ARUP

Cleanaway Operations Pty Ltd

Bromelton Energy and Resource Centre

Hazards and Risk Assessment

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

Rev D | 2 July 2026

Job number 293683-00

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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.

Document Verification

Project title	Bromelton Energy and Resource Centre
Document title	Hazards and Risk Assessment
Job number	293683-00
Document ref	BERC-ARU-BNE-ENRI-RPT-0001
File reference	

Revision	Date	Filename	BERC-ARU-BNE-ENRI-RPT-0001		
A	8 August 2025	**Description**	Issue for Cleanaway Review		
			Prepared by	**Checked by**	**Approved by**
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B	11 November 2025	**Filename**	BERC-ARU-BNE-ENRI-RPT-0001_B		
		Description	Issue of Adequacy Review		
			Prepared by	**Checked by**	**Approved by**
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		Signature		RPEQ 32157	
C	22 January 2026	**Filename**	BERC-ARU-BNE-ENRI-RPT-0001_C		
		Description	Issue for Approval		
			Prepared by	**Checked by**	**Approved by**
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D	2 July 2026	**Filename**	BERC-ARU-BNE-ENRI-RPT-0001_D		
		Description	Issue for Approval		
			Prepared by	**Checked by**	**Approved by**
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Issue Document Verification with Document ✓

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Executive Summary

The purpose of this report is to identify and mitigate the risks associated with hazardous chemicals and industrial hazards for the construction and operation of the Bromelton Energy and Resource Centre (BERC or the Project), a proposed Energy from Waste (EfW) facility located in Bromelton, Queensland.

The Project is designed to thermally treat 760,000 tonnes per annum (tpa) of waste feedstock that would otherwise be sent to landfill. The waste feedstock primarily consists of residual municipal solid waste and residual commercial and industrial waste. The Project incorporates maturation and processing of incinerator bottom ash (IBA) to recover recyclable metals and to utilise the remaining ash as an aggregate in construction.

This report reviews the following legislation in relation to hazardous chemicals and industrial hazards for both the construction and operational phases of the Project:

- Work Health and Safety (WHS) Regulations 2011
- State Code 21: Hazardous Chemical Facilities
- *Environmental Protection (EP) Act 1994*
- Environmental Protection Regulation 2019.

As the project is located near a rail corridor a separate Rail Sepcific Risk Assessment (Appendix B) has been prepared, based on the requirements of *Guide to Development in a Transport Environment: Rail* (Department of Transport and Main Roads (TMR), Queensland). This assessment considers the risks associated with hazardous chemicals being stored and handled in the facility near a rail corridor.

The following are the key regulatory requirements for BERC:

- Under Chapter 7 Division 2 of the WHS Regulations, the operator of the facility must ensure that a hazardous chemical used, stored and handled at a workplace is correctly labelled and obtain safety datasheets of hazardous chemical before commencing the operations.
- Under Chapter 7 Division 3 of the WHS Regulations, the operator must also ensure that a register of hazardous chemical used, handled or stored is prepared and kept at the workplace. Under the same division of the WHS Regulations, the operator must prepare a manifest of Schedule 11 hazardous chemicals. Under Chapter 7 Division 4 of WHS regulations, the operator must also display warning placards scheduled 11 hazardous chemicals. See section 3.2.1.1 of this report for details. These requirements need to be met before commencing of the operations.
- As diesel and ammonia (if used) exceed the threshold quantity of Schedule 3 of the EP Act, the operator shall notify the Department of Environment, Tourism, Science and Innovation (DETSI) of these ‘notifiable activities’.
- Prior to commencing operations an emergency plan shall be developed in accordance with Regulation 361 of the WHS Regulations before commencing operations. This shall include appropriate evacuation procedures, a medical treatment and assistance plan and an effective communication plan between the person coordinating an emergency response and all persons in the workplace. The operator shall also provide the emergency plan to Queensland Fire and Emergency Services (QFES) for review. The plan shall be updated to align with QFES’s recommendations before the facility operation begins.
- The operator shall provide placards in compliance with the Schedule 13 ‘Placard Requirements’ of the WHS Regulations, where the expected storage capacity is greater than the placard quantity. Similarly, a manifest shall be produced by the operator for all hazardous chemicals where the expected storage quantity exceeds the manifest threshold. The manifest shall meet all obligations under Schedule 12 ‘Manifest Requirements’.
- The Emergency Response Plan for the site shall be produced prior to occupancy, and shall include the following items:

- The emergency contact details for the railway manager (ARTC).
- An escalation process by which the railway manager is immediately notified of any incident, so that rail operations can be appropriately managed.
- An emergency response procedure for the railway corridor to be applied during incidents/emergencies. This procedure shall be agreed with the railway manager.

Abbreviations and Glossary

Abbreviation	Definition
APCr	Air Pollution Control Residue
ADGC	Australian Code for the Transport of Dangerous Goods by Road & Rail
BAT	Best Available Techniques
BERC	Bromelton Energy and Resource Centre
BREF	Best Available Techniques Reference Document
C&I	Commercial and Industrial
CEMS	Continuous Emissions Monitoring System
DETSI	Department of Environment, Tourism, Science and Innovation
DG	Dangerous Goods
EfW	Energy from Waste
EP Act	*Environment Protection Act 1994* (Qld)
EP Regulation	Environmental Protection Regulation 2019
ERA	Environmentally Relevant Activity
FEED	Front End Engineering Design
HAZID	Hazard Identification
HCF	Hazardous Chemical Facilities
IBA	Incinerator Bottom Ash
IBAA	Incinerator Bottom Ash Aggregate
kg	Kilogram
LPG	Liquefied Petroleum Gas
m	Metres
m^2	Meters Squared
m^3	Meters Cubed
mg	Milligrams
MHF	Major Hazard Facility
MJ	Mega Joules
MSW	Municipal Solid Waste
MW	Megawatt
MWh	Megawatt hours
QFES	Queensland Fire and Emergency Services

Abbreviation	Definition
SFAIRP	So Far As Is Reasonably Practicable
SDA	State Development Area
SDS	Safety Data Sheet
SDAP	State Development Assessment Provisions
SNCR	Selective Non-Catalytic Reduction
t	Tonnes
TEEP	Technically, environmentally, and economically practical
tpa	Tonnes Per Annum
WHS	Work Health and Safety
w/w	Weight by weight

1. Introduction

1.1 Purpose

The purpose of this report is to identify risks relating to hazardous chemicals and industrial hazards for the construction and operation of the Bromelton Energy and Resource Centre (BERC), a proposed Energy from Waste (EfW) facility located in Bromelton, Queensland.

1.1.1 Report structure

This report is structured as follows:

- Section 1 – provides an overview of the Project.
- Section 2 – addresses the regulatory framework. This section outlines the requirements for the management of hazardous chemicals and industrial hazards with respect to the:
  - Work Health and Safety (WHS) Regulations 2011
  - State Code 21: Hazardous Chemical Facilities
  - *Environmental Protection (EP) Act 1994*
  - Environmental Protection Regulation 2019.
- Section 3 – outlines regulatory outcomes and the identified risks from hazardous chemicals and industrial hazards to the facility, during the construction and operational phase. Operational risks were identified during a HAZID (hazard identification) workshop with the engineering design team and process design specialists.
- Section 4 – this section identifies the residual risks and mitigation and management measures to be considered. It also provides conclusions and required next steps in relation to the relevant legislation.
- Appendix A Hazard Identification Register
- Appendix B Rail Specific Risk Assessment

1.2 Project description

1.2.1 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.

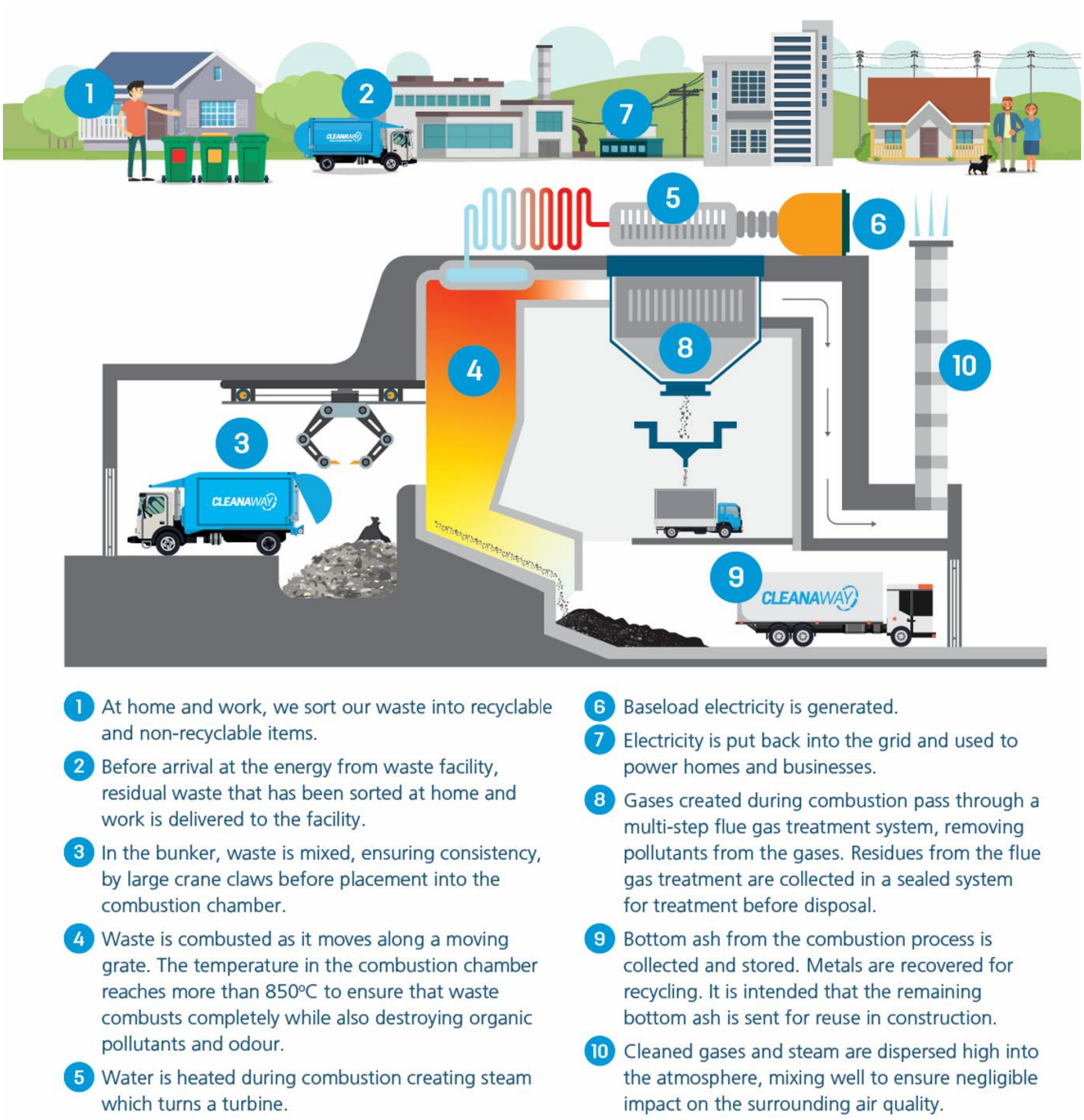

Figure 1: Energy from Waste process

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 (SEQ).

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) • 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

Project component	Detail
	• 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 50 to 60 staff

Figure 2: Site location

2. Regulatory Context

This section sets out the relevant legislation, policy and guidelines applicable to Queensland, for hazardous chemicals and industrial hazards in relation to the Project.

2.1 Work Health and Safety (WHS) Legislation

2.1.1 Work Health and Safety (WHS) Regulations 2011

2.1.1.1 Chapter 7.1: Hazardous Chemicals

Chapter 7 Part 1 of the WHS Regulations applies to the use, handling and storage of hazardous chemicals on-site, including the relevant placard and manifest quantities of hazardous chemicals and the requirements that apply when these quantities are exceeded. Chapter 7 Part 1 also includes duties of the operator to maintain hazardous chemical register and obtain safety datasheets (SDS).

2.1.1.2 Schedule 11: Placard and Manifest Quantities

Schedule 11 of the WHS Regulations outlines the placard and manifest quantities for hazardous chemicals. Hazardous chemicals stored on-site that exceed the Schedule 11 thresholds, are subject to additional placard and manifest requirements.

