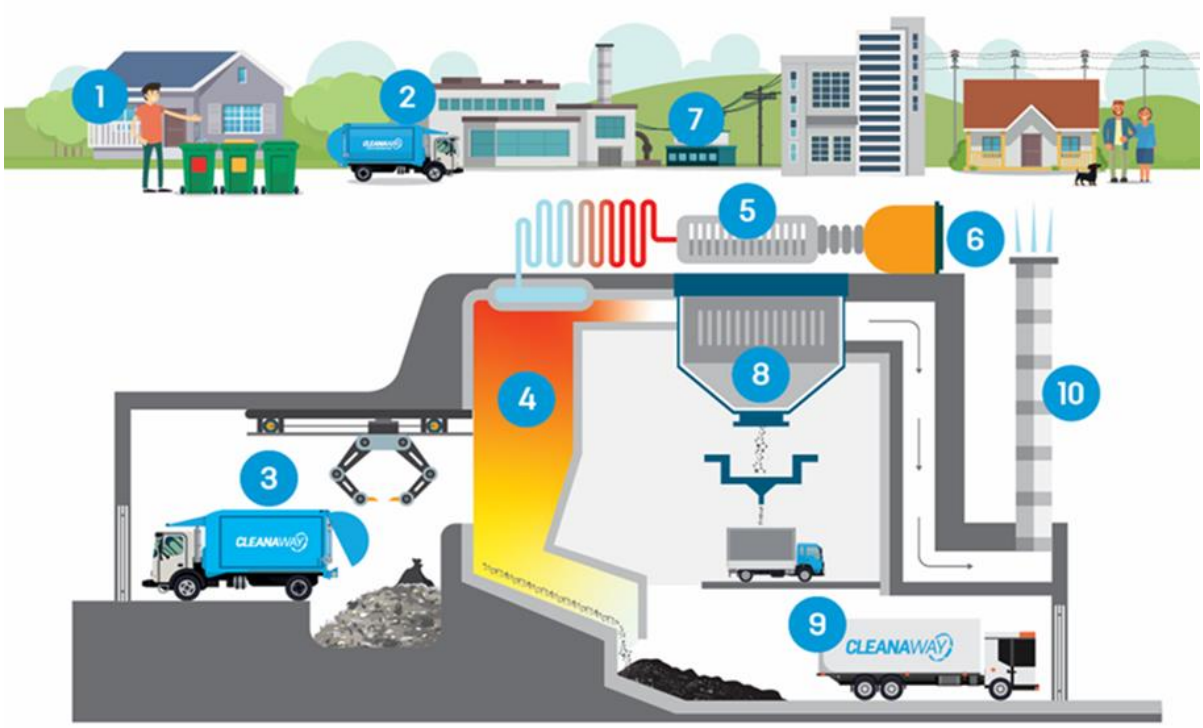
Note: This report refers to both the Department of Environment, Tourism, Science and Innovation (DETSI) and its former title, Department of Environment and Science (DES). The name used corresponds to the title of the Department at the time the documents referenced were issued.

1.2 Project Description

1.2.1 Project Overview

Cleanaway Operations Pty Ltd (Cleanaway) is developing an Energy from Waste (EfW) facility in Queensland known as the Bromelton Energy and Resource Centre (BERC / the Project). The Project will be located within the Special Industry Precinct of the Bromelton State Development Area (SDA), west of Beaudesert within the Scenic Rim Regional Council local government area.

The Project has been designed to thermally treat approximately 760,000 tonnes per annum (tpa) of waste feedstock, consisting of residual Municipal Solid Waste (MSW) and residual Commercial and Industrial (C&I) waste. Residual waste is waste that is not technically, environmentally, and economically practical (TEEP) to reuse or recycle, which would otherwise be sent to landfill for disposal. The facility's actual annual throughput will vary depending on the calorific value of the feedstock and plant availability. To account for variability in feedstock energy content, the facility will be designed for a maximum processing capacity of up to 10% above the nominal figure (836,000 tpa). The EfW process is summarised in Figure 1.



1. At home and work, we sort our waste into recyclable and non-recyclable items.
2. Before arrival at the energy from waste facility, residual waste that has been sorted at home and work is delivered to the facility.
3. In the bunker, waste is mixed, ensuring consistency, by large crane claws before placement into the combustion chamber.
4. Waste is combusted as it moves along a moving grate. The temperature in the combustion chamber reaches more than 850°C to ensure that waste combusts completely while also destroying organic pollutants and odour.
5. Water is heated during combustion creating steam which turns a turbine.
6. Baseload electricity is generated.
7. Electricity is put back into the grid and used to power homes and businesses.
8. Gases created during combustion pass through a multi-step flue gas treatment system, removing pollutants from the gases. Residues from the flue gas treatment are collected in a sealed system for treatment before disposal.
9. Bottom ash from the combustion process is collected and stored. Metals are recovered for recycling. It is intended that the remaining bottom ash is sent for reuse in construction.
10. Cleaned gases and steam are dispersed high into the atmosphere, mixing well to ensure negligible impact on the surrounding air quality.

Figure 1: Energy from Waste Process

1.2.2 Proponent

Cleanaway, an Australian owned company, has operated for more than 50 years, supporting industry, government, communities and households across Australia. Its mission is to make a sustainable future possible, achieved through action across all levels of the waste hierarchy. Waste generation is minimised through extensive education programs, with Cleanaway's 50 education officers reaching over 120 businesses, 30 councils, and almost 33,000 school participants in the last financial year.

Cleanaway invests heavily in recycling, operating several Material Recovery Facilities nationwide and has partnered with Pact Group, Asahi Beverages and Coca-Cola to deliver two large-scale PET (polyethylene terephthalate) recycling facilities and a HDPE (high density polyethylene) recycling facility with Pact Group. In addition, in collaboration with Viva Energy, Cleanaway is developing a soft plastics recycling plant. EfW is recognised by Cleanaway as an important part of the future waste management framework, enabling recovery of energy and other resources from residual waste that cannot otherwise be recycled.

1.2.3 Policy Alignment

The BERC aligns with the Queensland EfW Policy and the Queensland EfW Guideline (2021) by diverting residual waste from landfill and delivering economic and social benefits through employment and local business opportunities in South East Queensland.

In accordance with Policy outcome 7 of the Queensland EfW Policy, the BERC will be designed to meet the best practice emission standards and requirements of the European Industrial Emissions Directive (IED) (2010) and the associated Best Available Techniques Reference (BREF) Document for Waste Incineration (2019), which sets the European Union environmental standards for waste incineration.

The Project also supports the Queensland Waste Strategy contributing to its 2050 targets to reduce household waste by 25%, recycle 75% of all waste, and divert 90% from landfill. In doing so, the BERC will play a key role in advancing Queensland's transition to a circular economy and reducing long-term reliance on landfill.

1.2.4 Key Components

The key components of the Project are summarised in Table 1.

Table 1: Key Project Components

Project Component	Detail
Address	Lot 1 Beaudesert Boonah Road, Bromelton, Queensland, 4285 (Lot 1 on RP45234). Refer Figure 2.
Site Area	63 hectares
Summary of proposed works	The Project includes the construction of a main EfW facility for waste processing, incinerator bottom ash (IBA) maturation and processing facility and an air pollution control residue (APCr) facility. It also includes all onsite infrastructure needed for the EfW facility, such as site utilities, internal roads, weighbridges, parking and hardstand areas, stormwater infrastructure, fencing and landscaping. The Project will include a visitor centre to help educate and inform the community on circular economy principles, the waste hierarchy, including waste avoidance, recycling, resource recovery, the benefits of landfill diversion and the EfW process. The intent behind this education is to drive a shift in community awareness and attitudes toward waste management and resource recovery.
Technology Used	The proposed technology is moving grate combustion technology. This has been used globally for over 100 years and is common in many of the 500 similar operational examples across Europe.
Facility Outputs	Approximately 73.2 MW (577,600 MWh/year, corrected for ambient temperature) exported to the grid as baseload electricity. Potential to supply energy in the form of heat and/or process steam to local industrial users. Residual materials include IBA and APCr. - It is intended that the IBA will be mechanically processed on site to create incinerator bottom ash aggregate (IBAA). During this process, both ferrous and non-ferrous metals are recovered for recycling and sale. It is intended that the remaining material is repurposed for use as an aggregate in construction. - The Project includes a facility to stabilise APCr before removal and disposal at a licensed landfill.
Key infrastructure	EfW facility including administration and visitor's centre IBA maturation and processing facility (2 x pads and 2 x sheds)

Project Component	Detail
	APCr facility (1 x pad, 1 x shed) Transformer yard and switchyard De-coupling area for trucks Weighbridges Internal road network and carparking 2 x combined storm water treatment and detention basin 1 x lined retention basin Access from Beaudesert Boonah Road via a signalised intersection with Recycling Street
Hours of Operation	24 hours per day, seven days per week (365 days per year)
Operational Staff	Approximately 60 staff

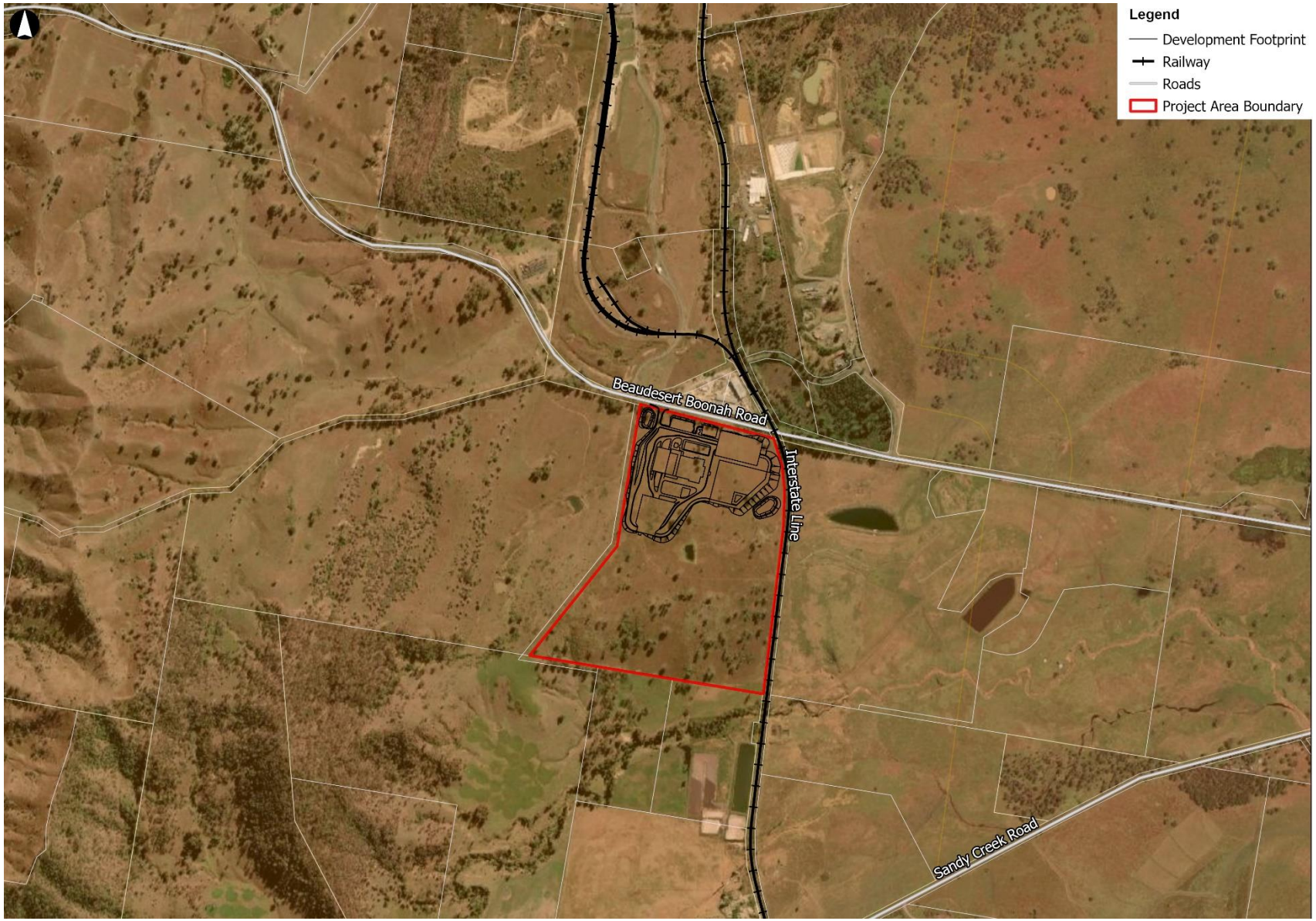


Figure 2: Site Location

2. Regulatory context

This section sets out the resource and waste management legislation, policy and guidelines applicable to Queensland. Together, these documents form the current regulatory context for resource and waste management in relation to the site.