2.1.1.3 Manifest Regulation Summary

If the manifest quantities in Schedule 11, 'placard and manifest quantities', are exceeded, it is required that a manifest of Schedule 11 hazardous chemicals is prepared by the operator, and that the regulator is given written notice of these manifest quantities. The manifest shall comply with Schedule 12, 'manifest requirements', which shall include the following key information:

- Name of the chemical
- Quantity of chemical stored.

For containers storing the hazardous chemical, the manifest of hazardous chemicals shall include:

- The identification number or code of the container
- The type and capacity of the container.
  - For a fixed vertical tank used to store fire risk hazardous chemicals – the diameter of the tank.

Further, the manifest shall be supplied by the operator to the Queensland Fire and Emergency Services (QFES), and it shall be kept in a place determined in agreement with the QFES.

2.1.1.4 Regulation 361: Emergency Plans

Where hazardous chemicals exceed the manifest quantities in Schedule 11 of WHS regulations, a written emergency plan shall be developed by the operator in accordance with Regulation 361 and shall also be provided to the QFES. The emergency plan shall be developed including the following:

"(a) emergency procedures including;

(i) an effective response to an emergency; and

(ii) evacuation procedures; and

(iii) notifying emergency service organisations at the earliest opportunity; and

(iv) medical treatment and assistance; and

(v) effective communication between the person authorised by the person conducting the business or undertaking to coordinate the emergency response and all persons at the workplace;

(b) testing of the emergency procedures, including the frequency of testing;

(c) information, training and instruction to relevant workers in relation to implementing the emergency procedures."

Additionally, should QFES provide any revisions or recommendations related to the content or the effectiveness of the supplied emergency plan, the emergency plan shall be updated to be aligned with the recommendations.

2.1.1.5 Placard Requirements

In accordance with Schedule 13, 'placard requirements', for all hazardous chemicals that exceed the placard quantity, appropriate placards (in accordance with the WHS Regulations) shall be located as close as reasonably practicable to the main entrance of the facility and in each room or walled section of the facility in which the hazardous chemical is used, handled or stored. If the chemicals are contained in outside storage areas, placards shall be located next to the container or outside storage area.

2.2 Hazardous Chemicals and Environmental Protection Legislations

2.2.1 Bromelton SDA Development Scheme

The Project is located within the Bromelton SDA. SDAs are areas declared under the State Development and Public Works Organisation Act to promote economic development. The Bromelton SDA Development Scheme 2017 (SDA Development Scheme) establishes a regulatory framework for the assessment of development which is regulated under the Development scheme. The project is within the Special Industry Precinct (SIP). The SIP provides an area for high-impact and difficult-to-locate industries that require separation from non-industrial uses due to the potential for off-site impacts.

The SDA wide assessment criteria that are relevant to this report include:

"(3) Development maintains the safety of noxious and hazardous materials and chemicals manufactured or stored in bulk during flood events."

Considerations of 'Natural Hazards' required by the SDA scheme are not addressed in this report. The reports Bushfire attack level assessment, air quality assessment and flood risk assessment address the natural hazards outlined in the SDA scheme.

The design presented within the Development Approval have taken into consideration the findings of this report as well as those mentioned above to minimise the impacts of 'Natural Hazards' on the operation of the BERC.

2.2.2 State Code 21: Hazardous Chemical Facilities

The State Development Assessment Provisions (SDAP) provide assessment benchmarks for the assessment of development applications involving the State Assessment and Referral Agency (SARA). State Code 21: Hazardous Chemical Facilities (HCF) defines HCFs as those where identified hazardous chemicals are present or likely to be present in quantities greater than 10% of the threshold for a major hazard facility (MHF) as listed in Schedule 15 of WHS Regulations 2011.

The purpose of State Code 21 is that the *"development is designed and sited, so far as is reasonably practicable (SFAIRP), to ensure:*

1. *Human health and safety and the built environment are protected from off-site risks resulting from physical or chemical hazards; and*
2. *Hazardous chemical facilities are protected from:*
   a. *Offsite hazard scenarios at existing hazardous chemical facilities.*

   b. *Natural hazards."*

2.2.3 *Environmental Protection Act 1994* and Environmental Protection Regulation 2019

2.2.3.1 Environmental Protection Act

The objective of the *Environmental Protection Act 1994* (*EP Act*) is to "*protect Queensland's environment while also allowing for developments that improves the total quality of life, both now and in the future, in a way that maintains the ecologically processes on which life depends (ecological sustainable development)".* The *EP Act* lists the obligations to prevent or minimise environmental harm, nuisances and contamination. The two duties that apply are:

- **General Environmental Duty (GED)** – the duty to not carry out activities that may cause harm without taking measures to prevent or minimise the harm caused
- **Duty to notify of environmental harm** – to inform the relevant authority and landowners when environmental harm has occurred or might occur.

The EP Act provides a framework for operators undertaking activities to meet its GED and provides requirements around 'notifiable activities' in accordance with Schedule 3, whereby these activities may result in environmental harm.

Schedule 320A of the EP Act requires landowners, occupiers, auditors or local government authorities to give notice to the Department of Environment, Tourism, Science and Innovation (DETSI), where land is being used for 'notifiable activities'.

The activities outlined in Schedule 3, 'notifiable activities', that are relevant to the Project are:

- "*7: Chemical storage (other than petroleum products or oil under item 29)—storing more than 10t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.*
- "*29: Petroleum product or oil storage—storing petroleum products or oil—*
    - *a. in underground tanks with more than 200L capacity; or*
    - *b. in above ground tanks with—*
        - *i. for petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code—more than 2,500L capacity; or*
        - *ii. for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code—more than 5,000L capacity; or*
        - *iii. for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS 1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia—more than 25,000L capacity.*"

2.2.3.2 Environmental Protection Regulation

Schedule 2 of the Environmental Protection Regulation 2019 (EP Regulation) lists out Environmentally Relevant Activities (ERAs) that are generally industrial or intensive animal industries with the potential to release emissions that may have an impact on the environment or surrounding land uses.

ERA 8 (Chemical Storage) regulates the storage of chemicals that are used as feedstocks in industrial or manufacturing processes. It generally applies only to the storage of virgin chemical materials and does not extend to waste products that are generated as part of an existing ERA activity.

In this case, the facility does not involve the external receipt, storage, or treatment of chemicals as standalone feedstocks. Instead, any chemical storage occurring onsite is directly associated with the conduct of ERA 61 (Thermal waste processing and treatment), ERA 14 (electricity generation) and ERA 54 (Mechanical waste reprocessing). As per the *Environmental Protection Regulation 2019*, waste generated onsite as a result of an ERA is regulated under the conditions of that primary ERA and does not separately trigger ERA 8.

3. Assessment of Regulatory Requirements

This section outlines the key impacts of relevant regulatory requirements for the BERC, with regard to hazardous chemicals and industrial hazards for both the construction and operational phases of the Project.

3.1 Expected Quantities

Table 2 shows the expected quantities of hazardous chemicals, defined by the global harmonised system as required by the WHS Regulations, stored on-site.

Based on the current design it is likely that 40% w/w urea solution will be used as opposed to ammonia (ammonium hydroxide or 25% aqueous ammonia solution). Ammonia is classified as a Class 8 dangerous good under the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADGC), where urea is not. All options have been included in this report for completeness.

Table 2: Expected quantities and classifications of hazardous chemicals

Hazardous Chemicals	Use On-Site / By-Product	UN Number[1]	Class	Packing Group[2]	Quantity Held On-Site
Hydraulic oil	The use of mechanical equipment such as the grate, cranes and turbines in the facility requires the use of hydraulic and lubrication oil.	TBC	3	III	2t
Lubrication oil		TBC	3	III	2t
Activated carbon	Activated carbon is added to the flue gas to remove absorbing dioxins, furans, gaseous mercury and other impurities that may be present in the flue gas.	1362	4.2	III	$50m^3$
25% aqueous ammonia Solution (if used)	Used in the Selective Non-Catalytic Reduction (SNCR) process where ammonia is injected into the boiler to reduce nitrogen oxide emissions in the combustion process	1005	8	N/A	<120t
Propane/acetylene	Propane and/or Acetylene are used as fuels for welding as required during maintenance operations	1978/3374	2.1	N/A	<100kg
Sodium hydroxide	Used to adjust pH of process water	1823	8	II	1400kg
Hydrochloric acid	Used in water treatment regeneration.	1789	8	II	1400kg
APCr[3]	APCr is collected as a solid residue from the flue gas treatment system, then stabilised in concrete for transport.	-[4]	-	-	350t[5]
Stabilised APCr (curing)					4,600t
Stabilised APCr (cured)					4,600t
Diesel	BERC uses diesel as the start-up fuel to ensure temperatures are high enough for safe and efficient waste combustion. Once the temperature can be sustained by the waste, diesel is no longer required. While diesel is not classified as a dangerous good, it can add to the fuel load in the event of a fire and shall be considered when assessing the site.	1202	-[6]	N/A	360kL

A UN number is a four-digit number that identifies hazardous chemicals, in order to classify and track chemicals in international trade.

[2] Packing groups are a number (I, II or III) assigned to specific dangerous goods: I being a substance presenting high danger to III being a substance presenting low danger.

[3] APCr is not transported as treatment will occur at the site. Once treated and stabilised on-site APCr will be transported in solidified form off-site

[4] APCr does not have a specific UN Number or dangerous goods classification. Based on Safe Work Australia's guidance for mixture classification and the BREF, APCr does not meet the definition of toxic under the ADGC or the Queensland Work Health and Safety Regulation 2011.

[5] This quantity refers to the maximum amount of raw pre-treated APCr stored on-site prior to treatment.

[6] Diesel is a combustible liquid, but is not classified as a dangerous good under the ADGC.

3.2 Regulatory Outcomes

3.2.1 WHS Regulations

3.2.1.1 Schedule 11: Placard and Manifest Quantities

Table 3 below outlines the relevant hazardous chemicals stored on-site from Table 2 and the associated placard and manifest thresholds.

Table 3: Relevant hazardous chemicals and their placard/manifest thresholds

Hazardous Chemicals	Hazardous Chemical Classification	Quantity Held On-Site	Placard Quantity Threshold	Placard Quantity Exceeded?	Manifest Quantity	Exceeded Manifest Quantity?
Hydraulic oil	Category 4 Flammable liquid	2t	10,000L	No	100,000L	No
Lubrication oil	Category 4 Flammable liquid	2t	10,000L	No	100,000L	No
Activated carbon	-	50m^3	-	-	-	-
25% aqueous ammonia solution (if used)	Category 1C Skin corrosion	176,000L	50L	Yes	500L	Yes
Propane/acetylene	Category 1 Flammable Gas	<100kg	200L	No	5,000L	No
Sodium hydroxide	Category 1B Skin Corrosion	1400kg	250L or kg	Yes	2,500L or kg	No
Hydrochloric acid	Category 1B Skin Corrosion	1400kg	250L or kg	Yes	2,500L or kg	No
Diesel	Category 4 Flammable Liquid	360,000L	1,000L	Yes	100,000L	Yes

For hazardous chemicals exceeding placard quantities, appropriate placards in accordance with the WHS Regulations, shall be located as close as reasonably practicable to the main entrance of facility and in each room or walled section of the facility in which the hazardous chemical are used, handled, or stored. If the hazardous chemicals are contained in outside storage areas, placards shall be located next to the container or outside storage area.

For hazardous chemicals exceeding manifest quantities, a manifest shall be prepared by the operator in accordance with Schedule 12 of the WHS Regulations. Additionally, a written emergency plan shall be developed and provided to QFES by the operator for review in accordance with Regulation 361 of the WHS Regulations.

3.2.2 State Code 21

Table 2 shows the hazardous chemical division/packing group classifications per the global harmonised system as required by the WHS Regulations. Most of the chemicals listed in Table 2 are not listed in Table 15.1 of the WHS Regulations, so are not considered with respect to State Code 21. Table 3 shows the hazardous materials stored at the site with their hazardous material classifications, placard quantities and manifest quantities. Table 4 shows the hazardous chemicals listed in Table 15.1 of the WHS Regulations with their MHF and HCF thresholds.

Table 4: Hazardous chemicals stored on-site as outlined in Table 15.1 of the WHS Regulations

Hazardous Chemicals	Quantity Held On-Site	MHF Quantity Threshold	HCF Quantity Threshold (10% MHF)	Exceeded HCF Quantity?
Acetylene	<100kg	50t	5t	No
Hydrochloric Acid	1400kg	250t	25t	No

Only ammonia solutions with more than 50% ammonia are categorised under Schedule 15 of the WHS Regs, so the proposed 25% solution is not assessed under State Code 21.

3.2.3 EP Act 1994 and EP Regulation 2019

To address the requirement for minimising the environmental impact of any hazardous chemicals stored on-site, a HAZID assessment was undertaken to identify key risks and propose relevant controls and mitigation measures.

3.2.3.1 EP Act

Based on Table 3, the following hazardous chemicals exceed the quantity thresholds in Schedule 3 of the EP Act:

- Diesel storage exceeds the threshold of 25,000L under notifiable activity of ‘petroleum product or oil storage’.

The storage of above hazardous chemicals is classified as a ‘notifiable activity’; therefore, the DETSI shall be notified by the operator under the EP Act.

3.2.3.2 EP Regulation

No hazardous chemical activities are identified as Environmentally Relevant Activities (ERA) under Schedule 2 of the EP Regulations.

3.3 Hazard Identification (HAZID)

The Project held a hazard identification (HAZID) workshop to identify hazards and risks in relation to the storage of hazardous chemicals and industrial hazards. The workshop included the multi-disciplinary design team from Arup, Ramboll, Therefor Group and Cleanaway. The HAZID process involved a comprehensive review of the EfW process, analysing key process steps, their corresponding risks and their potential causes and consequences. Where risks were identified, the design team proposed reasonably practicable mitigation measures to remove or reduce the risks to acceptable levels. The HAZID register is attached in Appendix A.

59 credible hazard scenarios were identified. Of those, nine are assessed as having a medium residual on-site risk, and 50 as having a low residual on-site risk. Only six of those hazard scenarios are assessed as having a credible off-site consequence; five are assessed as having a low residual off-site risk and one (traffic collision) has a medium residual off-site risk.

4. Consultation Outcomes

Following the submission of the Planning Application, comments related to this report were received from TMR and Seqwater.

4.1 TMR Comments

The themes of the comments and the agreed outcomes of the consultation meeting on 26 May 2026 are summarised in this section.

4.1.1 Development in a Railway Environment

Further clarification was requested regarding the potential for the Project to impact on the nearby rail corridor. Following discussion, it was noted that the Rail Specific Risk Assessment in Appendix B of this report addressed the matter.

4.1.2 Quantities of Dangerous Goods

Clarification was sought regarding the quantities of dangerous goods on site, with particular reference to Table 5.2 of the Model Planning Scheme Code for Hazardous Industries and Chemicals. The quantities of dangerous goods were detailed in previous versions of this report with reference to Work Health and Safety legislation and State Code 21. The following Table 5 compares the quantities of each dangerous good to be stored on site against the Table 5.2 thresholds.

The only exceedance of a Table 5.2 threshold is activated carbon. The hazards associated with dangerous goods storage are assessed in this report (including its appendices). The offsite risk is negligible, consistent with the intent of the Model Code.

Table 5: Dangerous goods screening against Table 5.2 of the Model Planning Scheme Code for Hazardous Industries and Chemicals

Hazardous Chemicals	DG Class	Packing Group	Storage Type (Table 5.2)	Quantity Held On-Site	Table 5.2 Quantity Threshold	Table 5.2 Quantity Exceeded?
Hydraulic oil	3	III	Located within or attached to a building	2t	10,000L	No
Lubrication oil	3	III	Located within or attached to a building	2t	10,000L	No
Activated carbon	4.2	III	Any other aboveground storage or handling	50m^3 (12,500 – 32,500 kg)	10,000kg	Yes
25% aqueous ammonia solution (if used)	8	III	Any other aboveground storage or handling	176,000L	200,000L	No
Propane/acetylene	2.1	n/a	Any other aboveground storage or handling	<100kg	5000L	No
Sodium hydroxide	8	II	Any other aboveground storage or handling	1400kg	200,000kg	No
Hydrochloric acid	8	II	Any other aboveground storage or handling	1400kg	200,000kg	No
Diesel	Combustible liquid		Any other aboveground storage or handling	360,000L	500,000L	Yes

4.1.3 Mitigation of Hazard Scenarios

Further clarification of how the Project will mitigate the potential for dangerous goods storage on site to impact on off-site receptors, particularly the rail corridor. The Rail Specific Risk Assessment identified separation distances and other design features as control measures for these potential hazard scenarios, resulting in the scenarios being assessed either as low risk or not credible.

The layout drawing in Appendix C was presented during the consultation meeting to demonstrate the adequacy of the separation distances.

4.1.4 Consequence Modelling and Contour Mapping

Contour mapping was requested to present consequence modelling results. During the consultation meeting, it was explained that no credible scenario was identified associated with flammable and combustible materials that would warrant consequence modelling, so it had not been included in the previous versions of this report nor the Rail Specific Risk Assessment.

Specifically, the quantities of propane/acetylene are negligible, equivalent to a small number of barbecue gas bottles, so no off-site consequence is credible. Further, the hydraulic oil and lubrication oil are not flammable liquids (rather, they are combustible) and are stored in relatively low quantities indoors. No off-site consequence is credible. Diesel is also not flammable. During the consultation meeting, failure rate data was presented, indicating that the likelihood of a diesel pool fire following a catastrophic failure of the tank is in the order of 2×10^{-10} per year. The expected frequency[1] of a catastrophic failure of a single skin tank of less than $450m^3$ capacity is 1.6×10^{-5}. The expected frequency[2] of ignition of a diesel pool is 1.3×10^{-5}. Regardless, this pool fire scenario was modelled and presented in the consultation meeting, demonstrating no off-site impact. This is shown in Figure 3, with the heat flux contours approximately 500m from the rail corridor.

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[1] Source: HSE 2019. Failure Rates and Event Data for Use with Risk Assessment

[2] Source: LastFire 2012, LASTFIRE Project Update, Large Atmospheric Storage Tank Fire Project, Incident Survey for 1984 - 2011

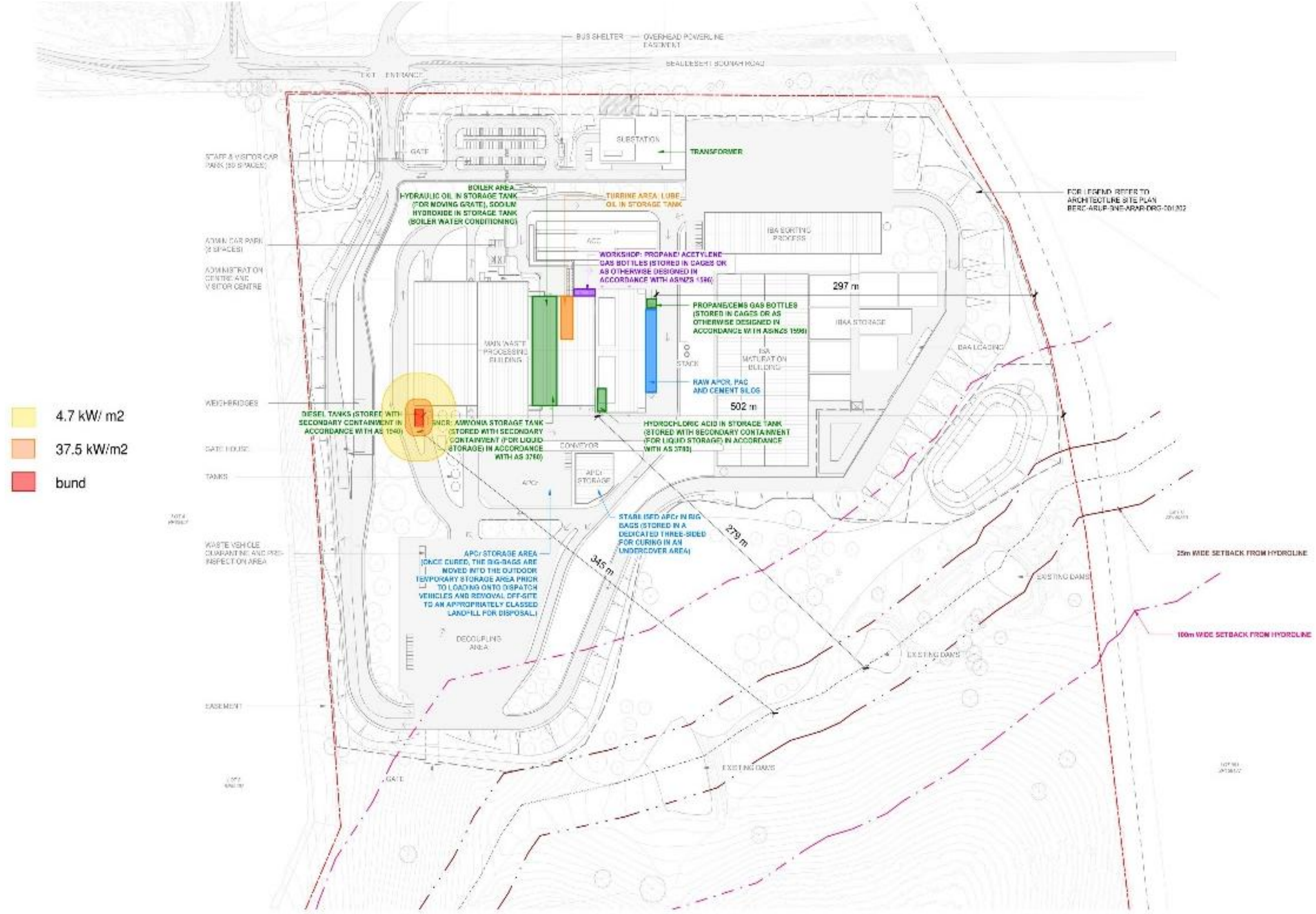

Figure 3: Diesel pool fire consequence modelling contours

4.1.5 Emergency Response Plan

An Emergency Response Plan (ERP) for the site was requested. During the consultation meeting, the operational nature of the ERP document was discussed, with reference to information that is not available at the Planning Application stage, such as the names and phone numbers of key site personnel. It was agreed that the ERP is a document that should be produced prior to occupancy, but also that the specific information requested to be included in the ERP should be reflected at this stage of the Project.

As such, this report is updated to make the following recommendation:

- The Emergency Response Plan for the site shall be produced prior to occupancy, and shall include the following items:
  - The emergency contact details for the railway manager (ARTC).
  - An escalation process by which the railway manager is immediately notified of any incident, so that rail operations can be appropriately managed.
  - An emergency response procedure for the railway corridor to be applied during incidents/emergencies. This procedure shall be agreed with the railway manager.

4.2 Seqwater Comments

The Site-Specific Risk Assessment –Water Quality in Appendix D of this report is prepared to address PO28 of the Seqwater Development Guidelines. The Site-Specific Risk Assessment finds that the facility "is designed so dangerous goods, hazardous substances or environmentally hazardous materials are stored and handled in a manner that minimises the potential for the release of hazardous materials and chemicals to drinking water source areas during a potential contamination event", consistent with AO28.4.

Reference is also made to Appendix C showing the location of dangerous good storage,

5. Conclusions

This report identifies potential hazards and risks associated with the construction and operation of the BERC, specifically in relation to the management and storage of hazardous chemicals on-site as well as the ongoing operation of the facility.

To meet the legislative and authority requirements associated with the management and storage of hazardous chemicals, the next steps include:

- Under Chapter 7 Division 2 of the WHS Regulations, the operator of the facility must ensure that a hazardous chemical used, stored and handled at a workplace is correctly labelled and obtain safety datasheets of hazardous chemical before commencing the operations.
- Under Chapter 7 Division 3 of the WHS Regulations, the operator must also ensure that a register of hazardous chemical used, handled or stored is prepared and kept at the workplace. Under the same division of the WHS Regulations, the operator must prepare a manifest of Schedule 11 hazardous chemicals. Under Chapter 7 Division 4 of WHS regulations, the operator must also display warning placards scheduled 11 hazardous chemicals. See section 3.2.1.1 of this report for details. These requirements need to be met before commencing of the operations.
- As diesel and ammonia (if used) exceed the threshold quantity of Schedule 3 of the EP Act, the operator shall notify the Department of Environment, Tourism, Science and Innovation (DETSI) of these 'notifiable activities'.
- Prior to commencing operations an emergency plan shall be developed in accordance with Regulation 361 of the WHS Regulations before commencing operations. This shall include appropriate evacuation procedures, a medical treatment and assistance plan and an effective communication plan between the person coordinating an emergency response and all persons in the workplace. The operator shall also provide the emergency plan to Queensland Fire and Emergency Services (QFES) for review. The plan shall be updated to align with QFES's recommendations before the facility operation begins.
- The operator shall provide placards in compliance with the Schedule 13 'Placard Requirements' of the WHS Regulations, where the expected storage capacity is greater than the placard quantity. Similarly, a manifest shall be produced by the operator for all hazardous chemicals where the expected storage quantity exceeds the manifest threshold. The manifest shall meet all obligations under Schedule 12 'Manifest Requirements'.
- The Emergency Response Plan for the site shall be produced prior to occupancy, and shall include the following items:
  - The emergency contact details for the railway manager (ARTC).
  - An escalation process by which the railway manager is immediately notified of any incident, so that rail operations can be appropriately managed.
  - An emergency response procedure for the railway corridor to be applied during incidents/emergencies. This procedure shall be agreed with the railway manager.