2.1 Commonwealth legislation

Commonwealth legislation relevant to the BERC is discussed in Section 6.2 of the Planning Report. There is no relevant commonwealth legislation considered for this report.

2.2 State legislation

Relevant State legislation is discussed in Section 6.3 of the Planning Report. Specific legislation that has been considered in relation to waste management includes:

- *Environmental Protection (EP) Act 1994*
- Environmental Protection Regulation 2019
- *Waste Reduction and Recycling (WRR) Act 2011*
- Waste Reduction and Recycling Regulation 2011.

2.3 Policy, standards and guidelines

Specific policies and guidance documents that have been considered in relation to waste management include:

- National Waste Policy[1] and Action Plan[2]
- Queensland EfW Policy[3] and EfW Guideline[4]
- Queensland Waste Management and Resource Recovery Strategy[5]
- EOW Guideline[6] (ESR/2016/3323) and EOW codes
- The Bromelton State Development Area (SDA) Scheme
- Queensland Environmentally Relevant Activities (ERA) guidelines, specifically the guideline for activities with waste impacts (ESR/2015/1836).

2.4 International legislation, policy, standards and guidelines

Relevant international documents that have been considered in relation to waste management include:

- European Union (EU) Best Available Techniques Reference Documents, in particular Waste Incineration (BREF-WI), last released in 2019 and Waste Treatment (BREF-WT), last released in 2018.

---

[1] DCCEEW, *National Waste Policy*, 2018

[2] DCCEEW, *National Waste Policy Action Plan*, 2024

[3] DES, *Energy from Waste Policy Queensland*, 2021

[4] DES, *Energy from Waste Guideline*, 2021

[5] DES, *Waste Management and Resource Recovery Strategy*, 2019

[6] DES, *End of Waste – Waste Reduction and Recycling Act 2011 Guideline,* Version 3.00, 2023

- Directive 2010/75/EU on industrial emissions (IED).

2.5 Waste legislative context

The *EP Act, WRR Act* and associated regulations are the key legislative documents relating to waste and resource management in Queensland, providing a framework which is used to[7]:

- Identify the activities that qualify as ERAs
- Define matters that the administering authority must take into account, in conjunction with standard criteria under the *EP Act*, when making decisions concerning activities involving the generation, handling or disposal of wastes
- Prescribe 'regulated wastes', including clinical and related wastes and specific requirements for these types of waste
- Set out waste transport and tracking requirements.

Included in Schedule 2 of the EP Regulation are the ERAs specifically relating to waste management. All wastes irrespective of type produced or if covered by an ERA must be properly managed to minimise risk to the environment. Use of a waste tracking system is required for regulated wastes, and it must record and report generation, transportation, treatment and disposal destination of these wastes.

Under Schedule 8, Part 3, Division 1 of the EP Regulation, the environmental objectives for activities with waste impacts are as shown in Figure 3.

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.

Performance outcome

(a) Waste generated, transported, or received, is managed in accordance with the waste and resource management hierarchy in the *Waste Reduction and Recycling Act 2011*; and

(b) If waste is disposed of, it is disposed of in a way that prevents or minimises adverse effects on environmental values.

Figure 3: Environmental objectives for activities with waste impacts[8]

The EP Regulation determines certain waste types as 'regulated waste' as per Section 42 arising from commercial or industrial activities. Classification of regulated wastes are determined on a risk basis[9] as:

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

Regulated wastes are listed in Schedule 9, Part 1 of the EP Regulation, with non-regulated wastes and testing thresholds also included in Schedule 9. The threshold criteria for relevant waste characteristics and process for testing can be used to determine if a lower risk waste classification is appropriate. The waste generator can accept the default classification and does not have to undertake sampling and testing.[10]

[7] DETSI, *Guideline Application requirements for activities with waste impacts*, Version 5.05, 2025, p. 4-5

[8] DES, *EP Regulation Schedule 8, Part 3, Division 1*, 2019

[9] Queensland Government, *Regulated waste classification*, 2021 (Source: https://www.business.qld.gov.au/running-business/environment/waste-management/regulated-waste/classification)

[10] DETSI, *Overview of regulated waste categorisation, Version 4.00,* 2025, p.3

2.6 Queensland Energy from Waste Policy

Queensland's EfW Policy was released under the Waste Management and Resource Recovery Strategy and is supported by the EfW Guideline. The Queensland EfW Policy provides seven high-level outcomes[11] for EfW facilities, including:

1. Protect the waste hierarchy
2. Demonstrate operational performance
3. Engage with the community
4. Residual waste as feedstock
5. Adapt to residual waste changes
6. Energy recovery requirements
7. Environmental protection requirements

The Queensland EfW Policy applies to all technologies that produce all forms of energy (fuel, electricity, heating, cooling) from waste materials. The BERC is Thermal EfW. All seven EfW Policy outcomes listed above are applicable to Thermal EfW technologies.

This Report focuses on meeting part of the requirements listed in Outcomes 1 and 7 for protection of the waste hierarchy and meeting environmental protection requirements respectively. Refer to the Energy from Waste Policy Report for compliance with each of the criteria.

2.6.1 Resource and waste management hierarchy

The Queensland EfW Policy is guided by the waste hierarchy in the Waste Strategy with a further breakdown of the EfW hierarchy as shown in Figure 4.

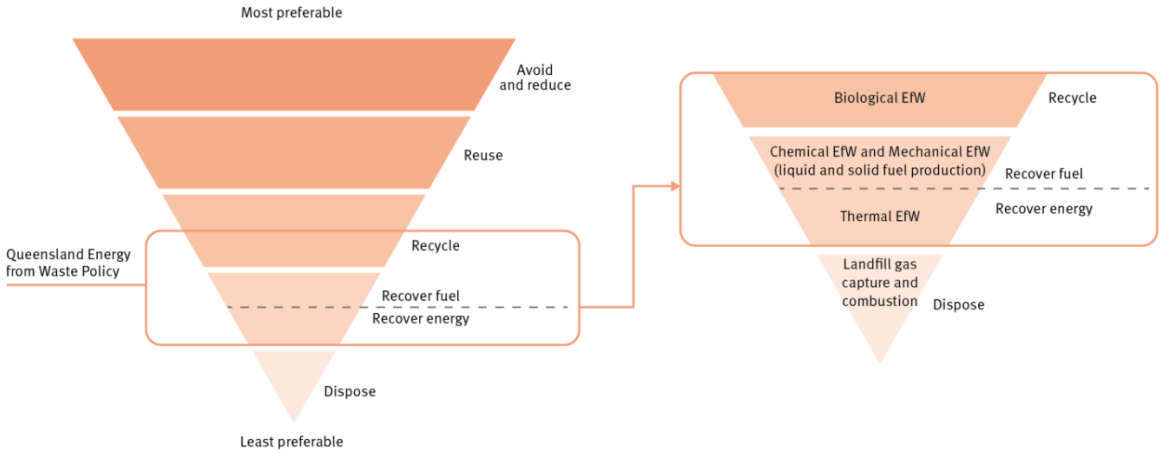


Figure 4: Queensland Waste and Resource Hierarchy (left), and EfW Hierarchy for residual waste (right) [12]

The primary objective of the Project is to support best practice waste management by upholding the waste and resource hierarchy, which recognises recycling and recovery as higher order actions than disposal. The BERC will divert residual waste from landfill, to minimise disposal, supporting the Queensland Government targets for recycling (75% by 2050) and landfill diversion (90% by 2050), responsible waste management and reducing the burden of landfills on the environment and communities. In doing so, the BERC will recover energy and recyclable materials from the feedstock that would otherwise have been destined for disposal.

[11] DES, *Energy from Waste Policy Queensland*, 2021, p.9

[12] DES, *Energy from Waste Policy Queensland*, 2021, p. 5

2.6.2 Environmental Protection and Best Available Techniques

Management of potential environmental impacts of EfW facilities are to be in accordance with the relevant EU BREFs as defined in the EfW Policy and Guideline. International best practice is widely recognised as the European Union BREF-WI, last published in December 2019.

The BREF-WI provides 37 BAT conclusions based on the IED and information shared between EU member states, numerous reference facilities and technology providers. A variety of approaches, systems and controls constitute BAT, as recognised in the BREF-WI. Not all techniques are appropriate in all situations and not all techniques can be used together. Techniques are chosen that best suit the technology being utilised. The Technical Process Description Appendix of the Planning Report demonstrates (where applicable) how the design of the Project meets the requirements of the 37 BAT conclusions.

The Queensland EfW Policy and the BREF-WI also refer to the BREF-WT. While the BREF-WT broadly relates to treatment of a wide range of wastes, including non-thermal, biological waste treatment and generally excludes thermal treatment of waste, the BREF-WT does discuss best practice in relation to the treatment of APCr (referred to in the BREF-WT as Flue Gas Treatment residue), to stabilise this material prior to disposal. However, best practice in relation to the management and treatment of IBA is covered by the BREF-WI and is specifically excluded from the scope of the BREF-WT.

2.7 End of Waste Framework

A waste can be deemed a resource if the DETSI considers specific quality criteria for a specified use are met. The End of Waste Framework provides a process for the development of new markets for recovered waste materials in Queensland. Under the EOW Framework, a waste can be deemed a resource under an EOW code or an EOW approval and will no longer be deemed a waste unless it does not continue to meet the requirements of the EOW code or approval.

An EOW approval is issued to a single entity, for a limited period to conduct trials to demonstrate whether the waste can be used as a resource and is suitable for an EOW code. Figure 5 details the process of changing status of materials under the EOW Framework.

Figure 5: Status of materials under the EOW Framework[13]

In 2021, the Waste Management and Resource Recovery Association of Australia (WMRR) submitted an application to DES for IBA to receive an EOW code in anticipation of the development of one or more large-scale EfW facilities in Queensland. The WMRR flagged the likely quantities of IBA expected to be generated by a large-scale EfW facility and also noted that without an EOW code and a reuse pathway, disposal of IBA would likely render EfW projects financially unviable.

The WMRR's submission provided an overview of IBA reuse in international jurisdiction such as the UK and the EU, to maximise landfill diversion outcomes and replace the use of virgin quarried materials in civil construction applications. The WMRR also flagged international experience regarding the difficulties of establishing new commercial markets for products from IBA and the importance of a strong regulatory framework to support the reuse of IBA products in place of virgin materials. In its submission, WMRR proposed that recognised international standards be adopted including Standard rules SR2012 No13 of the Environmental Permitting (England & Wales) Regulations 2010 and the EU Industrial Emissions Directive

[13] DES, *EOW Guideline,* 2023

(2010/75/EU), which stipulate minimum requirements including operating conditions that ensure the conversion of waste results in IBA with a total organic carbon content of less than 3wt%.

The WMRR also noted the work of other Australian jurisdictions (Victoria and Western Australia) in progressing IBA research and market development work as well as the investment made by UK market leader Blue Phoenix in WA, who have developed Australia's first IBA processing facility in response to a 25-year contract to process IBA from Kwinana Energy Recovery facility.

The EOW Framework was reviewed in 2023 by an independent consultant with a series of recommendations adopted by the Queensland Government. The Department supported 35 of the 37 recommendations in principle[14]. The recommendations[15] included:

- greater certainty for the application of the definition of waste and for the various pathways that may create a resource from waste
- increased reuse of waste as a resource and improved circular economy outcomes
- improved processes for nominating and creating EOW codes
- facilitating greater connections between resource producers and resource users
- greater strategic approach to identifying waste suitable for EOW codes
- investigating a number of changes to the EOW framework such as specific approvals that may facilitate significantly more reuse and recovery of waste
- periodic review and consolidation of codes to avoid duplication and ensure reuse is being facilitated adequately.

More recently, Blue Phoenix have put forward a submission for an EOW code that is currently being considered by DETSI. Blue Phoenix are awaiting notification of the outcome which is anticipated for release in early 2026.

2.8 Queensland Landfill Levy

For disposal of unsuitable feedstock or residual waste streams, landfill levy rates are applicable in Queensland across various waste types which include General waste, Category 1 regulated waste, Category 2 regulated waste and other wastes such as treated timber sawdust/shavings or contaminated earth. The levy rate is applied based on which levy area (metro and regional) the waste is generated and which area it is disposed of, with the higher levy rate required to be applied. Bromelton resides within the metro levy zone with any residual wastes expected to be charged at the higher rate if disposal is required.

The levy is planned for review by the Queensland Government in 2025-2026.

[14] Source: https://environment.desi.qld.gov.au/__data/assets/pdf_file/0026/352664/eow-framework-review-project-report-desi-response.pdf

[15] Business Queensland, End of Waste Framework, 2024, Source: https://www.business.qld.gov.au/running-business/environment/waste-management/regulated-waste/eow-framework

3. Assessment methodology

Waste will be generated during construction, commissioning and operation of the BERC which will be required to be managed to mitigate potential impacts. At this stage, detailed design of the facility has not been undertaken. High-level estimates of waste generation rates have been developed for main waste streams during construction and operation. Estimating and classifying waste streams assists to identify potential impacts and develop suitable mitigation measures. More accurate waste estimation and management provisions for construction will be detailed in a CWMP as the Project progresses. Detailed waste management provisions for site operation will be documented in an OWMP.

3.1 Existing conditions

The site currently consists of a greenfield site (open grassland and scattered trees) with an existing spray race identified onsite, as confirmed in the Contaminated Land investigation report. There is an existing natural overland drainage line running west to east through the centre of the site, through a series of small farm dams, and south of the proposed development footprint.

3.2 Construction waste generation and management

Waste generated during construction will be managed in line with industry best practice to minimise potential impacts from on-site management of waste and prioritise recovery of materials for reuse and recycling.

The largest waste stream arising from the construction phase of the Project will be spoil (soil and rock) from the excavation and site enabling works with a surplus of bulk earthworks of approximately 30,000m^3. Site investigations identified some risk of contamination with further testing recommended prior to earthworks to confirm and identify suitability for reuse, treatment or disposal. Preliminary earthworks design indicates net export of material from the site may be required, if surplus from cut/fill balance exceeds the amount able to be reused onsite for landscaping and engineering purposes. The area surrounding the spray race was further sampled and analysed through intrusive soil sampling and groundwater sampling in January 2024, by Douglas Partners. Sampling was found to not detect soil contamination at concentrations considered to present a risk of harm to potential human and ecological receptors. Further investigations are recommended across the site.

Other minor construction waste materials include excess masonry and concrete, offcuts and packaging materials. These items are not regulated wastes under Schedule 9 of the EP Regulations and do not have associated reporting or tracking duties. However, the associated environmental duties for depositing, receiving and transporting the waste still apply. C&D waste typically lends itself to source separation (i.e., different receptacles for various waste materials generated) with systems implemented to achieve source separation for reuse/recycling as part of the construction of the BERC, in order to maximise resource recovery and achieve the highest order outcomes possible. Anticipated construction waste streams are identified in Chapter 5.

Construction waste generation and management will be documented in a CWMP before starting on-site works. The CWMP will outline:

- Types and volumes of waste likely to be generated
- The procedure for assessing, classifying and storing waste in line with the Queensland EP Regulations
- Storage and treatment of waste on site including stockpiles
- Methods of transport and disposal of wastes, including regulated wastes, so that any waste leaving the site is transported and disposed of lawfully and does not pose a risk to human health or the environment
- All opportunities for reducing waste, reusing materials and increasing recycling
- Requirements for compliance with the *EP Act*

- Any exemptions required for construction phase waste management.

The CWMP will reflect the core principles of the waste hierarchy and Queensland waste legislation:

- Waste is to be minimised, wherever practicable
- Waste should be separated, where practicable, to maximise resource recovery
- Waste should be contained to avoid generation of odour, leachate, windblown litter and vermin attraction
- Regulated wastes will be identified and tested (if required) to identify and comply with relevant waste duties
- Waste removal by appropriately licenced waste transporters, complying with waste duties
- Consignment of waste streams for recovery or disposal at an appropriately licenced facility
- Waste transactions will be recorded by correctly completing the relevant part(s) of the waste transport certificate (WTC) where necessary for trackable waste as per schedule 11 of the EP Regulation[16].

A biodiversity assessment has been undertaken for the site which confirms that weeds are present, including nine Category 3 restricted invasive plants:

- *Asparagus aethiopicus* (ground asparagus)
- *Asparagus africanus* (ornamental asparagus)
- *Lantana camara* (lantana)
- *Lantana montevidensis* (creeping lantana)
- *Opuntia spp.* (prickly pear)
- *Senecio madagascariensis* (fireweed)
- *Sporobolus fertilis* (paramatta grass)
- *Sporobolus pyramidalis* (giant rats tail grass)
- *Vachellia nilotica* (prickly acacia).

During construction, weed management measures will be developed and implemented. Any soil or green waste that contains weed material will be disposed of at an appropriate facility. Weed management measures during construction will include appropriate control and disposal measures to minimise impacts associated with the spread of weeds and plant pathogens.

3.3 Commissioning waste generation and management

During commissioning, all waste generated at the BERC will be contained in appropriately labelled containers while on-site and removed by appropriately licenced waste transporters for management at a lawful place.

Commissioning related wastes are expected to include pre-commissioning wastes associated with lubricating oil flushing of hydraulic units and wastewater from boiler chemical cleaning as well as operational residues such as IBA and APCr, though in more varying compositions and quantities relative to normal steady state operation as the extent of operation will vary whilst the Commissioning Plan is executed. Waste substances arising during commissioning from the thermal processing of waste to recover energy (thermal treatment residues) are discussed further in Chapter 4.

[16] DETSI, *Waste Tracking Guideline*, Version 3.01, 2023. p.4 Source: https://www.detsi.qld.gov.au/policies?a=272936:policy_registry/wt-gl-managing-waste-tracking-qld.pdf

The BERC Commissioning Plan will identify procedures for testing residues to confirm process operating performance (e.g., IBA unburnt carbon content to meet environmental and combustion performance guarantee requirements), residue treatment requirements (e.g., establishing APCr blending and curing requirements for stabilisation) and testing requirements for residues requiring disposal offsite (e.g., solidified APCr).

During commissioning, management procedures (for IBA and APCr) may be refined based on the results of the testing undertaken. Sufficient space is provided on-site such that no hazardous waste will require transportation off-site prior to undergoing an appropriate stabilisation process.

3.4 Operational waste generation and management

Operational waste generation and proposed mitigation measures are outlined based on the facility concept design and typical waste generations from similar commercial and industrial activities. Operational wastes generated will be from the site office and visitor centre. Waste residues arising from the thermal processing of waste (thermal treatment residues) are discussed further in Chapter 4.

Cleanaway is committed to demonstrating best practice in waste management and resource recovery by ensuring that source separation systems are in place for all relevant operational waste streams. This includes paper and card, comingled recyclables, organic waste and e-waste. Operational waste streams are identified in Chapter 5. All waste generated at the BERC during operation will be contained in correctly labelled containers while onsite and removed by appropriately licenced waste transporters for management at a lawful place.

3.4.1 Operational waste management plan requirements

Preliminary waste generation rates have been estimated by applying the typical waste generation rates for offices, based on best practice guidelines and conservative estimates within Australia. The Queensland WRR Act provides requirements for a Waste Reduction and Recycling Plan for a planning entity as outlined in Section 142 which includes:

- Current and predicted information about waste
- The waste and resource management hierarchy
- The waste and resource management principles
- The State's waste management strategy
- Any other matters prescribed under a regulation about the requirement for a waste reduction and recycling plan.

An OWMP will be developed to align with the above requirements set out in Section 142 of the WRR Act during detailed design and in addition will include:

- Types and quantities of waste expected to be generated and their proposed management
- Waste storage area details, including:
- Location of storage area
- Bin sizes and quantities (aligned with expected generation and collection frequency)
- Facilitating equipment (such as scales, sinks, bin wash and compactors) as determined relevant
- Collection frequencies and access for the collection vehicle
- Goals to reduce waste generated, indicators to measure performance and actions to reduce waste generation and improve recycling.

The facility layout includes approximately 2,800m^2 of floor area between the visitor centre and administration building, which will generate operational waste similar to a commercial office. As a conservative estimate for this report, it is assumed that the entire area operates as a commercial office. Waste

generation estimates will be refined during the detailed design stage as the OWMP is developed. Queensland does not currently have guidelines for operational waste generation with best practice guidelines provided by interstate reference documents for a conservative estimate.

Wastes will be segregated into appropriately labelled and colour-coded receptacles. Waste segregation enables recovery of recyclable materials and appropriate containment and management of higher risk materials. Waste and recyclable materials will be removed from the site by appropriately licensed contractors and reused, recycled or disposed of at appropriately licensed facilities (lawful place). Cleanaway offers collection services for commercial and industrial waste as part of its core business and is likely to service the site during operation. Various other private service providers may be used at the facility and the site operator will provide contractors with all necessary waste classification information to enable them to comply with any relevant waste tracking and reporting duties.

Given that source separation systems will be in place to support high-value recovery of all relevant waste streams, the small quantity of residual waste generated by the facility will be eligible for energy recovery. Residual waste from on-site operations will be subject to the same waste acceptance criteria as waste from external sources.

Municipal-type waste, generated by the operators of the facility typically within the kitchen, meeting rooms and workshops and from packaging for delivered parts and equipment, will be managed separately to priority wastes. Municipal-type wastes will be source-separated for recycling, where practicable, and collected regularly by waste collection contractors as required.

Greywater and sewage wastewater will be generated through routine operations in minor quantities (~2,000L/day) from the on-site use of staff and visitor amenities. Greywater will be managed separately to sewage wastewater and will be stored for collection in septic tanks. Greywater may be reused within the process as recycled water e.g., for make-up to the IBA discharger. The potential reuse of greywater from the septic tanks for landscaping irrigation requires further site investigation. Residual sewage wastewater will be managed through an on-site treatment system for collection and transport off-site once septic systems become full.

4. Residuals from thermal treatment

Combustion of waste creates solid residues (ash) that must be managed appropriately. BERC will produce two types of residues from the energy recovery process:

1. ***Incinerator Bottom Ash*** – IBA is the primarily inert, non-combustible component of the waste that is left on the grate at the end of the combustion process. It is collected at the bottom of the grate and contains non-ferrous and ferrous metals that can be recovered.

   Some of the ash from the combustion process becomes entrained in the flue gases and is carried into the heat transfer section of the boiler (known as boiler ash). The boiler ash is then deposited in the boiler hoppers located below each heat exchanger tube bank, before any flue gas treatment reagents are injected into the process. With reference to Figure 7, radiant boiler ash, which is the portion of boiler ash collected from the radiant section passes of the boiler (and extracted via a screw conveyer at the bottom of the boiler's vertical 2nd-3rd pass, i.e., the high temperature section of the boiler) is suitable for recovery in construction applications and will be mixed with the IBA. This resource recovery practice is noted in the BREF-WI and is known to occur in EU Member States such as Norway and Denmark, which have strict local regulations to minimise landfill disposal and maximise resource recovery.

   The expected generation for this stream is approximately 180,400tpa (dry weight) for 100% thermal capacity, and up to 198,500tpa (dry) for 110% thermal capacity at the design waste CV, assuming 25% ash content in the waste feedstock content, before undergoing processing for further resource recovery.

2. ***Air Pollution Control residues*** – APCr is the mixture of fly ash (residual particulate matter remaining in the flue gas), neutralisation reaction salts formed from the reaction between acid gases in the flue gas and lime reagent, excess lime reagent, spent powdered activated carbon and convective boiler ash. With reference to Figure 7, boiler ash captured downstream of pass three (i.e., the cooler convective section of the boiler) is expected to contain higher concentrations of heavy metals and will be diverted to the APCr stream for treatment and disposal. Fly ash, neutralisation reaction salts, powdered activated carbon and solid lime reagent are separated from the flue gas by the baghouse filter section of the Flue Gas Treatment system. Since the baghouse filter cake contains unspent reagents, the majority is recirculated to the reactor section of the Flue Gas Treatment system, to minimise fresh reagent consumption. A small purge stream of baghouse filter cake is removed to prevent the build-up of fly ash, neutralisation reaction salts and spent powdered activated carbon within the Flue Gas Treatment system.

   This purge stream and the convective boiler ash are combined and are together referred to as APCr. APCr is temporarily stored in silos prior to treatment to stabilise the material prior to landfill disposal. The APCr represents a small proportion of the total residues collected and typically equivalent to ~4.5% of the total weight of the waste feedstock processed. The expected generation for this stream prior to stabilisation is up to approximately 34,200tpa (dry weight) for 100% thermal capacity, and approximately 37,620tpa (dry) for 110% thermal capacity at the design waste CV.

Figure 6 below shows the various EfW process residue streams and how these process residues flow into the two managed thermal treatment residues.

The key objectives of the residue management systems are to maximise resource recovery where feasible and to stabilise residues that are not suitable for recovery, prior to landfill disposal. Recycled process water supplemented by fresh make-up water is used within the Flue Gas Treatment system for flue gas conditioning and lime hydration, as well as for IBA quench cooling and to maintain a water seal in the ash discharger system at the end of the moving grate. The water either evaporates into the flue gas or into the boiler hall under the boilers or leaves the process within quenched IBA (approximately 20% moisture content). Recycled process water is also used in the on-site APCr stabilisation process.