Appendix A

HAZID Register

Risk Assessment Methodology

Risk is assessed in the word diagram with the following headings:

- Consequences.
- Offsite risk rating – the consequence and likelihood of the scenario *affecting people and assets located offsite* is assessed.
- Safeguards – risk control measures related to design, construction, testing, procedures and hazard mitigation.
- Onsite risk rating – the consequence and likelihood of the scenario *affecting people and assets located onsite* is assessed.

The risk rating is based on a 5x5 risk matrix considering the likelihood and consequence of the scenario. The worst credible case consequence for each scenario is determined, then the likelihood of that consequence level is determined.

Rating	Likelihood Level	Definition	Example Descriptions	Estimated Control Reliability
5	Almost Certain	Expected to occur frequently unless actively managed	Has occurred at this site or frequently across the industry	<1% reliable
4	Likely	Expected to occur under foreseeable conditions	Multiple causal pathways; has happened at peer sites	20% reliable
3	Possible	May occur	Credible scenarios exist; some reliance on less robust controls	50% reliable
2	Unlikely	Not expected to occur, but could in unusual conditions	Relies on failure of multiple controls; some industry examples globally	80% reliable
1	Exceptional	May only occur in exceptional circumstances	Rare or no known incidents globally; no realistic causal pathway	>99% reliable

Rating	Consequence Level	Example Descriptions
5	Catastrophic	Multiple fatalities or life-threatening injuries; extensive destruction of facilities or assets; prolonged total shutdown (weeks +); severe and lasting environmental or reputational harm.
4	Major	Single fatality or serious injury; major damage to critical assets; significant disruption or downtime (days); substantial regulatory, environmental or reputational consequences.
3	Moderate	Injury requiring medical treatment; localised damage or system impairment; short-term operational disruption (hours); manageable external or community concern.
2	Minor	First-aid-level injury; minor, contained damage; brief or easily managed disruption; negligible external impact.
1	Insignificant	No injury; minimal or cosmetic damage; no operational, environmental or reputational effect.

RISK RATING TABLE					
	1 - Insignificant	**2 - Minor**	**3 - Moderate**	**4 - Major**	**5. Catastrophic**
5 – Almost Certain	Low	Medium	High	Very High	Very High
4 - Likely	Low	Medium	High	High	Very High
3 - Possible	Low	Medium	Medium	High	Very High
2 - Unlikely	Low	Low	Medium	High	High
1 - Exceptional	Low	Low	Low	Medium	High

ID	Area	Property	Guideword	Cause	Consequence	Safeguard	Onsite Residual Risk			Offsite Residual Risk			Potential Additional Controls	Timeline
							L	C	R	L	C	R		
1	Tipping hall	Fire	Waste	Waste that has a smouldering load (most common source for a truck fire is a lead acid/li-ion batteries and vapes)	Fire inside a truck (load)	Waste Analysis Plan (WAP) will be implemented as a preventive measure to identify any source of fire in the incoming waste. The operational response is for employees to physically observe the smoke. The response is to stop and tip the load on concrete or a sealed area not in the building. A fire hose/hydrant will be nearby. Fire engineering to include fire detection and suppression system.	2	3	M	Not credible			Emergency response procedures to be identified in the Emergency Management Plan Consultant team to determine whether compliance with FM Global Data Sheets will be done for insurance.	Detailed design stage
2		Fire	Truck	Truck breaks down/catches fire	Fire inside a truck	The operational response is for employees to physically observe the smoke. The response is to stop and tip the load on concrete or a sealed area not in the building. A fire hose/hydrant will be nearby.	2	3	M	Not credible			Emergency response procedures to be identified in the Emergency Management Plan	Detailed design stage
3		Fire	Combustible material	Fire in bunker comes back into tipping hall	Fire spread through building	Vehicles are the only combustible materials within tipping hall. There are no other combustible materials. The design includes fire detection and sprinklers. Fire engineering review during detail design to cover fire detection and suppression system. Visual inspection in tipping hall and in bunker. Crane operator visuals and CCTV can provide alert. Good housekeeping – residual waste dropped. Possible area for waste to be inspected. Front loader to push waste into bunker. Vehicle and their contents present combustible materials risk. Any rubbish left in hall must be removed.	1	4	M	1	3	L	Emergency response procedures to be identified in the Emergency Management Plan. Housekeeping procedures need to be prepared as a preventive measure to keep tipping areas free of residual waste.	Detailed design stage Commissioning stage
4		Crash	Truck	High frequency of movements in tipping hall	Fire inside a truck	Vehicles are the only combustible materials within tipping hall (forklifts and front-end loaders operate around the site). There are no other combustible materials. The design management of this risk includes fire detection and sprinklers. Trucks have their own fire extinguisher. Waste acceptable protocol – no waste liquid accepted. Traffic analysis and management plan developed with recommendations to be implemented in detailed design stage. Escalation of crash to fire scenario is very unlikely	1	3	L	Not credible			Emergency procedures to be identified in the Emergency Management Plan	Detailed design stage
5		Crash	Truck	Fuel spill	Fuel ignites	Flame detection, firefighting equipment including appropriate extinguishers (trucks carry foam extinguishers) to be provided. Fire detection and sprinklers are to be provided within the tipping hall. Traffic analysis and management plan developed with recommendations to be implemented in detailed design stage.	2	2	L	Not credible			Emergency response procedures to be identified in the Emergency Management Plan.	Detailed design stage
6		Air flow	Odor	Handling putrescible waste	Odor release	To be managed in tipping hall and bunker. Fast operating entrance and exit doors and manually operable louvers. Tipping hall and bunker are maintained under negative pressure. Secondary filtration system as backup.	2	2	L	1	2	L	N/A	

ID	Area	Property	Guideword	Cause	Consequence	Safeguard	Onsite Residual Risk			Offsite Residual Risk			Potential Additional Controls	Timeline
							L	C	R	L	C	R		
7		Collision	Truck	High frequency of movements in tipping hall	Collision with onsite workers in tipping hall. Damage to safety critical systems like hydrants.	Traffic analysis and management plan developed with recommendations to be implemented in detailed design stage.	2	4	M	Not credible			Emergency response procedures to be identified in the Emergency Plan. Safety critical systems need to be protected from impact. Safety signs, safety mirrors and walkways need to be considered for safe interaction between workers, critical systems and trucks.	Detailed design stage
8	Bunker	Fire	Waste	Hot ash / disposal of hot waste / self-heating	Fire in waste	Thermal detection of waste, remotely controlled full water cannons, bunker is scanned (infrared) continuously at various levels of detection. Each level determines a new action from water cannons (semi-automatic). Crane operator/control room will be alerted and can take control of water cannons. In the event that the operators in control room are alerted to the presence of hot spots or smouldering or burning waste in the waste bunker, they can interject and move the material into the furnace feed hopper using the grab crane, as required.	2	3	M	Not credible			N/A	
9		Flammable gas	In waste	Decomposition of waste	Biogas catches fire/explodes	Negative air pressure in the waste bunker caused by drawing combustion air from that area would carry biogas into furnace along with the combustion air. Decomposition of waste can occur at the bottom of the bunker but is too slow compared to the normal residence time of waste in the waste bunker. The bunker would be emptied in sections so that waste is not kept in the bunker for long enough for decomposition to occur and is also mixed.	2	2	L	Not credible			Establish operating procedures for moving waste from bunker to furnace to avoid waste being in the bunker for too long (first in, first out). Consultant team to confirm air changes per hour in the waste bunker to keep generated flammable gas well below the lower flammability limits within the bunker area.	Commissioning stage Detailed design stage
10		Recovery	Confined	Confined space access	Operational continuity	There is no ready access for people to physically enter the waste bunker.	1	4	M	Not credible			Operational Management Plan to outline procedures around confined spaces and lifting equipment for people for activities such as waste bunker concrete inspections. Safety signs to be provided to communicate the hazard of confined space workers.	Detailed design stage
11		Recovery	Fall	Fall into bunker from vehicles or people (vehicle operators or cleaning staff)	Operational continuity	Temporary barriers and signage in place.	1	4	M	Not credible			Operational Management Plan to outline procedures around confined spaces and lifting equipment for people for activities such as waste bunker concrete inspections. Side tippers may be used for BERC, so the opening is larger for potential falls. Alternative measures to be considered.	Detailed design stage
12		Fire	Shredder	Shredder generates sparks that initiates a bunker fire	Fire in bunker	Firefighting equipment including remotely controlled water cannons will be used. The shredder can withstand a deluge of firewater if required.	2	2	L	Not credible			In the event of a major fire, thorough inspections of the shredder including the bearings is required to be implemented	Operation and maintenance
13		Fire	Shredder	Shredder shredding items that are flammable,	Fire in bunker	Supervised loading and selective feeding. Design does not allow for fire to stay in shredder. The shredder has a wide opening and material falls out of the shredder back into the	2	2	L	Not credible			The configuration of firefighting equipment in the waste bunker area will ensure that the shredder and its output is	Detailed design stage

ID	Area	Property	Guideword	Cause	Consequence	Safeguard	Onsite Residual Risk			Offsite Residual Risk			Potential Additional Controls	Timeline
							L	C	R	L	C	R		
				combustible or can generate sparks		waste bunker. Therefore, any material that is on fire would not stay in the shredder							adequately covered by the fire suppression system(s).	
14		Explosion	Shredder	Combustible waste (specially wood/paper) shredded to small pieces with dust formation	Dust explosion	Continuous thermal monitoring and visual monitoring by crane operator. Negative air pressure in bunkers.	1	3	L	Not credible			Housekeeping procedures need to be prepared as a preventive measure to flat surface free of combustible dust. The possibility of explosive dust atmosphere from combustible waste shredding and requirement of classified electrical equipment in bunker area needs to be considered in the detailed design.	Commissioning stage Detailed design stage
15		Flow	Dust (not combustible)	Dust accumulation from normal operation	Visibility and nuisance	Implement good housekeeping. The walls of the bunker is designed to minimise accumulation of dust from falling back into the bunker. Use of water cannon and/or misters (preferred control) for dust suppression. No HAC required as the dust is not combustible.	3	1	L	Not credible			N/A	
16	Furnace	Flow	High	Backfire from furnace into chute.	Fire from furnace comes back into chute.	During operation, the feed chute is typically kept full of waste by the waste crane operator. Feed chute level monitoring alerts the operator and/or the combustion control system to adjust the feed rate accordingly. There is also a fire damper inside the chute, to keep the feed chute sealed and prevent the uncontrolled ingress of combustion air into the furnace via the feed chute. In addition, the furnaces operate under slight vacuum conditions, which means that hot flue gases preferentially flow up into the heat recovery boiler, rather than back out the feed chute. Fire damper between bunker and boiler hall. The automatic combustion control system controls how much waste is on the conveyor, ram feeder into furnace.	2	2	L	Not credible			N/A	
17		Combustion Air flow	Zero/Low	Emergency or planned	Gasification in furnace combustion chamber	Emergency diesel generators provides electricity to critical fans. Auxiliary burners have a burner management system and uninterrupted power supply (UPS) to ensure combustible gases in the flue gas are fully combusted before entering the boiler and flue gas treatment system.	2	3	M	Not credible			Operating and maintenance procedures need to be in place for safe start-up and shutdown of the furnace. This is particularly important to prevent furnace fire box explosion scenarios.	Commissioning stage
18		Flammable gas	In waste	Gas canister	Explosion in furnace	Operationally, these items if visually seen by the grab crane operators will be removed. Additionally, the furnace design allows for canister explosions (size unknown).	2	2	L	Not credible			The size of the gas cylinder needs to be confirmed that the furnace is able to handle. The design needs to handle 19kg gas cylinder explosion.	Detailed design stage
19	Boiler	Leak	Steam	Instantaneous release of steam from pipework, potential for injury	Shutdown of line	Contained within boiler. No external pipework exposed to flue gas. Boiler and pressure vessels designed to AS1210 (or allowable international boiler code). Mandatory (regulatory) inspections of boiler. Operationally, regular maintenance, continuous emissions monitoring systems (CEMS) (for monitoring moisture content) .	1	3	L	Not credible			N/A	
20		Leak	Water	Flue gas is corrosive, corrodes the inside of the boiler	Shutdown of line	Contained within boiler. No external pipework exposed to flue gas. Designed to AS1210 (or allowable international boiler code). Mandatory (regulatory) inspections of boiler. Operationally, regular maintenance, CEMS (for monitoring moisture content) .	2	1	L	Not credible			N/A	

ID	Area	Property	Guideword	Cause	Consequence	Safeguard	Onsite Residual Risk			Offsite Residual Risk			Potential Additional Controls	Timeline
							L	C	R	L	C	R		
21	Aqueous ammonia storage area	Loss of material	Aqueous Ammonia/ urea	Leak in storage or pipes	People exposed to ammonia or urea (options being considered)	Urea (if used) stored inside (not outside due to temperature and to prevent crystallisation) (if 40% urea solution is used). Solid urea may be used to avoid this issue. Note Urea exposure is an odour issue not a toxic one. Ammonia (solution) (if used) to be stored outside. Location to be determined - provisional location for ammonia tank outside in a separate bund.	2	2	L	Not credible			Confirm if urea or ammonia will be used during detailed design. If ammonia is used, confirm location. Separate bund will be required if it is located within the tank farm.	Detailed design stage
22		Pressure	High	Ammonia tank (if applicable) needs to be vented	People near venting pipe exposed to ammonia	Tank venting is required during operation e.g. during tank filling. The venting pipe design shall be high enough so as not to affect people. The vent and overflow lines will require ammonia absorption protection. This can be achieved with water seals to absorb the vapours or a scrubber.	2	2	L	Not credible			Aqueous ammonia storage needs to be designed to AS3780 for aqueous ammonia.	Detailed design stage
23		Tank level	High	Over delivery of ammonia (if applicable)	Overflow of ammonia	Monitoring of the tank level gauge during filling. Tank secondary containment to be provided. Ammonia storage to be designed to AS3780. Water sprays included around the bunded area. In the event of release, the spray traps the ammonia in the water, reducing the offsite risk from ammonia vapour being carried in the air.	2	2	L	Not credible			Loading/unloading system needs to be designed to AS3780 for aqueous ammonia.	Detailed design stage
24		Crash	Vehicle collision	Vehicles colliding with tank(s).	Vehicle collision with outside tank		1	2	L	Not credible			Tank protection to be provided in accordance with AS3780.	Detailed design stage
25	IBA Handling/ Maturation	Reaction	Hydrogen	Water reacting with elemental aluminium in IBA	Explosion of hydrogen	Evolution quantities are very small raw IBA will not be stored within a building or unventilated area. The gas will safely dissipate in the atmosphere. Conveyors are naturally ventilated at high points. Stockpiled in open air. Maturation building will be a 3-sided building with ventilation at high points. Hydrogen detection and ventilation (number of air changes to ensure below LEL) at high points including in the IBA hall	2	2	L	Not credible			Likelihood of explosive atmosphere in IBA handling areas (like conveyers within the building) need to be considered in detailed design stage. Hazardous Area Classification as required by AS/NZS 60079.10.1.	Detailed design stage
26		Reaction	Phosphine	Bonemeal in waste producing phosphine	Explosion of phosphine in IBA	Unlikely to have a lot of bonemeal in incoming waste. The BERC draft Waste Acceptance Protocol classifies medical waste, vet waste, and bodies as unacceptable waste and such waste shall not be accepted for processing at BERC.	1	2	L	Not credible			N/A	
27		Explosion	Dust	Ignition source	Dust generated by IBA process explodes	IBA is maintained in a moist condition with 15-20% moisture. IBA sorting and processing will occur in a fully enclosed area with appropriate ventilation and dust extraction. IBA has very low unburnt carbon content (<3% total organic carbon) and is therefore inert. Matured and processed IBA aggregate (IBAA) will be stored outdoors with appropriate dust suppression. Loading into vehicles for transport off-site will also occur outdoors.	1	3	L	Not credible			N/A	
28		Loss	Water supply	IBA is not cooled	IBA causes fire/explosion/ dust explosion	Duty standby on water supply to water bath on ash discharger. IBA is essentially inert, with very low unburnt carbon content (<3% total organic carbon).	1	3	L	Not credible			N/A	
29		Failure	Extraction system or conveyor	Loss of power or mechanical failure	Accumulation of hydrogen gas	ID fan and IBA vapour extraction fans are connected to the emergency diesel generator. Mechanical ventilation for IBA extraction hall to be provided. IBA conveyor enclosure to be ventilated. Hydrogen detection monitors to be located in high points where hydrogen gas could potentially accumulate.	1	2	L	Not credible			N/A	

ID	Area	Property	Guideword	Cause	Consequence	Safeguard	Onsite Residual Risk			Offsite Residual Risk			Potential Additional Controls	Timeline
							L	C	R	L	C	R		
30	IBA Sorting	Explosion	Dust	Dust atmosphere during sieving and metal recovery operations	Metal dust explosion	Sorting facility is within a building however IBA moisture content will still be ~10% Use of enclosed conveyers. Use of fugitive dust management system will be decided during detailed design. Discharge points of bag filter/air filter shall be at a safe elevation above the IBA sorting plant roof.	1	2	L	Not credible			Depending upon the type sieves used, likelihood of explosive atmosphere in IBA handling areas (like conveyers within the building) need to be considered in detailed design stage. Hazardous Area Classification as required by AS/NZS 60079.10.1	Detailed design stage
31	IBAA Storage	Emissions	Dust	Stored in open area	Dust emissions	IBAA unlikely to contain particulate matter. IBAA moisture content will be ~10%. Temporarily stored in IBAA storage area. Storage sprayed with rainwater collected from IBA area Dust suppression on roadways in IBA area.	2	2	L	1	2	L	N/A	
32	Baghouse	Fire	Baghouse	Heat from flue gas or external fire source	Fire in baghouse	The filter bags are typically covered by filter cake (a layer of lime and activated carbon), that ultimately becomes APCr. Low/negligible risk of fire/explosion due to the low concentration of activated carbon. Choice of bag materials to be considered in detailed design. Economiser cools flue gas upstream of a semi-dry scrubber inclusive of a water quench, which further cools and moistens the flue gas upstream of the baghouse filter.	1	3	L	Not credible			N/A	
33		Loss of feed bags	Control	Catastrophic failure of baghouse bags	Catastrophic failure of feed bags	Isolate and replace bag. A CEMS will be implemented to continuously monitor flue gas dust concentration and alert the operators to take action in the event of a filter bag failure.	1	3	L	Not credible			N/A	
34		Explosion	Dust	Flammable gas atmosphere in the filter housing	Explosion, damage to baghouse	The filter bags are typically covered by filter cake (a layer of lime and activated carbon), that ultimately becomes APCr. Choice of bag materials to be considered in detailed design. Economiser cools flue gas upstream of a semi-dry scrubber inclusive of a water quench, which further cools and moistens the flue gas upstream of the baghouse filter.	2	2	L	Not credible			Likelihood of explosive atmosphere within the filter housing need to be considered in detailed design stage. Hazardous Area Classification as required by AS/NZS 60079.10.1	Detailed design stage
35	Storage silo	Explosion	Activated carbon	Storage and handling (de-bagging) of activated carbon is an explosion risk	Dust explosion	Typical material safety requirements include storage in a dry, cool, well-ventilated area, away from strong oxidizers, strong acids, ignition sources, combustible materials, and heat. An adequate air gap between packages is recommended to reduce propagation in the case of fire. As with all finely divided materials, all transfer, blending, and dust collecting equipment shall be grounded to prevent static discharge. Good housekeeping practices will prevent the accumulation of dust or dusty conditions in areas associated with activated carbon handling and storage. Permanent nitrogen blanketing of the storage silo is to be adopted. Where dust is unavoidable, dust-proof boxes and regular electrical line maintenance are recommended. Hazardous Area Classification as required by AS/NZS 60079.10.2:2016. Appropriate standard operating procedures will be developed by the proponent for maintenance and use.	1	3	L	Not credible			N/A	
36	Flue gas treatment	Loss of emissions	Flue gas treatment	Pipe burst or leaking valve of APCr	Uncontrolled release of emissions	APCr storage and handling is indoors. APCr is a fine solid (powder) which may generate some dust in the unlikely event of an uncontrolled release. APCr consists of alkaline salts which can be removed to prevent dust accumulation. Operators	1	3	L	1	2	L	N/A	

ID	Area	Property	Guideword	Cause	Consequence	Safeguard	Onsite Residual Risk			Offsite Residual Risk			Potential Additional Controls	Timeline
							L	C	R	L	C	R		
						to wear appropriate PPE while attending to any release of APCr and corrective maintenance to address the point of release.								
37		Abnormal operation	Abnormal operation Startup/shut down	Power loss	Flue gas treatment out of action	An emergency diesel generator to be included in design	3	1	L	Not credible			N/A	
38	APCr storage area	Loss	APCr	APCr silos out of action	Small spillage of APCr	APCr mixed with cement and water to create concrete slurry and bagged prior to batch transport to another area for curing. Raw APCr will not be transported offsite without being treated. If the transfer pipe cracks/breaks, the screw conveyors are used. Two APCr storage silos provide redundancy.	2	1	L	Not credible			Specific health and safety measures need to be taken to handle APCr and cement including ventilation systems, enclosures for conveyers specially the transfer points, water runoff controls systems.	Detailed design stage
39	APCr transfer pipework	APCr	APCr	Corrosion	Leak in pipe	Pipe material selection in accordance to industry best practice.	1	1	L	Not credible			Consider if fibreglass pipework would perform better during detailed design	Detailed design stage
40	Bulk Chemical storage Area	Storage	Hydrochloric acid (if used)	Pipe burst	Leakage near equipment and flanges	Design to AS3780	1	3	L	Not credible			N/A	
41		Storage	Sodium hydroxide	Pipe burst	Leakage near equipment and flanges	Design to AS3780. Likely used for water treatment, thus, stored in small quantities.	1	3	L	Not credible			N/A	
42		Storage	Ammonia	Pipe burst	Leakage near equipment and flanges	Design to AS3780	1	3	L	Not credible			N/A	
43	Water Treatment	Incompatible substances	Control	Storage of sodium hydroxide and hydrochloric acid together	Interaction of acid and base	Design to AS3780. Segregation of storage areas for incompatible substances.	2	1	L	Not credible			N/A	
44	Transformer	Fire	Bund	Oil filled transformer	Transformer explosion	Design to AS2067 and AS/NZS60076 series.	1	3	L	Not credible			Let the fire burn out if an event occurs. Safeguards by electrical engineer to be specified if stored inside.	Detailed design stage
45	UPS	UPS batteries	UPS batteries	Lead acid batteries	Hydrogen production	Design to appropriate standards	1	2	L	Not credible			N/A	
46		UPS batteries	UPS batteries	Lithium ion (if used)	Overloaded and creating a fire	Design to appropriate standards	2	2	L	Not credible			N/A	
47	Site	Weather	Extreme rainfall	Extreme rainfall	Flooding	Main energy from waste (EfW) facility and visitor centre will be located above the 1 in a 100-year event. The site's stormwater network will be designed in accordance with local regulations and will shed overland flows away from the buildings. There is no catchment flooding risk.	1	2	L	Not credible			N/A	
48		Weather	Wind	Weather	Damage to facility	Design to AS/NZS1170.2	2	1	L	Not credible			N/A	