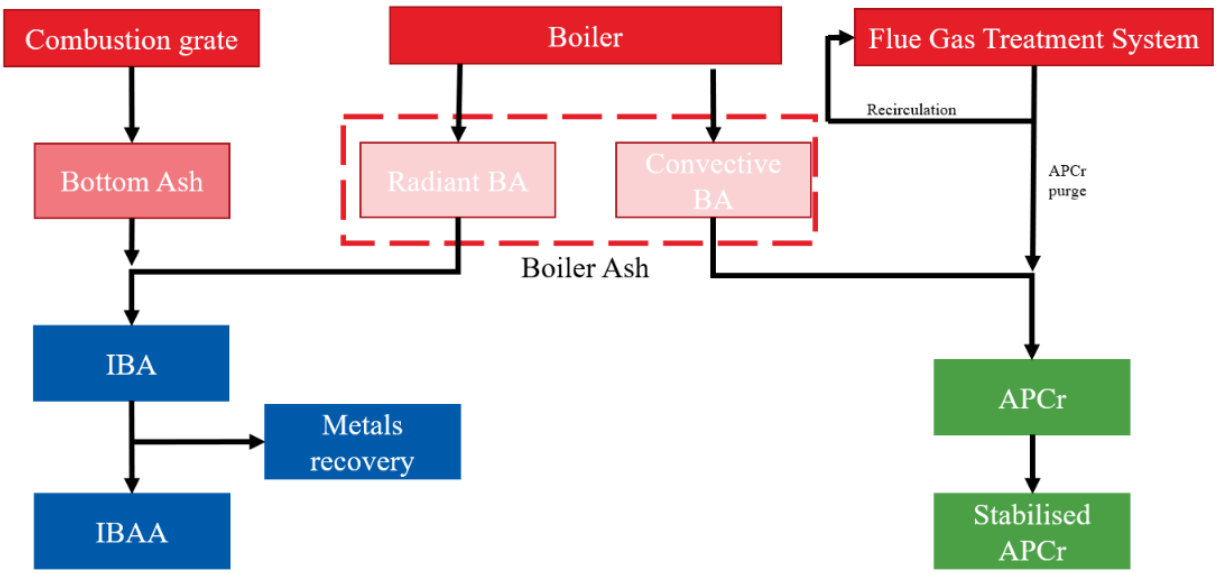


Figure 6: Process residues from thermal treatment

The boiler ash is distributed between the IBA (radiant boiler ash) and APCr (convective boiler ash) streams for relevant handling and management. The expected generation from this stream is approximately 4,600tpa (dry weight) in total at 100% thermal capacity and at the design waste CV, or less than 1% of the feedstock by weight. While the radiant boiler ash is expected to be less than 1% of the IBA by weight, the proposed approach maximises resource recovery and helps to limit the amount of APCr requiring stabilisation prior to disposal.

Figure 7 illustrates the collection points for the radiant and convective boiler ash streams.

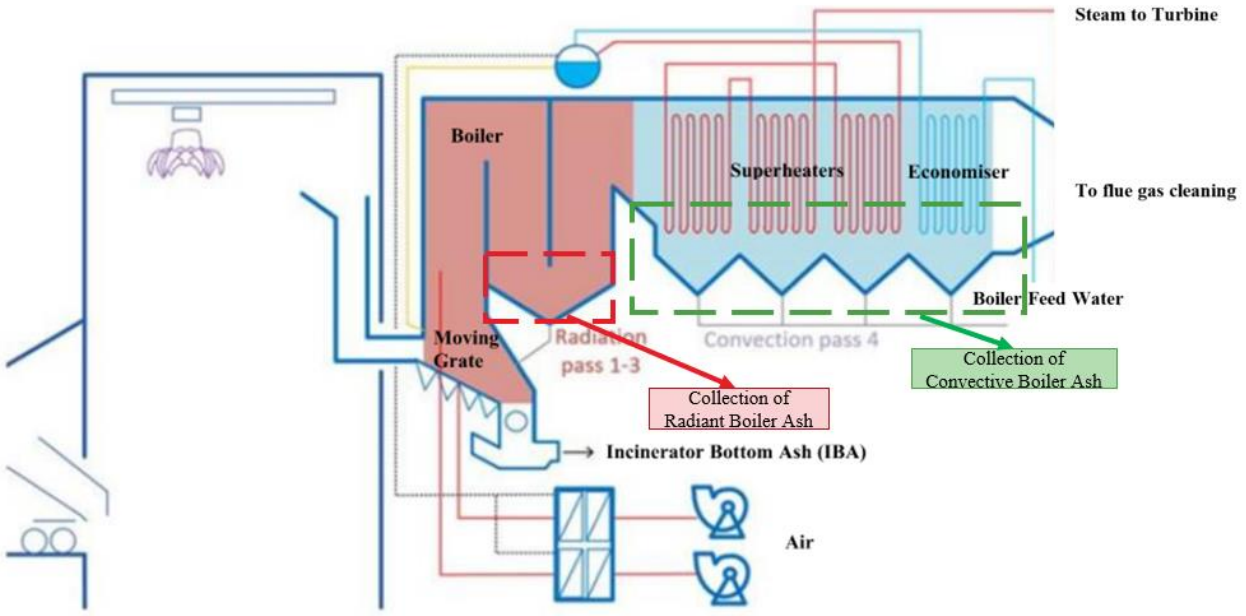


Figure 7: Radiant and Convective Boiler Ash residues

4.1 Precedent for residue waste management at EfW facilities

There is currently no publicly available data of comparable EfW facilities operating in Australia at the time of writing. Consequently, direct sampling and testing of IBA and APCr arising from Australian waste streams is not possible. The expected composition of thermal treatment residues is based on the composition

information for the Covanta Dublin EfW reference facility (reference facilities are introduced in the Technical Process Description). The Queensland Waste Classification thresholds for regulated solid wastes have been applied to this data in the following Section 4.2 to determine expected classifications. Testing the residues will be required to be undertaken to determine if a lower risk classification can be applied.

During the BERC commissioning phase it is also recommended that end-of-waste characterisation and quality testing procedures be used to confirm the quality of the processed IBAA and its suitability for reuse as an alternative civil construction product.

Currently in Queensland there is one operational EfW facility (ResourceCo) that processes C&D waste into Process Engineered Fuel (PEF) for use in cement manufacture. This facility employs a mechanical EfW treatment solution which is within the scope of the EfW Policy, however this facility processes different feedstock and produces different by-products and is therefore not suitable for comparison with the BERC.

The Gold Coast City Council have announced plans to construct a thermal EfW facility at their Advanced Resource Recovery Centre (ARRC). The EfW facility at the ARRC is expected to process comparable feedstock to the BERC and utilise similar technology. However, the ARRC's EfW facility is anticipated to be fully operational at a similar time to the BERC, in 2032/33. Therefore, international reference facilities provide the best opportunity for preliminary categorisation.

In international jurisdictions it is common to reuse IBAA as a construction aggregate. Both Australian facilities currently under construction in Western Australia, Kwinana and East Rockingham EfW facilities, have also constructed dedicated IBA processing facilities; however, the reuse pathway is yet to be established in most Australian states including Queensland. Precedent end-of-waste characterisation and quality testing procedures are expected to be implemented in Western Australia for the Kwinana and East Rockingham EfW projects and in Victoria for the Maryvale EfW facility. For more details on the management pathways for IBA and APCr, refer to Section 4.3.

4.2 Residue classification

The characteristics and classification of the thermal treatment residue streams inform appropriate onsite handling and pathways for recovery or disposal.

The BERC approach to management of thermal treatment residues is to establish recycling and reuse pathways where possible. Appropriate disposal options will be identified in the event where recycling pathways become unavailable.

All EfW residues and by-products must be characterised and managed according to the EP Regulations. Direct testing of the BERC residues will be possible during the commissioning phase. The EP Regulations prescribed requirements for sampling and testing wastes as per Division 2 will be used to confirm the waste classifications for those residues requiring disposal, if required. Whilst the preference is for the reuse of IBAA where possible through application of an EOW approval, classification will still be required for IBA/IBAA to allow for contingency disposal and will be required for the disposal of APCr. Implementation of control measures of testing, auditing and reporting are likely to be required to maintain compliance to EOW approvals and codes.

It is important to note that IBA disposal is a contingency only (during the commissioning period or if IBA quality deteriorates due to a process fault). In addition to the standard testing procedures the Project intends to test IBA and APCr at regular intervals to monitor the concentration of dioxins, furans and dioxin-like PCBs. Additional testing may be required by DETSI or product off-takers.

Characterisation of thermal treatment residues will be undertaken during commissioning through an appropriate approach outlined in the Commissioning Plan.

4.2.1 Incinerator Bottom Ash

The composition of IBA residues from the Dublin reference facility was obtained through the EPA Ireland. A detailed report on Characterisation and Classification of IBA was submitted to the Regulator on 20

November 2019, and updated in March 2020 to incorporate EPA comments, was found in support of IBA classification as non-hazardous waste and is publicly available for download.[17]

The IBA characterisation and classification report is based on a full suite of 'hazardous property testing' for waste classification, performed by WRc laboratories on 11 samples of IBA collected from the Dublin reference facility in 2018. The ash was representative of material as it is transported off the Dublin site and prior to any maturation processes, which are undertaken at an overseas IBA recycling facility.

Of these 11 samples:

- One sample was tested against all 15 HP (Hazardous Property) characteristics
- Seven samples were tested against the four HP characteristics which are most relevant to IBA (HP 4/8 - irritancy/corrosivity, HP7 – carcinogenicity, HP 14 – ecotoxicity)
- Four samples were submitted to detailed minerology testing, which informed the assessment of ecotoxic fractions of some metals for which the total metal content exceeded the basic HP14 threshold
- Further testing was performed involving chemical speciation and thermodynamic modelling, to allow the assessment of HP14 ecotoxicity to be refined.

Leachability testing was conducted, however is not presented here as the testing reflects the leachability of raw IBA, which is not a waste product from the Project. The BERC's raw IBA will be matured on-site (described further in Section 4.3.2), a process which involves chemical changes that partially immobilise contaminants to reduce the leachability of compounds (total concentration is largely unaffected by the maturation process). The IBA will then undergo metals recovery at a dedicated on-site ash handling facility. IBAA is the final by-product to be reused or disposed, if not in alignment with off-taker requirements, and is therefore the relevant material stream to categorise under the EP Regulations (noting that the characterisation is only applicable for disposal purposes, not for reuse).

IBAA leachability data has been provided by Ramboll from an example Danish EfW plant (which processes MSW and C&I waste streams using the same technology on a similar scale to the Project). Leachability was assessed using the European standard EN 12457-1 methodology. The Queensland Regulated Waste Categorisation do not require leachability testing for characterisation of solid waste material, it may however be needed to determine if regulated waste can be accepted at a landfill or waste management facility under its waste acceptance criteria. Leachability testing will be conducted on IBA and IBAA during commissioning and ongoing during operation.

Table 2 compares the total contaminant concentration for all compounds which were tested at the Dublin reference facility and for which a threshold is specified in the Queensland EP Regulation. Leachability data, from the Danish facility, was more limited and is provided for the compounds where it was available.

Table 2: IBA and IBAA characterisation based on reference data (comparison to waste classifications only relevant for disposal, not recovery)

Substance	IBAA Leachability (Ramboll data from Danish facility – average of 8 samples)	Dublin IBA 1st phase testing	Dublin IBA 2nd phase testing	EP Regulation thresholds for solid tested waste			Preliminary Categorisation
				Not Regulated	Category 2 regulated waste	Category 1 regulated waste	
Component (Note 1)	**mg/L L/S 2, EN12457-1 Test procedure.**	**Maximum 'as received' mg/kg**	**Maximum 'as received' mg/kg**	**TC mg/kg**	**TC mg/kg**	**TC mg/kg**	**Cat 1 / Cat 2 / Not-regulated**
pH (Note 2)	Not available	12.66	12.60	6.5-9	2-<6.5 or >9 -12.5	<2 or >12.5	Cat 1
Antimony	Not available	46.7	71.3	<9	9-36	>36	Cat 1
Arsenic	0.002	8.65	15.5	<300	300-1,200	>1,200	Not regulated

[17] Available from: https://leap.epa.ie/docs/a2372ff1-af94-4d20-a4c9-8ec8d11c2298.pdf

Substance	IBAA Leachability (Ramboll data from Danish facility – average of 8 samples)	Dublin IBA 1st phase testing	Dublin IBA 2nd phase testing	EP Regulation thresholds for solid tested waste			Preliminary Categorisation
				Not Regulated	Category 2 regulated waste	Category 1 regulated waste	
Component (Note 1)	**mg/L L/S 2, EN12457-1 Test procedure.**	**Maximum 'as received' mg/kg**	**Maximum 'as received' mg/kg**	**TC mg/kg**	**TC mg/kg**	**TC mg/kg**	**Cat 1 / Cat 2 / Not-regulated**
Barium	Not available	396	899	<4,500	4,500-18,000	>18,000	Not regulated
Beryllium	Not available	0.87	0.92	<90	90-360	>360	Not regulated
Boron	Not available	136	161	<20,000	20,000-80,000	>80,000	Not regulated
Cadmium	0.0003	14.8	21.3	<90	90-360	>360	Not regulated
Chromium VI	0.04	<0.09	nd	<300	300-1,200	>1,200	Not regulated
Copper	1.21	2105	2927	<220	220-880	>880	Cat 1
Cyanide (free)	Not available	<0.82	nd	-	-	-	-
Cyanide (total)	Not available	<0.82	nd	<240	240-960	>960	Not regulated
Lead	0.01	1,254	1,316	<300	300-1,200	>1,200	Cat 1
Mercury	Not available	0.42	0.46	<80	80-320	>320	Not regulated
Molybdenum	Not available	14.7	13.8	<117	117-468	>468	Not regulated
Nickel	0.005	94.9	107	<1,200	1,200-4,800	>4,800	Not regulated
Polycyclic aromatic hydrocarbons PAH (total)	Not available	6.98 (one sample, all others nd)	nd	<300	300-1,200	>1,200	Not regulated
PCBs	Not available	0.000008	nd	<2	2-50	>50	Not regulated
Phenol (total)	Not available	1.07	nd	<40,000	40,000-160,000	>160,000	Not regulated
Selenium	Not available	0.45	0.46	<700	700-2,800	>2,800	Not regulated
Silver	Not available	5.05	7.25	<117	117-468	>468	Not regulated
Vanadium	Not available	93.7	41.1	<117	117-468	>468	Not regulated
Zinc	0.04	1901	2841	<400	400-1,600	>1,600	Cat 1

Note 1: In this table, *N/A* means there is no applicable compliance value for this contaminant and the category will be determined by the available values for the contaminant. *Not available* means the test was not undertaken for this substance. *nd* means test undertaken but the substance was not detected in the sample.

Note 2: pH attribute classification does not use mg/kg units as per other substances in this table.

Table Key:

All values are below the threshold for the designated classification.	
One value exceeds the threshold for the designated classification. All other values are below the threshold for the designated classification.	
More than one value exceeds the threshold for the designated classification.	

Based on the IBA testing results for the Dublin reference facility, Antimony, Copper, Lead and Zinc content governs the classification of this reference facility IBA stream. The results presented fall into the Category 1 regulated waste category. The data indicates with a high degree of confidence that the concentration of all other compounds fall within the 'Not regulated waste' classification based on the total contaminant concentration threshold.

Furthermore, in some jurisdictions, including the UK, convective boiler ash is allowed to be mixed with IBA. This would result in IBA containing higher concentrations of some hazardous compounds, including heavy metals. It is unknown if the Dublin facility mixes convective boiler ash with IBA. If this is the case, the Dublin data represents a conservative initial estimate of the likely concentrations of hazardous compounds in the BERC's IBA (as the BERC's convective boiler ash will be part of the APCr stream). Furthermore, the Dublin reference facility IBA will have elevated levels of potentially recyclable copper and

zinc, since IBA from the Dublin reference facility is processed offsite by others for metals and resource recovery.

As noted above, IBAA is the expected final by-product which will require classification for reuse or disposal. This product involves chemical changes that partially immobilise contaminants to reduce the leachability of compounds (total concentration is largely unaffected by the maturation process) and reduce its alkalinity. This may result in IBAA being considered as an immobilised waste and therefore being reclassified as a Category 2 Regulated Waste to be managed accordingly for disposal, unless an EOW code is in place.

It is understood that an EOW application for IBAA reuse is being progressed by others.

4.2.2 Air Pollution Control residue

Data has been obtained through a Freedom of Information Request on the analysis of APCr for the Dublin reference facility. The dataset analyses the key elements of the waste that could be classified as hazardous. The reference facility dataset does not include typical major constituents such as calcium or silicon as these are inherent in any ash stream and thus did not need to be analysed. A typical compositional make up of APCr is provided in Table 3.

Table 3: Typical composition of APCr

Element Name	Average Composition (mg/kg)
Calcium	230,000
Chlorine	180,000
Silicon	69,000
Magnesium	9,400
Iron	12,000
Aluminium	26,000
Potassium	23,000
Sodium	17,000
Zinc	15,000
Sulphur	15,000
Lead	5,400
Titanium	3,300
Manganese	480
Barium	540
Tin	890
Copper	710

Table 4 presents a comparison of the maximum concentration of compounds which were tested at the Dublin reference facility with the corresponding contaminant threshold stated in the Queensland regulated waste categorisation overview. The maximum values were chosen from the data set to be as conservative as possible in the analysis.

The Dublin reference facility tested for twenty contaminants as well as pH; only 14 of the contaminants correlate with the thresholds stated in the Queensland EP Regulations.

Table 4: Comparison of EP Regulation thresholds to Dublin APCr testing data for maximum contaminant concentration

Category	Dublin APCr testing	EP Regulation thresholds for solid tested waste			Preliminary Categorisation
		Not Regulated	Category 2 regulated waste	Category 1 regulated waste	
Component	**Maximum mg/kg (dry basis)**	**TC (mg/kg)**	**TC (mg/kg)**	**TC (mg/kg)**	**Cat 1 / Cat 2 / Not-regulated**
pH (Note 1)	12	6.5-9	2-<6.5 or >9 -12.5	<2 or >12.5	Cat 2
Antimony	690	<9	9-36	>36	Cat 1
Arsenic	67	<300	300-1,200	>1,200	Not-regulated
Barium	1,200	<4,500	4,500-18,000	>18,000	Not-regulated
Cadmium	180	<90	90-360	>360	Cat 2
Chromium	180	<300	300-1,200	>1,200	Not-regulated
Copper	750	<220	220-880	>880	Cat 2
Fluoride	170	<930	930-3,720	>3,720	Not-regulated
Lead	2,200	<300	300-1,200	>1,200	Cat 1
Mercury	8	<80	80-320	>320	Not-regulated
Molybdenum	33	<117	117-468	>468	Not-regulated
Nickel	150	<1,200	1,200-4,800	>4,800	Not-regulated
Selenium	8	<700	700-2,800	>2,800	Not-regulated
Vanadium	300	<117	117-468	>468	Cat 2
Zinc	11,000	<400	400-1,600	>1,600	Cat 1

Note 1: pH attribute classification does not use mg/kg units as per other substances in this table.

Based on the APCr results from the Dublin reference facility, it can be seen that several components exceed the threshold for Category 1 Regulated Waste. In this analysis, the Antimony, Lead, and Zinc content would govern the classification of the APCr stream.

Leachability test results for Dublin were not available, so could not be compared. However, the APCr will already be classified as a Category 1 regulated waste. Direct testing of raw and stabilised APCr from the BERC facility using the Queensland Regulated Waste Categorisation thresholds will be essential during the commissioning phase to confirm the waste classification and level of treatment required.

It is expected that reclassification of APCr from Category 1 regulated waste to an immobilised waste as Category 2 regulated waste will be possible as the APCr will be treated on site. Disposal of APCr will be dependent on meeting the relevant toxicity characteristic leaching procedure of the landfill where it is to be disposed.

4.3 Proposed management pathways for process residues

4.3.1 Site layout and residue handling

The following site layout has been proposed with areas for residue/waste handling allocated as shown in Figure 8. Specific site allocation for IBA storage, processing and treatment has been located to the east of the site with a sufficient area of 2.0 ha for treatment of IBA residues. This area will include an IBA maturation building and a sorting process facility, which will also include ferrous and non-ferrous metals recovery prior to mechanical processing into an aggregate for reuse. The APCr stabilisation process is located within the main EfW processing building and a separate covered storage area of 0.1 ha has been located adjacent to the EfW facility to accommodate cement stabilised APCr while it is curing into concrete-like blocks. A total area of 0.7 ha has been allocated to stabilisation and storage of the cement-stabilised APCr.

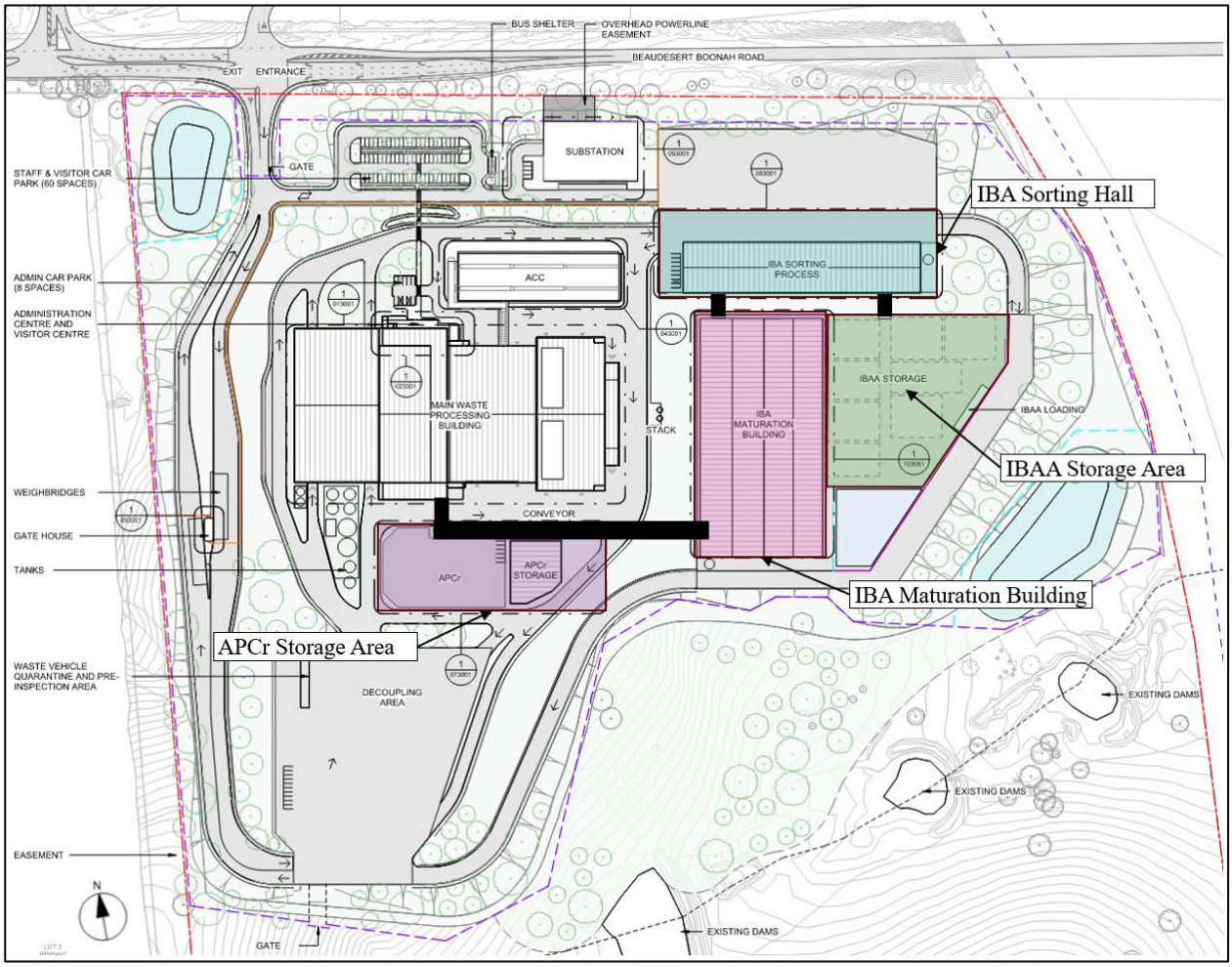


Figure 8: Site layout and areas for residue handling

4.3.2 Incinerator Bottom Ash (and Aggregate)

The waste code provided in the EP Regulations that is likely to apply to IBA is:

- Residues from industrial waste treatment or disposal operations – Waste code N205.

This waste code is a Category 1 Regulated Waste and a trackable waste for transactions and transport.

IBAA that does not meet the requirements of an applicable EOW code may be considered as an immobilised waste and reclassified as the following waste code:

- Encapsulated, chemically fixed, solidified or polymerised wastes – Waste code N160.

This waste code is a Category 2 Regulated Waste and remains a trackable waste for transactions and transport. Further processing may be undertaken within the IBA treatment area as required by reuse applications, for example crushing or size grading for use as aggregate in construction applications.

IBA Stabilisation and Maturation Process

IBA will be the largest residue stream generated by the BERC.

The proposed IBA handling process will enable recovery of valuable metals for recycling, ensure efficient and safe handling and will achieve a residual product suitable for reuse in accordance with a future EOW code. The primary objective is to avoid the disposal of IBA to landfill.