ID	Area	Property	Guideword	Cause	Consequence	Safeguard	Onsite Residual Risk			Offsite Residual Risk			Potential Additional Controls	Timeline
							L	C	R	L	C	R		
49		Weather	Lighting	Extreme weather event	Lightning hits stack	Provide local lightning protection as per regulations	1	2	L	Not credible			N/A	
50		Fire	Bushfire	Existing vegetation on site	Bushfire reaches site	TBC Site evacuation procedures in bushfire scenario – no credible injury consequence	2	2	L	Not credible			Bushfire assessment to be undertaken. Potential QRES engagement.	Detailed design stage
51		Sabotage	Sabotage	Environmental activists and theft of materials	Mostly vocal. Risk during construction if protestor is injured	Construction site to be secured. Building is secure outside of hours and has security system in place during operation. CCTV for security and operations provided at site boundary and internally. Secure fencing – cyclone fencing.	1	1	L	Not credible			N/A	
52		Fire	Bund	100 000L of diesel	Diesel ignition	Design to AS1940. Diesel not flammable, low probability of ignition. Engagement with relevant fire authorities. Hydrant locations, etc	1	2	L	Not credible			N/A	
53		Separation	Transformer	Transformer	Domino effect for transformers	Design to AS2067 and AS/NZS60076 series	2	1	L	Not credible			Safeguards by electrical engineer to be specified if stored inside.	Detailed design stage
54	Turbine Hall	Fire	Bund	Turbine lube oil storage	Fire	Design in accordance with Australian Standards and industry best practice (deluge system)	1	2	L	Not credible			N/A	
55	MCC	Fire	Electrical equipment	Loose connections, equipment damage, overheating	Fire	Design in accordance with Australian Standards and industry best practice	1	2	L	Not credible			N/A	
56	N/A	Storage	Quick lime	Pipe burst	Leakage near equipment and flanges	Design to AS3780.	1	1	L	Not credible			Bulk storage on-site. It is unlikely that this will be provided as a slurry. To be determined based off equipment providers.	Detailed design stage
57	Off-site	Contamination	IBA leachate	IBA leachate flow off-site	Contaminate off-site surroundings	TBC	1	2	L	Not credible			QFES requirements for fire water runoff to be considered	Detailed design
58		Entrance/exits	Traffic hazards	Traffic collisions between trucks and cars	Injury/fatalities of people within vehicles	TBC	1	4	M	1	4	M	Work with TMR to reduce speeds at thoroughfare	Detailed design
59		Exits	Queuing	Trucks are queued up waiting for exit	Accident of trucks coming back onto the main road	Ample queuing space on private land	1	1	L	1	1	L	N/A	

Appendix B

Rail Specific Risk Assessment

ARUP

Cleanaway Operations Pty Ltd

Bromelton Energy and Resource Centre

Rail Specific Risk Assessment

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

B | 22 January 2026

Job number 293683-00

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Document Verification

Project title	Bromelton Energy and Resource Centre
Document title	Rail Specific Risk Assessment
Job number	293683-00
Document ref	BERC-ARU-BNE-RRA-RPT-0001
File reference	BERC-Rail-Risk-Assessment

Revision	**Date**	**Filename**	Rail Specific Risk Assessment		
A	11 Nov 2025	**Description**	Issued for Adequacy Review		
			Prepared by	**Checked by**	**Approved by**
		Name	Gemma Pollard	Ben Smith RPEQ 32157	Anna Steart
		Signature			
B	22 Jan 2026	**Filename**	Rail Specific Risk Assessment		
		Description	Issue for Approval		
			Prepared by	**Checked by**	**Approved by**
		Name	Gemma Pollard	Ben Smith RPEQ 32157	Anna Stewart
		Signature	pp Benjamin Le	Benjamin Le	AStewart

Issue Document Verification with Document ✓

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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.

Abbreviations

Table 1: Summary of Abbreviations

Abbreviation	Definition
AHD	Australian Height Datum
APCr	Air Pollution Control Residue
ARTC	Australian Rail Track Corporation
AS	Australian Standard
BERC	Bromelton Energy and Resource Centre
BREF	Best Available Techniques Reference
C&I	Commercial and Industrial
CMP	Construction Management Plan
EfW	Energy from Waste
IBA	Incinerator Bottom Ash
IBAA	Incinerator Bottom Ash Aggregate
IED	Industrial Emissions Directive
ISO	International Organization for Standardization
MSW	Municipal Solid Waste
MWe	Megawatt Electric
ONRSR	Office of the National Rail Safety Regulator
RL	Relative Level
SDA	State Development Area
SRRC	Scenic Rim Regional Council
TEEP	Technically, environmentally, and economically practical
TMR	Department of Transport and Main Roads

Executive Summary

This Rail Risk Assessment for the Energy from Waste (EfW) facility known as Bromelton Energy and Resource Centre (BERC) in Queensland follows the *Guide to Development in a Transport Environment: Rail* (the Guide) and, in accordance with the Guide, specifically focuses on risks that may impact the adjacent railway corridor.

The Project layout has been developed such that the majority of the development site, and all of the operational components of the development, are outside of the area adjacent to the railway as defined in the Guide (i.e. land within 25 metres of the boundary of the railway).

Hazard Context Review

This risk assessment is undertaken based on the hazard scenarios to the adjacent Sydney – Brisbane rail corridor and how these threats may manifest.

A total of 17 hazard scenarios were identified. Following an internal Risk Screening Workshop, 12 credible hazards were identified, with 5 considered not credible. Generally, the non-credible hazard scenarios are those for which the threat reaching the area adjacent to the rail corridor is not considered credible.

Risk Assessment Results

The 12 credible hazard scenarios are assessed in accordance with the risk assessment methodology in the Guide. The 12 hazard scenarios are assessed as low risk to the rail corridor, based on the Guide's risk criteria. This is reflective of the robust control framework developed for the BERC Project, and the separation distance between the operational components of the BERC site and the rail corridor.

Risk Treatments

The following risk treatments are proposed for BERC and are considered in the determination of the risk scores for each hazard scenario:

- Incinerator bottom ash (IBA) stockpiles matured in three-sided building.
- Misting/ dust suppression systems.
- Barrier wall around IBA pad.
- Additional maintained vegetated buffer.
- Bunded fuel tanks.
- Spill containment.
- Maintain the rail boundary interface as specified in the Construction Management Plan (CMP).
- Automatic leak detection.
- Emergency spill plan agreed with rail authority.
- Fire detection and suppression.
- Fire water containment.
- Liaison with local fire authority and rail operator for coordinated response plan.
- Operator training.
- Rail authority permit to work.
- Exclusion zones between work and rail.
- Preventive and regular maintenance.

- Immediate notification protocol to rail authority if exceedance occurs.
- Exclusion fencing.
- Flood modelling including shared catchment.
- Overflow directed away from rail.
- Lifting plans.
- Spotters.
- Crane slew restrictors.
- General housekeeping.
- Debris netting on scaffold.
- Engineer-certified design.
- Confirm all underground services via 'Dial Before You Dig' and rail authority plans.
- Supervise excavation near known alignments.
- Annual fire drills and response test.
- Regular performance checks.
- Incident reviews (post-event).

Risk Assessment Outcome

As all identified and assessed hazards pose a low risk to the rail corridor, in accordance with the risk criteria in the Guide, "appropriate control measures should be in place to allow the development to proceed".

The Project shall continue to manage risks through design, construction, commissioning and operation, and that risk management shall continue to consider the potential for impacts to the rail corridor.

1. Introduction

1.1 Purpose of Assessment

The *Guide to Development in a Transport Environment: Rail* (Department of Transport and Main Roads (TMR), Queensland) (the Guide) outlines the requirements for developments located near or within rail corridors to ensure safety, operational integrity, and compatible land use. The Guide defines the area adjacent to a railway as land within 25 metres of the boundary of the railway.

This report responds to the Guide by assessing how the proposed development aligns with its principles and technical requirements. It summarises relevant sections of the Guide, identifies key risks and interface issues, and outlines how the design and proposed mitigation measures align TMR expectations.

The Guide states that it "*provides specific technical guidance to assist development proponents to achieve compliance with the performance outcomes and acceptable outcomes in the Queensland State Development Assessment Provisions (SDAP) in relation to managing impacts of development on railway safety, structural integrity and operation.*" As such, the purpose of this assessment is to assess risks and hazards associated with the Project insofar as they relate to the area adjacent to the railway. Other risks and hazards associated with the development are outside the scope of this Rail Risk Assessment.

1.2 Project Description

1.2.1 Project Overview

Cleanaway Operations Pty Ltd (Cleanaway) is an Australian waste management, recycling and industrial services company. 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 layout has been developed such that the majority of the development site, and all of the operational components of the development, are outside of the area adjacent to the railway as defined in the Guide (i.e. land within 25 metres of the boundary of the railway).

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.

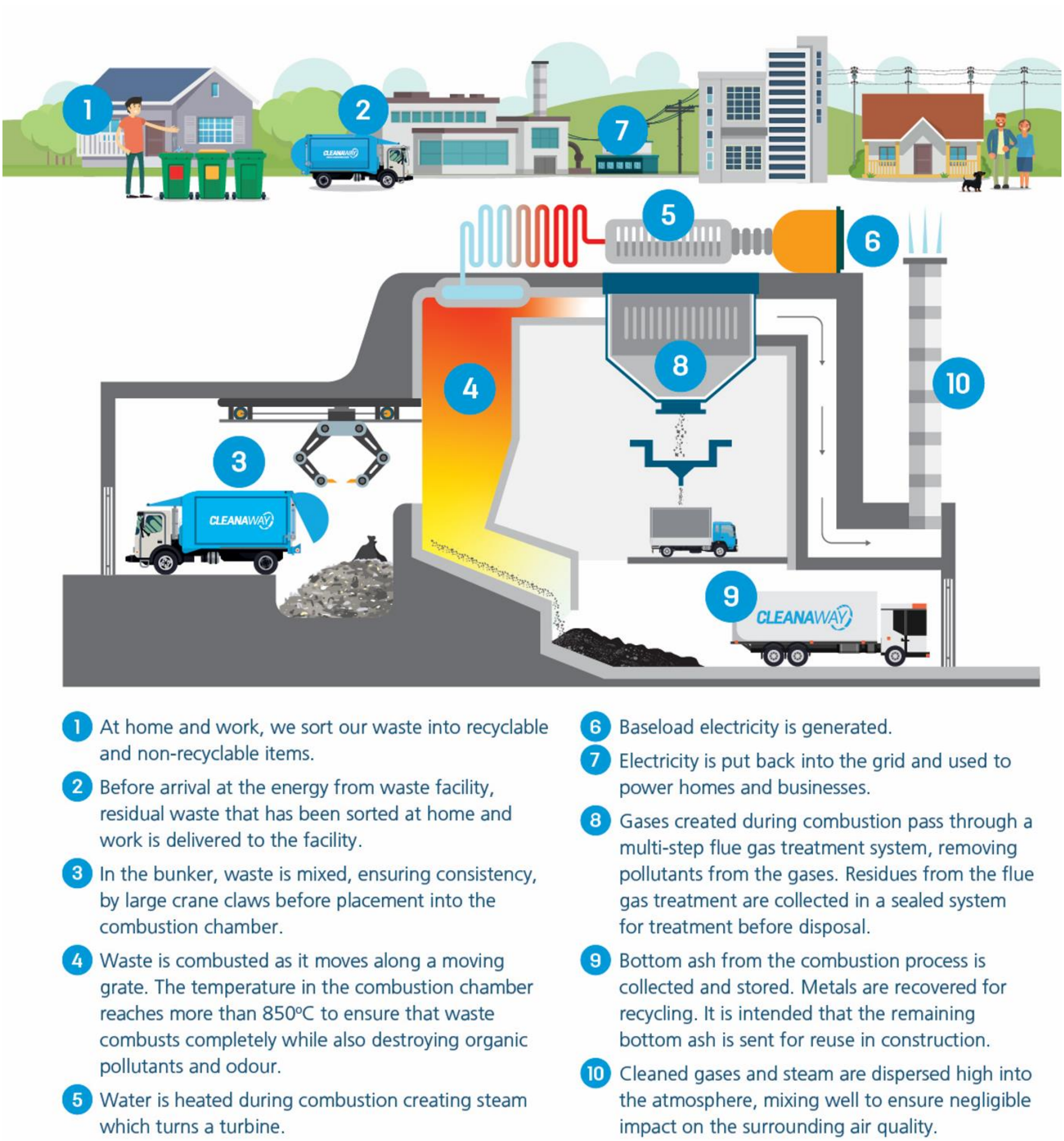


Figure 1: Energy from Waste Process

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 2.

Table 2: 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. Additionally, it 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 73.2MW (577,600 MWh/ year, corrected for ambient temperature) exported to grid as baseload electricity. • Potential to supply energy in the form of heat and/or process steam to local industrial users. • Residual material include IBA and APCr. • It is intended that the IBA will be mechanically processed on site to create incinerator bottom ash aggregate (IBAA). During the process, both ferrous and non-ferrous metals are recovered for recycling and sale. It is intended that the remaining material is re-purposed for use as an aggregate in construction. • 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). • APCr facility (1 x pad, 1 x shed). • Transformer yard and switchyard. • De-coupling area for trucks. • Weighbridges.