Boiler ash collected from the boiler radiant section (vertical passes two and three) will be combined with the IBA stream. This process is recognised by the BREF-WI as a typical procedure for some EU Member States. The stabilisation and treatment process for IBA will be a multi-stage process which is consistent with BAT 36 for increasing the resource efficiency for the treatment of IBA. The BERC IBA/IBAA treatment process

will be confirmed during detailed design as reuse requirements become clear, however will include maturation and metals recovery, and is likely to include various mechanical processing techniques, such as:

- Screening and sieving
- Crushing
- Aeraulic separation
- Metals recovery equipment (e.g., magnets and eddy current separators).

IBA will be quenched at the bottom of the grate with water to cool the IBA, following which the IBA will be conveyed across the site to the IBA treatment area. At the IBA treatment area, the IBA will be matured under cover in a building. This consists of storage for a period of approximately 2-12 weeks (testing during commissioning phase and from time to time throughout operation is required to confirm this duration). The storage area is sized such that it is suitable to store material for approximately 6 weeks (at the design waste ash content of 25%) during the maturation process and 4-6 weeks of additional IBAA product storage to allow for product IBAA to be dispatched in campaigns.

The maturation process will result in a reduction of the leaching of metals through both oxidation reactions and a natural carbonation process in which the uptake of atmospheric carbon dioxide (CO_2) in the presence of moisture binds the metals to the mineral parts of the IBA. The aging process will also lower the pH, remove or transform organic ligands via evaporation or leaching and reduces the reactivity of the IBA. These are all important for making the IBA suitable for construction applications. This maturation process is recognised as best practice in BAT 36 (e). During maturation, the IBA stockpiles will be turned and wetted to facilitate the chemical reaction and control fugitive dust emissions.

The matured IBA material will contain ferrous and non-ferrous metals, which can be recovered for recycling. This process may involve the use of various techniques including sieving, magnetic separation, eddy current separation, sensor technology and crushing/milling to separate metals from the IBA. All mechanical separation and processing of IBA will occur within the 'IBA Sorting Process' building to control noise, water and dust emissions. Dust management techniques include a combination of managing the IBA moisture content, the use of enclosed conveyors and dust collection and air filtration.

Further processing may be undertaken as required by the offtake customer and reuse application specifications. Cleanaway intend to select a reputable, experienced provider for IBA/IBAA processing equipment that can supply best available technology. Specific equipment has not been specified at this stage of design due to the developing IBAA reuse market.

IBAA Reuse

In Europe, it is common to reuse IBAA as an aggregate for construction purposes, such as for road-base material or 'in-fill' materials. Regulations for IBA utilisation are set by each country.

A precedent for the reuse of IBAA in Australia is anticipated in the coming years, with the Maryvale EfW facility in Victoria having received a Waste designation for reuse of their "matured incinerator bottom ash" from the Victorian EPA and in Western Australia (for the Kwinana and East Rockingham EfW projects) also developing IBA processing facilities, to produce an aggregate for use in road construction. It is expected that the aggregate may be used as a sub-base, fill or aggregate input to asphalt or concrete production.

Reuse of IBAA in Queensland will need to be confirmed under the EOW Framework and will require an EOW approval to test suitability of material reuse and application for an EOW code. EOW approval will be undertaken in line with the process prescribed in the EOW Guideline, which is expected to take less than six months. Blue Phoenix have put forward a submission for an EOW code that is currently being considered by DETSI and they are awaiting notification of the outcome which is anticipated for release in early 2026.

The preferred pathway for the IBAA at the BERC is to recycle and reuse the material in a similar fashion to the Blue Phoenix Australia Kwinana facility. As the Kwinana Energy Recovery facility is processing residual MSW and C&I waste (i.e., similar feedstocks to the Project), it is expected that an aggregate of similar standard can be produced. However, approval will need to be obtained to confirm an EOW code for IBAA's status as a reusable resource and market development will need to be undertaken to enable this reuse

pathway. Quality testing of the IBAA after processing will need to be undertaken during the commissioning phase to confirm that the IBAA meets the EOW code requirements.

During commissioning, a short term disposal pathway may be required. IBAA that requires disposal is expected to be reclassified as Category 2 regulated waste if considered immobilised waste, based on the analysis in Section 4.2.1, and will be disposed of to a suitably licensed landfill. Testing will be required to finalise classification prior to disposal to determine the appropriately licensed disposal facility, there are suitable licensed disposal facilities located within South East Queensland.

The management pathway for IBA/IBAA is shown schematically in Figure 9.

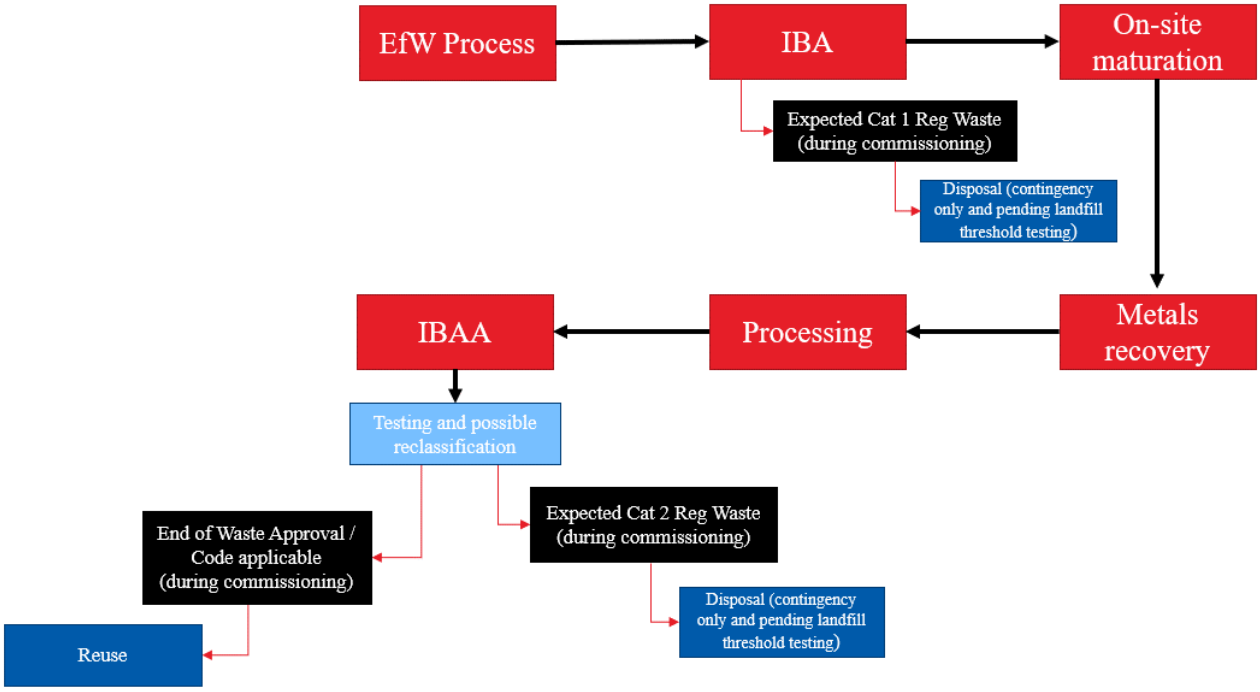


Figure 9: IBA/IBAA Management Pathway

Environmental Safeguards (IBA)

Key environmental safeguards related to IBA have been considered in the development of the BERC design and are included in Section 6 and the Environmental Risk Assessment, including:

- Indoor IBA maturation area to contain leachate and minimise fugitive dust emissions
- Wetting of IBA piles to control fugitive dust emissions
- Indoor processing of IBA (to produce IBAA) to control noise and dust
- Enclosed IBA conveyor to avoid spillage.

4.3.3 Air Pollution Control residue (APCr)

Waste codes provided in the EP Regulations that may apply to APCr are:

- Residues from industrial waste treatment or disposal operations - Waste Code N205
- Fly ash - Waste Code N150.

These waste codes are Category 1 Regulated Wastes and are trackable wastes for transactions and transport.

APCr Treatment and Stabilisation

APCr, combined with convective boiler ash recovered downstream of boiler vertical pass three is likely to contain hazardous levels of heavy metals and treatment will be required to immobilise contaminants.

APCr generated at the BERC may need to undergo chemical composition and leachability testing in order to be accurately classified. It is expected that raw APCr will be classified as a Category 1 Regulated Waste (as discussed in Section 4.2.2).

If testing during the commissioning phase demonstrates that APCr from the BERC is classified as Category 1 Regulated Waste, it is expected to still require treatment to immobilise boiler fly ash and heavy metal contaminants to render it suitable for disposal. After treatment it can be disposed to an appropriately licensed landfill. The objective of treating the APCr residues prior to landfilling is to reduce the concentration and leachability of Chemicals of Potential Concern (COPC), which enables compliance with the relevant landfill acceptance criteria. A treatment area has been provided on-site for the stabilisation (reduction in leachability) of the APCr prior to off-site transport.

The treatment method selected for APCr at the BERC is solidification. This is the most widespread approach to reducing the leachability of organic and inorganic COPC (e.g., heavy metals). Solidification involves mixing APCr with cement, water and other binding agents such as pozzolans (alumino-silicious material that reacts with lime and water) to increase the strength of the treated materials. This process creates a physical change and decreases the exposed surface area to leaching by immobilising the contaminants in a bound cementitious matrix. The BREF-WT notes that the waste input (APCr) will react with water and the cement to form metal hydroxides or carbonates which are usually less soluble than the original metal compounds in the waste matrix. COPC can also be subject to chemical stabilisation and immobilisation reactions with components in the binding material, to be confirmed during commissioning.

Stabilisation of the APCr will be integrated with the APCr collection systems through the use of enclosed conveyors and APCr storage silos to prevent exposure to the external environment and provide buffer storage capacity to allow the on-site APCr stabilisation plant to operate on shift-based campaigns. The on-site stabilisation plant will allow for adjustments to the solidification process with ongoing testing for compliance with landfill waste classification. Curing of the cementitious APCr mixture will reduce the permeability of the APCr and subsequent potential for leaching.

During the treatment process, the APCr is mixed into a slurry with cement and potentially other additives/binders such as pozzolans (depending on the type of cement used and desired stabilised material characteristics) as well as recycled process water (which may include harvested rainwater). The slurry is then poured directly into closable big-bags. These bags are transferred to a dedicated APCr stabilisation area for curing in an undercover area, with the encapsulation of the curing APCr mixture within the bags limiting the opportunity for dust, leachate, air emissions or chemical spills. The treated material is stored in the APCr stabilisation area for approximately seven days whilst the curing process occurs (curing time within bags to be finalised at commissioning stage).

The basis of design for the APCr treatment on-site at the BERC is provided in Table 5. Adjustments to the mixture may be required to ensure compliance with both pollutant concentration and leachability criteria associated with landfill acceptance. The mixture should be confirmed during the commissioning phase with lab-scale testing.

Table 5: APCr stabilisation design parameters[18]

Parameter	Adopted criteria
APCr composition	Approximately 50-65% hydrated lime and neutralisation reaction products, 1-3% activated carbon, the remainder flue gas particles (semi-dry flue gas treatment system).
APCr production	~34,200tpa for 100% and ~37,620tpa for 110% capacity
Silo size	4 x 250m^3 (providing redundancy)
Cement required for treatment (as a percentage of APCr weight)	~30%
Density of immobilised APCr	1.7t/m^3

[18] REN2021N00922-RAM-ME-00019 BERC APCr Memo v2.0 Issued 08JUL2025

Parameter	Adopted criteria
Moisture content of immobilised APCr	35%
Immobilised APCr production	~ 65,960tpa for 100% and ~72,550tpa for 110% capacity
Curing time	~ 7 days

APCr Disposal

After immobilisation it is expected that the waste will be classified as Category 2 Regulated Waste and it will be disposed of to a suitably licensed landfill. Confirmation of disposal facility and waste acceptance criteria will be determined during the commissioning phase; there are suitable licensed disposal facilities located within South East Queensland.

Whilst the initially proposed management pathway is treatment and disposal, the BERC will manage APCr in line with the waste hierarchy and therefore the preference is to recover materials from the APCr if possible (without compromising the environment or human health). Technologies are currently emerging in international markets which may make the recovery of valuable resources from APCr possible in the future. Cleanaway will continue to investigate methods for increased resource recovery from the APCr stream throughout design and operation.

The management pathway for APCr is shown schematically in Figure 10.

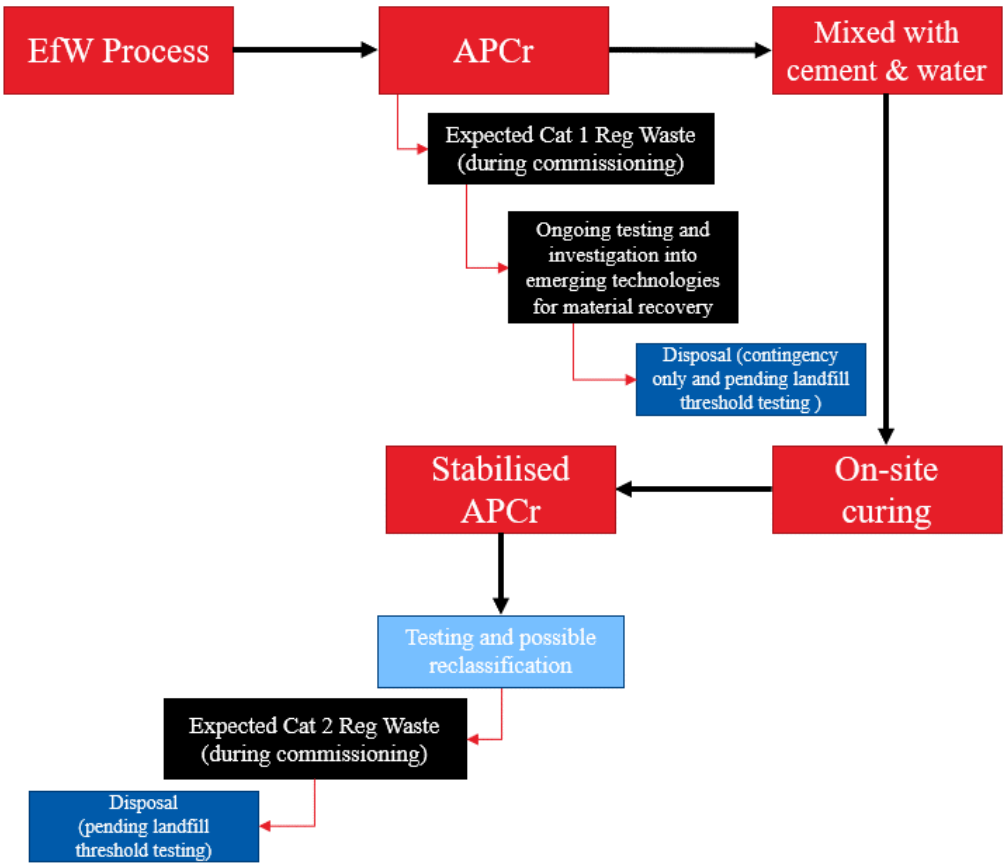


Figure 10: APCr Management Pathway

Environmental Safeguards (APCr)

Key environmental safeguards related to APCr have been considered in the development of the BERC design and are included in Section 6 and the Environmental Risk Assessment, including:

- Controlled handling of untreated APCr in enclosed conveyor systems into dedicated temporary buffer storage silos

- Preparation of stabilised APCr to occur inside a building to control dust, noise and spills
- Controlled handling of APCr into slurry form and bagging of stabilised APCr (using big-bags) to control spillage, emissions and leachate and to facilitate transportation
- Undercover area to facilitate curing while protecting from inclement weather.

5. Assessment of potential impacts

There are potential impacts associated with solid and liquid wastes arising from the construction, commissioning and operational phases. There are different potential impacts associated with solid waste and liquid waste with the following sections providing potential waste streams with classification, impacts and mitigation measures associated where applicable. Liquid waste classification is defined separately to solid waste classification and have been separated out accordingly.

5.1 Solid waste management

Table 6 identifies materials which may arise as waste streams during construction, commissioning and operation of the facility and classifies them in accordance with Schedule 9 of the EP Regulations. Table 6 also contains the potential impacts of each waste material and its expected mitigation measure ID. These mitigation measure IDs are described in more detail in Chapter 6.

Several streams (thermal treatment residues) are expected to be generated as part of normal operations, with their classification and management pathways discussed above in Chapter 4. Other streams are expected to be generated in minor quantities (some regularly, some irregularly as part of maintenance operations, as identified in Table 6). If waste streams are generated during construction and operation that are not identified in Table 6, they will be classified and managed on a case-by-case basis in accordance with the EP Act (using Schedule 9 of the EP Regulations 2021).

Regulated wastes are listed in Schedule 9, Part 1 of the EP Regulation, with non-regulated wastes and testing thresholds also included in Schedule 9. The thresholds criteria for relevant waste characteristics and process for testing can be used to determine if a lower risk waste classification is appropriate. If categorisation testing is undertaken by the generator to determine if a lower risk category applies, the process for this is:

- Identify relevant parameters, if any, and sample waste (per Section 45 of the EP Regulations)
- Waste testing by an appropriately qualified person (per Section 46 of the EP Regulations)
- Compare the test results against thresholds for Category 1, 2 and Not Regulated wastes.

If waste is determined to be a lower risk category, the waste can be treated as that category of waste while the results are current, as defined in Section 50 of the EP Regulations.

Landfilling of select types of waste cannot be undertaken without immobilisation as they would not meet the waste acceptance criteria as defined by the landfill or waste management facility. Immobilised wastes are considered as encapsulated, chemically-fixed, solidified or polymerised wastes and classified as Category 2 Regulated waste. The EP Regulation does not clearly define how the Category 2 classification of immobilised waste interacts with the Category 1 classification of the elements in the waste and once considered as immobilised waste it cannot be reclassified to non-regulated waste by testing.

There are no approved processes for immobilising waste, nor are there standards setting out when a waste has been effectively immobilised. Waste will be considered immobilised if it meets the relevant toxicity characteristic leaching procedure (TCLP) requirements of the landfill where it is to be disposed.

While leachability testing using either the TCLP, or the Australian standard leaching procedure (ASLP) or any other methodology, is not required for solid waste categorisation, it may be needed for regulated waste going to landfill or another waste management facility to show that the waste meets the landfill or other facility's waste acceptance criteria. [19]

[19] DETSI, Overview of regulated waste categorisation, Version 4.00, 2025, p.8-9

Table 6: Identification and expected classification of likely construction, commissioning and operational waste streams

Waste Material	Expected generation, description and quantity	Waste type, code and classification (Schedule 9 and 11) *(Expected – if applicable)*	Management Pathway	Potential Impacts	Mitigation Measure ID
Waste streams primarily generated during construction					
Excavated Soil and Rock	Significant generation ~30,000m^3 during site establishment works (construction). Note: Site investigations identified some risk of contamination with further testing recommended prior to earthworks to confirm and identify suitability for reuse, treatment or disposal.	Not-regulated waste/ General waste.	On-site reuse as part of site reshaping. Excess material transported off-site for recovery/reuse opportunities. Confirm if contaminated soil is present and identify suitable management pathway if not suitable for reuse.	Disposal of soils to inappropriate/unlawful place. Contamination or deterioration of groundwater quality.	WA01 WA06
Spray Race	Treated Timber (assumed not contaminated)	Not-regulated waste/ General waste. Treated timber, other than sawdust or shavings.	Transported off-site for disposal at appropriately licensed facility.	Contamination or deterioration of groundwater quality. Disposal of timber to inappropriate/unlawful place.	WA01 WA02
General construction and demolition waste	Moderate generation during construction activities. Typically comprises: Timber, Concrete, Rubble, Steel, etc.	Not-regulated waste/ General waste.	Material transported off-site for recycling/recovery opportunities at various facilities depending on stream (timber, metals, etc.).	Contamination or deterioration of groundwater quality. Waste of recyclable materials through unnecessary disposal.	WA01 WA02
Waste streams primarily generated during operation (EfW Process Residues)					
Incinerator Bottom Ash (IBA) Note: IBA contains boiler ash from the radiant section of the boiler.	Thermal treatment residue ~180,400tpa (dry weight, before metals recovery) at 100% and ~198,500tpa (dry) at 110% capacity. During commissioning (hot)/operation.	Residues from industrial waste treatment or disposal operations – N205 (Category 1 Regulated waste).	Maturation and metals recovery on-site. IBA aggregate reuse both on and offsite (after treatment, pending EOW approval). As a contingency for off-specification IBAA, disposal at an appropriate facility (expected to be Category 1 or Category 2 Regulated waste after maturation and recovery of recyclable metals). Testing of waste materials may be applicable.	Disposal of valuable resources to landfill. Contamination of land and groundwater if not managed appropriately. Human health impact if not managed appropriately.	WA03 WA04 WA07 WA08
Air Pollution Control residues (APCr)	Thermal treatment residue ~34,200tpa (dry weight, before stabilisation) at 100% and ~37,620tpa	Residues from industrial waste treatment or disposal operations. – N205	On-site treatment to reduce leachability of contaminants through immobilisation of	Disposal of valuable resources to landfill. Contamination of land and groundwater if not managed	WA03 WA04

Waste Material	Expected generation, description and quantity	Waste type, code and classification (Schedule 9 and 11) *(Expected – if applicable)*	Management Pathway	Potential Impacts	Mitigation Measure ID
Note: APCr contains boiler ash from the convective section of the boiler and fly ash (captured in the baghouse).	(dry) at 110% capacity. During commissioning (hot)/operation.	(Category 1 Regulated waste). Fly ash – N150 (Category 1 Regulated waste).	wastes. Reclassify waste to Category 2 Regulated Waste. Disposal at appropriately licensed facility.	appropriately. Human health impact if not managed appropriately.	WA07 WA08
Oversized waste rejected from IBA	Oversized materials that are unsuitable to convey to the IBA treatment area during operation.	To be determined on a case-by-case basis.	Combustible waste may be returned to the waste bunker (after shredding), while oversized metal objects may be recycled as scrap metal, with recovered scrap metals. Waste that is unsuitable for reprocessing or recycling to be assessed on a case-by-case basis as per Schedule 9 of the Regulation.	Potential waste discharger/extraction system blockage resulting in reduced throughput or unplanned shutdown of a boiler. Loss of recyclable material through unnecessary disposal.	WA04
Waste streams primarily generated during operation (municipal-type waste)					
Recyclable streams arising from office, lunchrooms, visitor centre.	Routine generation in minor quantities during operation. ~15,300L/y organic waste ~3,800L/y comingled recycled ~98,400L/y paper & card (Volume estimates are conservative and will be revised during development of OWMP).	Not-regulated waste/ General waste. Including solid commercial food wastes, Glass, Metals, Cardboard and Plastics.	Materials source separated and transported off-site for recycling/recovery opportunities at various facilities depending on stream (organics, plastics, paper/card etc.).	Loss of recyclable material. Litter onsite increased. Odour/vermin impacts to human health and flora/fauna.	WA04 AQ05 AQ06
Residual waste arising from office, lunchrooms, visitor centre. Note: To contain only items which cannot be practicably source-separated for higher order recovery.	Routine generation in minor quantities during operation. ~86,900L/y Mixed industrial waste residues that are not suitable or practicable to source separate for recycling.	Not-regulated waste/ General waste. Including compounds containing glass, metals and plastics, contaminated cardboard, and textiles.	Energy recovery on-site.	Loss of recyclable material. Litter on-site increased. Odour/vermin impacts to human health and flora/fauna.	WA04 AQ05 AQ06

Waste Material	Expected generation, description and quantity	Waste type, code and classification (Schedule 9 and 11) *(Expected – if applicable)*	Management Pathway	Potential Impacts	Mitigation Measure ID
	(Volume estimates are conservative and will be revised during development of OWMP).				
Waste streams primarily generated during operation (commercial-type waste)					
Unacceptable waste feedstock (from commercial feedstock)	Waste received but unacceptable for processing during operation. Intermittent generation during operation, minor quantities.	To be determined on a case-by-case basis.	Waste that is unsuitable for processing or recycling to be assessed on a case-by-case basis as per Schedule 9 of the Regulation.	Loss of recyclable material. Odour/vermin impacts to human health and flora/fauna.	WA04
Pallets (from deliveries)	Routine generation in minor quantities during operation/construction.	Not-regulated waste/ General waste. Treated timber, other than sawdust or shavings.	Reused or returned to suppliers in most cases.	Loss of recyclable material.	WA04
Green waste	Moderate quantities generated during site clearing works (construction) and maintenance of landscaped areas during operation.	Not-regulated waste/ General waste. Commercial garden and landscaping organics that do not contain any physical or chemical contamination.	On-site or off-site reuse after appropriate processing as mulch or compost.	Loss of recyclable material. Litter on-site increased. Spread of weeds.	WA04
Packaging	Routine generation in minor quantities during operation/construction. Items likely to include plastic bags, boxes and plastic wrap (pallets).	Not-regulated waste/ General waste. Including plastics and cardboard.	Material transported off-site as discrete streams for recycling/recovery opportunities at various facilities depending on stream (plastics, cardboard etc.).	Loss of recyclable material.	WA04
Operator and operational consumables	Routine generation in minor quantities during operation/construction. (PPE, disposable plastic equipment, disposable/damaged glass equipment).	Not-regulated waste/ General waste. Including plastics and glass.	Off-site recycling or disposal at appropriately licensed facility. (Including BERC, if classified as Acceptable Waste by the BERC Waste Acceptance Protocol).	Loss of recyclable material.	WA04