Project Component	Detail
	• 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 Plan

2. Site Details

Table 3 provides a summary of the key physical, environmental, and locational characteristics of the BERC site, including site condition, soil and geology, topography, drainage patterns, proximity to infrastructure and noise levels.

Table 3: BERC Site Details

<table>
<tr><th>Topic</th><th>Description</th></tr>
<tr><td>Address</td><td>Lot 1 Beaudesert Boonah Road, Bromelton QLD 4285</td></tr>
<tr><td>Site condition</td><td>The site is located within the Bromelton SDA and Scenic Rim Council local government area (SRRC) at Lot 1 Beaudesert Boonah Road, Bromelton Qld 4285, and formally described as Lot 1 on RP45234 (Refer Figure 2). The site is comprised of approximately 63 hectares and is irregular in shape.

The site has approximately 510m sole frontage to Beaudesert Boonah Road (State-controlled Road) and adjoins a railway corridor (Brisbane – Sydney Line) along the eastern boundary (965m). The southern property boundary (880m) and western property boundary (1,060m) interfaces with private land.

Historical photography indicates the site has primarily been used in the past 100 years for grazing and agricultural purposes. The site is vacant and contains sparse vegetation. There is a waterbody at the centre of the site.</td></tr>
<tr><td>Topography</td><td>The site slopes from the crest of a hill in the western portion of the site, which has an approximate elevation of relative level (RL) 95 m relative to the Australian Height Datum (AHD), sloping down to the north-western and south-eastern corners of the site, with elevations of 85 m AHD and 75 m AHD respectively.</td></tr>
<tr><td>Prevailing drainage patterns over the site</td><td>The Project area is pastoral and currently contains no formal piped stormwater infrastructure. There are no formal stormwater quality improvement devices on site; however, it is considered that the series of farm dams provide a level of stormwater attenuation and allow sediment removal.

The site is defined by a series of ridgelines that divide it into three distinct drainage catchments — northern, central and southern — as illustrated in Figure 3.

▪ Catchment 1 (Northern): Overland flows are collected by a swale within the Beaudesert Boonah Road corridor. These flows are conveyed to twin 2.125 m × 0.9 m pre-cast concrete box culverts beneath Beaudesert Boonah Road, discharging into a man-made channel that flows north toward Allen Creek.
▪ Catchments 2A and 2B (Central): Catchment 2A drains into existing on-site farm dams. Catchment 2B conveys overland flows to an arch culvert (1.85 m × 1.85 m) beneath the railway corridor, providing flow conveyance toward the north.
▪ Catchments 3 and 4 (Southern): These southern catchments shed overland flows off-site toward Swan Creek, located approximately 200 m south of the lot boundary.

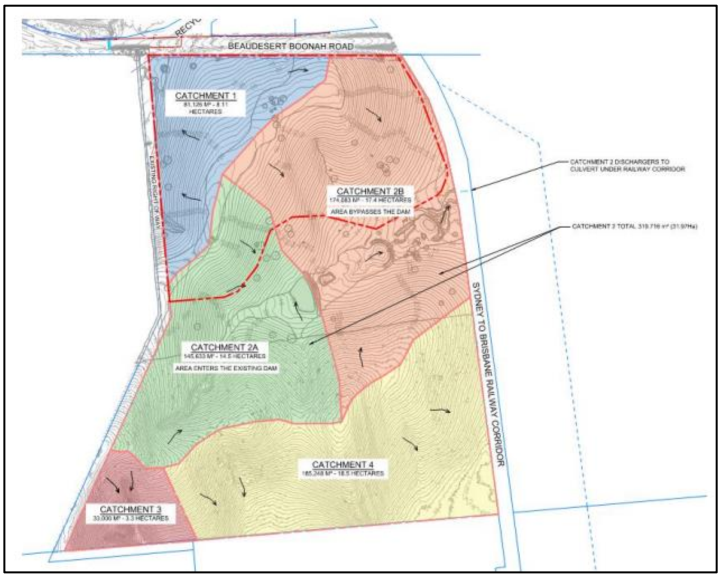


Figure 3: Existing Drainage Catchments</td></tr>
</table>

Soil type and geology	Soil type: The subsurface conditions typically consist of topsoil overlaying residual clay, followed by extremely weathered siltstone. Beneath these layers, the bedrock mainly comprises siltstone and mudstone, with occasional interbedded sandstone. Geology: The Lotsearch report indicates that the site is underlain by middle-Jurassic aged Walloon Coal Measures. The lithology of this unit consists of shale, siltstone, sandstone and coal seams.
Proximity to a railway and railway infrastructure/ utilities.	The site adjoins the railway corridor (Brisbane – Sydney Line) along the eastern boundary (965m).

3. Railway Details

Table 4 summarises the key characteristics and operational details of the adjacent Sydney–Brisbane rail corridor, including track geometry, speed, rolling stock type, usage, planned upgrades, and operational requirements.

Table 4: Adjacent Railway Detail

Topic	Description
Track geometry and alignment (for example, straight or curved section of track)	The Sydney-Brisbane rail corridor in this area is relatively straight and flat to maintain suitability for longer freight trains.
Track speed	Governed by the Australian Rail Track Corporation's (ARTC) Operational Standards and the Inland Rail Design Specifications, the BERC section of the rail track is 115 km/h and may reduce speed near this facility to 60-80 km/h.
Type of railway rolling stock (for example, electric passenger or diesel freight locomotives)	This rail corridor is primarily used for interstate diesel-electric freight locomotives. Electric passenger trains generally operate closer to Brisbane and are not typical at this BERC section of the rail corridor.
Derailment history	Using open-source material, no derailment history for this rail corridor was identified.
Current and future estimated usage and growth in patronage (10-year horizon)	Currently accommodates 1,800-metre-long freight trains, following completion of the Inland Rail Design project, the upgrades plan to increase the container trains to 3,600-metre-long freight trains. As passenger trains are unlikely to operate in this section of the rail corridor, no growth in patronage is expected in the next 10-years.
Details of any future/planned railway upgrades/works	The existing rail corridor is part of the Inland Rail project where enhancements to the railway are expected. Upgrades include improvements to the track alignment and geometry (to support longer, heavier trains), increased clearance levels to allow for double-stacked containers and built with the potential to accommodate 3,600-metre-long trains.
Formation of the track (for example, in cut, on an embankment or at grade)	This section of the track is predominately at grade.
Potential for the carrying of freight and dangerous goods	Currently accommodates 1,800-metre-long-freight trains.
Operational requirements of the railway	The operational requirements are based on the ARTC's Operational Standards and the Inland Rail Design Specifications. Key requirements include: • Locomotives of up to 25-tonnes. • Freight wagons of approximately 21-tonnes. • Standard gauge of 1435mm. • Maximum speed of up to 115km/h. • Utilises an Advanced Train Management System to ensure safety and efficiency. • Minimum vertical clearance of 6.5m for double-stacked containers. • Gradients to typically be below 1.5%. • Regular asset (track and rolling stock) monitoring. • Follow the fire and life safety protocols for rail infrastructure.

4. Development Details

- The BERC is an EfW facility proposed by Cleanaway within the Bromelton State Development Area (SDA) in Queensland. The development site is approximately 63-hectares, located directly adjacent to the interstate railway corridor (Sydney – Brisbane), and will operate 24-hours a day, 7-days per week.
- The Project site is within the Special Industry Precinct of the SDA. Two industrial properties Quickcell Technology Products Pty and SCT Logistics are located to the north of the site. The interstate rail line is located on the eastern boundary of the site.
- The facility will meet relevant guidelines and strategies and is consistent with the objectives set in the Queensland Waste Strategy, which targets a 75% recycling rate, and diversion of 90% of all waste from landfill by 2050. The Project is positioned to contribute to Queensland's move towards a circular economy and decreased dependence on landfill disposal over the long term. Throughout the development process, community engagement will also be sought to ensure local community input and feedback is received.
- The Project includes the construction of all onsite infrastructure needed for the EfW facility, such as site utilities, internal roads, weighbridges, parking and hardstand areas, stormwater systems, fencing and landscaping. This also covers building and operating an IBA maturation and processing facility on site, designed to store and stabilise IBA before it is mechanically processed into aggregate for use in construction. During this process, ferrous and non-ferrous metals will be recovered from the IBA for recycling and sale to the scrap metal market.
- The Project includes a visitor centre to increase the community's awareness and education around economy principles, the waste hierarchy, benefits of landfill diversion and the EfW process.
- Moving grate technology has been selected for the thermal treatment of waste to facilitate energy and resource recovery, which is well established globally and utilised in many operational facilities worldwide.

5. Construction Details

- During construction of the Project, increased construction traffic is expected. However, as the nearest railway crossings are grade separated, no impact on the railway corridor is anticipated.
- Construction is anticipated to take approximately 39 months (exclusive of commissioning and proof of performance testing prior to operations) to complete.
- The indicative construction methodology will be detailed in the Construction Management Plan (CMP) to be developed by the contractor when appointed.

6. Risk Identification, Analysis and Evaluation Approach

6.1 Identification of Hazards (Long List)

The first stage of the risk assessment process is hazard identification. Table 5 shows the long list of hazards that are identified. The long list hazard identification does not consider whether the hazard or the potential consequence in the rail corridor is credible. Further screening and risk assessment is undertaken to determine the list of credible hazards.

Table 5: Hazard Long List

Hazard Scenario	Hazard Source	Potential Consequence (Rail)
Dust emissions during construction and once operational	Dust emissions from Incinerator Bottom Ash stockpiles or construction dust from vehicle movements	• Dust drift, track contamination leading to traction/ slip issues • Increased rail maintenance • Reduced driver visibility
Diesel storage - BERC uses diesel as the start-up fuel to ensure temperatures are high enough for safe and efficient waste combustion. Once the temperature can be sustained by the waste, diesel is no longer required.	Storage of diesel on site	• Potential fuel causing fire/ explosion hazard impacting track access or causing service disruption
Fire within waste bunker or process areas	Waste stored in the bunker	• Smoke plume or radiant heat affecting rail corridor visibility and signalling
Storage or handling of hazardous substances (e.g., ammonia, lime, activated carbon) during construction and once operational	Hazardous substances stored on-site and creating a chemical spill	• Chemical spill entering rail corridor
Heavy vehicle operations and near rail boundary	Heavy vehicles operating near rail boundary	• Heavy vehicles operating near rail boundary causing interference with access to the rail corridor and signalling systems and blocking emergency response routes
Vibration from EfW plant (turbine, moving plant, vehicles) or construction vibration (piling, compaction, heavy plant)	Vibration caused from uneven mass distribution	• Vibration transfer to rail formation
Failure of air pollution control (baghouse, scrubber)	Visible emissions or residue deposition from incorrectly controlling air pollution	• Visible emissions or residue deposition on railway causing operational concern or triggering rail incident report
Security breach or trespass between sites during construction and once operational	Climbing over existing boundary fencing	• Unauthorised access to rail corridor from EfW site
Flooding from on-site stormwater system failure or sediment runoff from construction site	On-site stormwater system failure	• Water ingress onto track or electrical infrastructure
Smoke/ heat from fire	Secondary hazard from fire occurring	• Potential to cause extreme smoke/ heat resulting in injury to people, damage to assets
Cranes and lifting near overhead lines or rail easement during construction	Contact with overhead line equipment (OLE) into rail corridor	• Disruption to rail service operations
Undertaking construction work adjacent to live rail line (personnel, plant, fencing)	Construction work spilling into the rail boundary	• Encroachment into rail corridor

		• Personnel struck by train; plant collision
Construction noise	Heavy machinery causing reduced hearing and interference with rail communications or signalling maintenance work	• Disruption to rail service operations
Material or debris encroachment onto rail land during construction	Material or debris drifting onto rail corridor due to heavy wind conditions	• Obstruction or damage to track • Rail incident, disruption in service operations
Temporary works failure (excavation collapse, hoarding, scaffolding, crane collapse) during construction	Material or machinery collapses onto rail corridor	• Railway track is disrupted, causing operational delays
Unplanned service strike (stormwater, sewer, power, communications) during construction	Power outage from storm	• Disruption to rail signalling or communications if shared utilities are affected
Plume visibility	Temperature related condensation of steam in the exhaust air and the water vapour becomes visible	• Plume becomes visible at the railway corridor, disrupting train operations

6.2 Risk Evaluation

The risk evaluation follows TMR's risk analysis criteria (from the Guide) to calculate the relative level of risk on the basis of the following formula:

$$\textbf{Risk} = \textbf{Likelihood} \times \textbf{Severity}$$

The relative risk is assessed based on the risk criteria shown in Table 6 (reproduced from Table 13 of the Guide).