Waste Material	Expected generation, description and quantity	Waste type, code and classification (Schedule 9 and 11) *(Expected – if applicable)*	Management Pathway	Potential Impacts	Mitigation Measure ID
Workshop and maintenance consumables (such as paints, oils, solvents, greases)	Routine generation in minor quantities during operation/construction. Various items are possible.	Waste from the manufacture, formulation or use of- • Inks, dyes, pigments, paints, lacquers or varnish – F100 (Category 2 Regulated Waste). • Organic solvents – G160 (Category 1 Regulated Waste) Oil and water mixtures or emulsions, or hydrocarbons and water mixtures or emulsions – J120 (Category 2 Regulated Waste).	Transported off-site for disposal at appropriately licensed facility.	Contamination of land and groundwater. Loss of recyclable material.	WA02 WA04
Empty paint, oil, chemical, solvent, grease containers	Routine generation in minor quantities during operation/construction.	To be determined on a case-by-case basis.	Transported off-site for disposal at appropriately licensed facility.	Contamination of land and groundwater. Loss of recyclable material.	WA02 WA04
Worn or broken baghouse filter bags	Routine though infrequent generation in minor quantities during operation.	Residues from industrial waste treatment or disposal operations. – N205 (Category 1 Regulated waste).	Disposal at appropriately licensed facility.	Contamination of land and groundwater. Loss of recyclable material.	WA02 WA04
Chemical clean-up/spill kits	No routine generation (contingency measure only).	To be determined dependent on waste chemicals spilled and waste classification.	Off-site disposal at appropriately licensed facility.	Contamination of land and groundwater.	WA02 WA04
Waste activated carbon from secondary odour control	No routine generation (contingency measure only).	Residues from industrial waste treatment or disposal operations. – N205	Off-site disposal at appropriately licensed facility.	Contamination of land and groundwater.	WA02 WA04

Waste Material	Expected generation, description and quantity	Waste type, code and classification (Schedule 9 and 11) *(Expected – if applicable)*	Management Pathway	Potential Impacts	Mitigation Measure ID
	Classification to be confirmed (separate from baghouse system).	(Category 1 Regulated waste).			
Laboratory testing chemicals	Routine generation in minor quantities during operation.	To be determined on a case-by-case basis.	Off-site disposal at appropriately licensed facility.	Contamination of land and groundwater.	WA02 WA04
Stormwater interceptor and Gross Pollutant Trap (GPT) wastes	Routine generation in minor quantities during operation. GPTs installed in stormwater network. Oil/water separators installed in stormwater network in sensitive areas.	Oil and water mixtures or emulsions, or hydrocarbons and water mixtures or emulsions – J120 (Category 2 Regulated Waste).	Transported off-site for disposal at appropriately licensed facility.	Contamination of land and groundwater.	WA02 WA04
Replacement equipment (process)	Infrequent generation arising from maintenance works.	Not-regulated waste/ General Waste. Including Metals and/or plastics.	Recycling (various opportunities at appropriately licensed facility).	Loss of recyclable material.	WA04
Replacement equipment (electronic)	Infrequent generation arising from maintenance works.	Not-regulated waste/ General Waste. Including E-Waste.	Recycling	Loss of recyclable material.	WA04

5.2 Liquid waste management

Liquid wastes which will be generated during the construction, commissioning and operational phases will require separate handling and containment to the solid waste. Table 7 identifies potential liquid waste streams that may arise during the Project phases.

Table 7: Expected Liquid Waste generation and management

Liquid waste	Expected generation and description	Management pathway	Potential impacts	Mitigation Measure ID
Liquid effluent from construction amenities	Routine generation in minor quantities during construction.	Collected in portable toilets onsite and transported off-site for disposal at appropriately licensed facility.	Contamination or deterioration of groundwater quality.	WA01 WA02 WA05
Wash-water from concrete wash-out plant (if required)	Routine generation in minor quantities during construction.	Collected on-site and transported off-site for disposal at appropriately licensed facility.	Contamination or deterioration of groundwater quality.	WA01 WA02 WA05
Boiler and pressure piping hydrostatic pressure test water	Likely once off for each boiler and associated pressure piping as part of hydrotest procedure during commissioning/ construction.	Wastewater transported off-site for treatment and reuse as appropriate.	Contamination or deterioration of groundwater quality.	WA02 WA05 WA07 WA08
Firewater run-off	No routine generation (emergency measure only). During construction, commissioning and/or operation.	Firewater to be retained on-site to prevent off-site contamination of waterways and groundwater. Testing may be required to determine reuse opportunities, treatment required or lawful place of disposal.	Contamination of land and groundwater.	WA02 WA04
Lubricating oil flush for hydraulic units (e.g., steam turbine and grate hydraulics)	Infrequent generation arising from commissioning and maintenance works.	Transported off-site for disposal at appropriately licensed facility.	Contamination of land and groundwater.	WA02 WA04
Boiler initial chemical clean and excess boiler drain down wastewater	Infrequent generation arising from commissioning and maintenance works.	Collected on-site and transported off-site for disposal at appropriately licensed facility. Test boiler drain down water quality (demineralised water quality) to confirm suitability for reuse or disposal.	Contamination of land and groundwater.	WA02 WA04
Liquid effluent from site amenities	Routine generation in minor quantities during operation. ~2,000L/day (Nominal daily rate) ~4,032L/day (nominal peak daily rate for design purposes).	Collected in on-site septic tank. Greywater will be managed separately to sewage wastewater and may be reused within the process as recycled water e.g., for make-up to the IBA discharger. Potential reuse of greywater for on-site landscape irrigation requires further site investigation.	Contamination of land and groundwater.	WA02 WA04 WA05
Run-off from IBA / IBAA storage area.	Infrequent generation arising during commissioning and/or operation.	Contained within a dedicated lined retention pond.	Contamination of land and groundwater.	WA07

6. Proposed mitigation measures

This Chapter and Table 8 outline the proposed mitigation and management measures that have been developed to mitigate the potential resource and waste management impacts of the project during construction, commissioning and operation.

Table 8: Mitigation measures for resource and waste management

ID	Mitigation measure	Description	Timing
WA01	Construction Waste Management Plan	A Construction Waste Management Plan will be produced, to include: • Provisions for segregation and separate collection of recoverable materials, including green waste • Waste to be managed in line with the waste hierarchy • Measures for the containment of waste during storage and transport, such as covering, fencing, bunding • Classification of wastes in accordance with the EP Regulation 2021 and requirement that all wastes will be delivered to an appropriately licensed facility for recovery or disposal. Transport documentation to be provided as required.	Construction
WA02	Hazardous Materials Management Plan	All waste will be appropriately contained at all times onsite. A Hazardous Materials Management Plan will be prepared to outline appropriate control measures.	Construction
WA03	Metal recovery process	Processing procedures developed for metals recovery from IBA.	Commissioning/ Operation
WA04	Operational Waste Management Plan	Waste will be managed in line with the waste hierarchy. An Operational Waste Management Plan will be developed and will include: • Provision for source separation systems for recyclable materials, including food waste, paper and card and comingled recyclables • Provision for storage and collection of waste • Requirement that all wastes will be delivered to an appropriately licensed facility for recovery or disposal, with transport documentation to be provided as required • No operational waste, other than residual waste from the Administration building and Visitor Centre and other non-process related residual waste bins, will be disposed directly to the tipping hall for energy recovery • Ventilation and vermin proofing.	Operation
WA05	Septic waste management	Septic waste to be managed in purpose-built portable toilets during construction or septic tanks during operation, serviced by an appropriately licensed contractor/provider.	Construction
WA06	Soil remediation	Soil removed during earthworks to be assessed and remediated as necessary (noting site investigations identified some risk of contamination). Noxious weeds are identified through the ecology assessment, a Weed Management Plan will be developed, outlining appropriate control and disposal options.	Construction
WA07	Design of facility allows for safe handling of thermal treatment residue	**IBA:** Conveyor to be enclosed to contain IBA and dust. Handling and storage of IBA are undertaken within under cover buildings where spillage can be contained. Dust is controlled by spraying water on the IBA storage piles. Run-off water collected from the IBA and IBAA stockpiles will be contained within a dedicated lined retention pond for recovery and reuse for dust suppression and moisture management.	Commissioning/ Operation

ID	Mitigation measure	Description	Timing
		APCr: APCr curing is to occur in an enclosed space within waterproof 'big-bags' which will be closed before transport. 'Big-bags' will limit dust evolution and spillage in the event that a bag is dropped and splits either before or after full curing of the cement stabilised APCr within the bag. Storage area provided is significantly larger than calculations indicate will be required.	
WA08	Thermal treatment residue monitoring and testing	Ongoing monitoring of IBA generation and storage. IBAA composition and leachability to be tested in accordance with EOW Code requirements (Contingency of off-specification IBAA or IBA during commissioning period only: Queensland Regulated Waste classification protocols). Ongoing monitoring of APCr generation and storage. APCr composition and leachability to be tested in accordance with Queensland Regulated Waste classification protocols.	Commissioning/ Operation
AQ05	Operating Licence- air quality conditions.	An operating license will be issued for facility compliance requirements.	Operation
AQ06	Operational Environmental Management Plan – air quality and GHG measures.	An OEMP will be prepared. Air quality modelling will be used to understand operating scenarios including management of residual streams. The OEMP should also manage vehicle impacts and may include the following measures: • Addressing engine idling • Operating and maintaining equipment correctly • Use of biodiesel where practicable • Vehicles used for material transport (trucks/trailers), should be covered to prevent dust escape.	Operation

7. Conclusions

This report has identified the relevant waste streams generated during construction and operation of the Project. Waste streams have been classified according to Queensland regulations and guidelines where possible, including the expected classification and management pathway for IBAA and APCr. The classification of these residues will be confirmed during the commissioning phase of the facility via chemical testing.

The assessment has considered potential risks associated if waste is managed inappropriately for the BERC including to the environment, human health and in alignment with the waste hierarchy. Mitigation measures have been identified to reduce associated risks and will be considered further as the design develops.

The largest waste stream arising from the construction phase of the Project will be spoil from the excavation of the facility. Initial ground investigations did not identify contamination. Additional ground investigation will be undertake at the next design stage to assess suitability for reuse or requirement for treatment or disposal. Non-contaminated spoil from site excavations is expected to be suitable for reuse in construction.

A significant portion of waste generated from operation of the BERC will be residues from the thermal treatment of residual MSW and C&I waste. These have been indicatively classified, and appropriate management pathways have been considered. Other waste streams, including waste arising from commissioning, operation, maintenance and general administrative activities, have been indicatively classified so that it is clear what waste duties apply.

Obtaining an EOW Code for IBAA will be critical to the development and financing of any EfW facility in Queensland and potential IBAA offtake customers and their product quality requirements must be identified. It is understood that an EOW application for IBAA reuse is being progressed by others, with an outcome expected in 2026.

Some aspects of the design related to waste management will be reviewed and refined during the detailed design and commissioning phases, which will need to review the latest guidance and undertake further risk assessments, including safety in design and environmental risk assessments, to appropriately mitigate potential impacts. During the detailed design stage, further plans will need to be developed relating to waste management, including:

- Construction Waste Management Plan
- Operational Waste Management Plan
- Commissioning Plan.

Management of all wastes will be in accordance with the *Environmental Protection Act 1994* and the Environmental Protection Regulation 2019.

8. References

- DES, Energy from Waste Policy Queensland, 2021
- DES, Energy from Waste Guideline, 2021
- DES, Waste Management and Resource Recovery Strategy, 2019
- DES, End of Waste – Waste Reduction and Recycling Act 2011 Guideline, Version 3.00, 2023
- DETSI, Guideline Application requirements for activities with waste impacts, Version 5.05, 2025,
- Queensland Government, Regulated waste classification, 2021 Source: https://www.business.qld.gov.au/running-business/environment/waste-management/regulated-waste/classification
- DETSI, Overview of regulated waste categorisation, Version 4.00, 2025
- DES, EOW Guideline, 2023
- Queensland Government, Levy rates, 2025 Source: https://www.qld.gov.au/environment/management/waste/recovery/disposal-levy/about/levy-rates
- DETSI, Waste Tracking Guideline, Version 3.01, 2023. Source: https://www.detsi.qld.gov.au/policies?a=272936:policy_registry/wt-gl-managing-waste-tracking-qld.pdf
- Directive 2010/75/EU on industrial emissions (IED).
- European Union Best Available Techniques Reference Documents for Waste Incineration (2019) (BREF-WI)
- European Union Best Available Techniques Reference Documents for Waste Treatment (2018) (BREF-WT)
- WMRR Submission for proposed end of waste code – incinerator bottom ash (IBA) 15 February 2021, by Gayle Sloan (CEO) to the Department of Environment and Science
- https://www.wmrr.asn.au/Web/Web/Our_Services/Advocacy_and_Industry_Resource_Pages/Submissions/QLD_Submissions.aspx (see 2021 Queensland Submission listing)