Table 6: Overall Risk Score Criteria

Relative Risk	Assessment of Risk	Implications for Development
1 – 2	Low	• Appropriate control measures should be in place to allow the development to proceed
3 – 4	Medium	• Significant control measures should be in place to allow development to proceed. Such control measures may require design changes to components of the development
5 – 9	High	• It is unlikely that suitable control measures can be put in place. Development is unlikely to be supported by TMR
10 or more	Totally unacceptable	• Development cannot proceed

6.2.1 Risk Assessment Methodology

This risk assessment considers the potential for each hazard scenario to impact the existing rail corridor.

The main objectives of undertaking risk analysis are to:

- Determine the appropriateness of existing controls to manage the identified priority risks.
- Prioritise risks for subsequent evaluation.
- Provide an improved understanding of the vulnerability of critical assets to the identified risks.

Through assessing identified threats on this basis, a level of information is provided such that risks can be prioritised in a way that aids in the assessment of tolerability.

The risk score is calculated by determining the worst credible case consequence for each hazard scenario, then determining the likelihood of that consequence occurring.

Likelihood Criteria

Table 7 shows the likelihood values from the Guide that are used in this assessment. The Guide provides only the qualitative description in the first column of Table 7 with no definition for each term. The second column is therefore provided here to give an indicative description of each likelihood level; these should not be construed as prescriptive definitions, but rather as examples of what each likelihood level could mean.

Table 7: Likelihood Criteria – Based on TMR's Guide to Development in a Transport Environment

Likelihood of Occurrence	Example Description
Totally eliminated (0)	**Never occurred** in the Australian Rail Industry
Rare (1)	**Has not** occurred in the Australian Rail Industry in the last 10-years
Unlikely (2)	**Infrequently** occurs in the Australian Rail Industry in the last 5-years
Likely (3)	**Occasionally** occurs in the Australian Rail Industry (once a year)
Certain (4)	**Periodically** occurs in the Australian Rail Industry (2-10 times per year)
Imminent (5)	**Always occurs** in the Australian Rail Industry (10 times a year or more)

Severity Criteria

Table 8 shows the severity definitions from the Guide.

Table 8: Severity of Risk Criteria - Based on TMR's Guide to Development in a Transport Environment

Risk	Risk Source	Potential Outcome
1	Minor	• No harm to railway staff, customers, passengers, users of the development and external public • No damage to railway infrastructure • No damage to development or structural elements • No fire or blast
2	Medium	• No harm to railway staff, customers, passengers, users of the development and external public • No damage to railway infrastructure • No damage to development or structural elements. • Minor fire
3	Major	• Minor injuries/ harm to railway staff, customers, passengers, users of the development and external public • Some damage to railway infrastructure • Some damage to development or structural elements • Fire or blast
4	Catastrophic	• Injuries/ harm to railway staff, customers, passengers, users of the development and external public • Death • Major damage to railway infrastructure • Major damage to development or structural elements • Major fire or blast • Impact largely contained to development/railway
5	Catastrophic External	• Impact of a catastrophic event • Significant impact beyond the boundaries of the premises

6.3 Risk Rating

A Risk Screening Workshop was undertaken on 5 November 2025. The workshop determined that, of the 17 hazards identified in Table 5, 12 hazards are considered credible sources of a consequence in the rail corridor. The risks associated with those hazards are assessed with consideration of the controls in place, including the effectiveness of those controls. The relative level of risk for the hazards is shown in Table 9.

Table 9: Residual Risk Scores

Hazard	BERC Proposed Controls	Likelihood	Severity	Risk Score
Dust emissions during construction and once operational	• IBA stockpiles matured in three-sided building • Misting/ dust suppression systems • Barrier wall around IBA pad • Additional maintained vegetated buffer • Refer to air quality report for additional information.	Rare (1)	Minor (1)	**Low** (1)
Diesel storage	• All diesel will be stored in a designated area away from the railway infrastructure • Bunded fuel tanks • Spill containment • Maintain the rail boundary interface as specified in the Construction Management Plan (CMP) • Automatic leak detection • Emergency spill plan agreed with rail authority	Rare (1)	Minor (1)	**Low** (1)
Fire within waste bunker or process areas	• Fire detection and suppression • Fire water containment • Liaison with local fire authority and rail operator for coordinated response plan • Annual fire drills and response tests	Rare (1)	Medium (2)	**Low** (2)
Heavy vehicle operations and near rail boundary	• The nearest road is located on an embankment adjacent to the railway, with guardrails installed as a control measure to prevent trucks from entering the railway corridor • Operator training • Rail authority permit to work • Exclusion zones between work and rail	Rare (1)	Minor (1)	**Low** (1)
Failure of air pollution control (baghouse, scrubber)	• Preventive maintenance • Operator training • Immediate notification protocol to rail authority if exceedance occurs • Regular performance checks • Incident reviews (post-event)	Rare (1)	Minor (1)	**Low** (1)
Security breach or trespass between sites during construction and once operational	• Exclusion fencing	Rare (1)	Minor (1)	**Low** (1)
Flooding from on-site stormwater system failure or sediment runoff from construction site	• Flood modelling has been undertaken to understand and mitigate flooding risk. Refer to Stormwater	Rare (1)	Minor (1)	**Low** (1)

	Management Plan and Flood Risk Assessment. • Overflow directed away from rail • Regular maintenance			
Smoke/ heat from fire	• Fire detection and suppression • Fire water containment • Liaison with local fire authority and rail operator for coordinated response plan	Rare (1)	Medium (2)	**Low** (2)
Cranes and lifting near overhead lines or rail easement	• Rail authority permit to work • Lifting plans • Exclusion zone between work and rail • Spotters • Crane slew restrictors	Rare (1)	Minor (1)	**Low** (1)
Material or debris encroachment onto railway land	• Exclusion fencing • Housekeeping • Debris netting on scaffold	Rare (1)	Minor (1)	**Low** (1)
Temporary works failure (excavation collapse, hoarding, scaffolding, crane collapse)	• Engineer-certified design • Regular inspection • Exclusion zone between works and rail	Rare (1)	Minor (1)	**Low** (1)
Unplanned service strike (stormwater, sewer, power, communications)	• Confirm all underground services via 'Dial Before You Dig' and rail authority plans • Supervise excavation near known alignments	Rare (1)	Minor (1)	**Low** (1)

Table 10 presents risks that have been assessed as not credible, together with the justification for this determination.

Table 10: Summary of Risks Screened Out as Not Credible

Risk	Reasoning
Storage or handling of hazardous substances (e.g., ammonia, lime, activated carbon) during construction and once operational	Hazardous substances are stored within the main EfW facility, located centrally on the site and away from the rail corridor. Handling of these materials occurs inside enclosed areas of the facility. Appropriate storage, handling procedures, and control measures are in place to manage risks.
Vibration from EfW plant (turbine, moving plant, vehicles) or construction vibration (piling, compaction, heavy plant)	The Noise and Vibration Assessment concludes that vibration levels during both construction and operation will be below thresholds that could affect railway infrastructure or operations. Standard construction controls will be implemented to minimise vibration.
Undertaking construction work adjacent to live rail line (personnel, plant, fencing)	Construction activities will be planned and managed in accordance with rail safety requirements. Physical separation from the live rail line will be maintained, with appropriate fencing, exclusion zones, and safe working procedures in place to prevent encroachment.
Construction noise	The Noise and Vibration Assessment concludes that construction noise levels will comply with relevant criteria and will not adversely affect railway operations. Mitigation measures will be implemented where required.
Plume visibility	The Air Quality Assessment concludes that plume visibility will be infrequent. The EfW stack design and operating conditions minimise the potential for visible plumes.

6.4 Risk Assessment Outcome

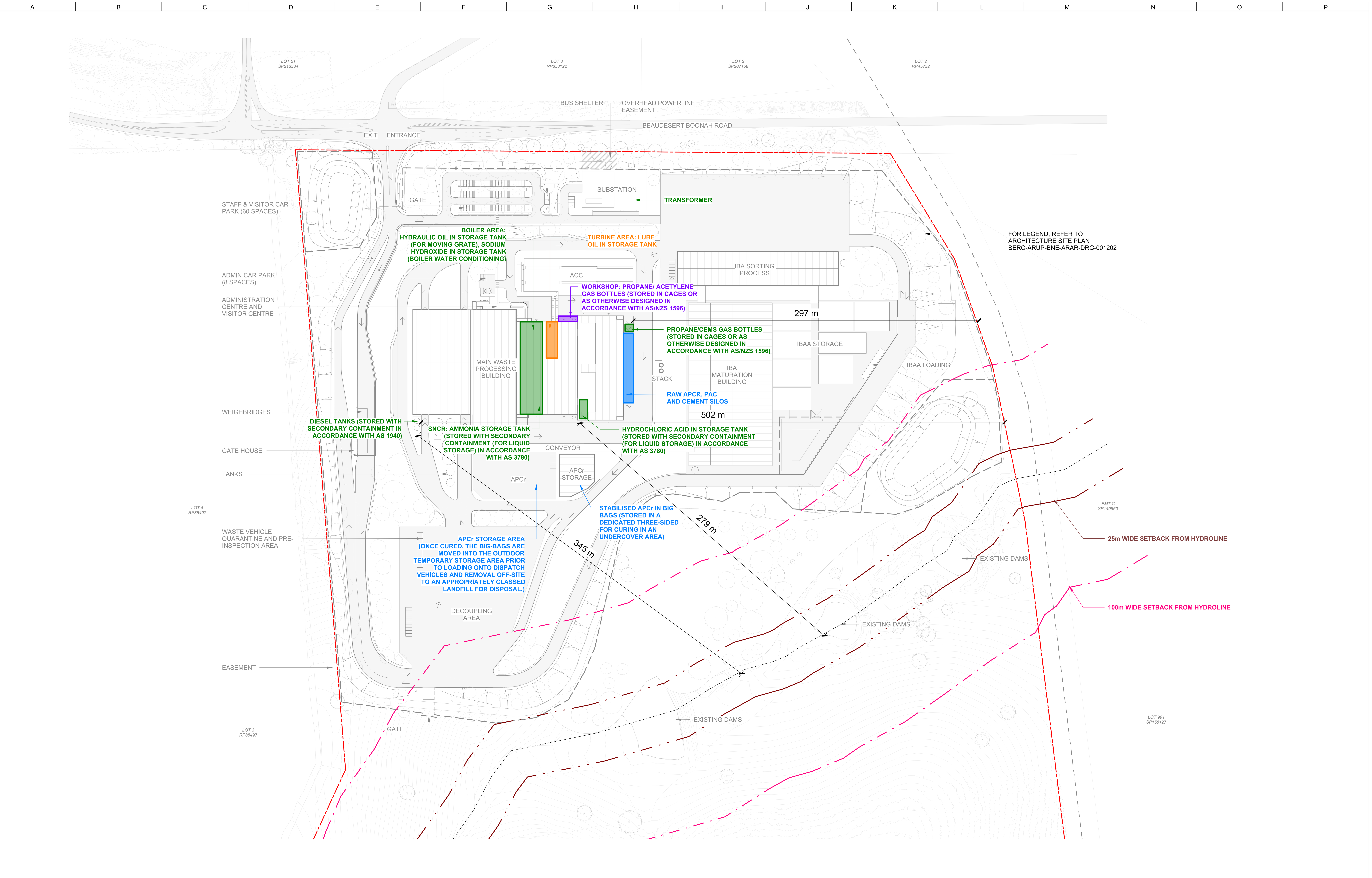
Following the review of risks to the rail corridor from the development of BERC and once operational, 12 hazard scenarios are considered credible and, with consideration of the controls in place, assessed as low risk according to the Guide's criteria. This is reflective of the robust control framework developed for the BERC Project, and the separation distance between the operational components of the BERC site and the rail corridor.

As all identified and assessed hazards pose a low risk to the rail corridor, in accordance with the risk criteria in the Guide, "appropriate control measures should be in place to allow the development to proceed".

The Project shall continue to manage risks through design, construction, commissioning and operation, and that risk management shall continue to consider the potential for impacts to the rail corridor.

Appendix C

Dangerous Goods Storage Arrangements



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Issue	Date	By	Chkd	Appd
R01	25/05/2026	SC	AS	AS

Client: CLEANAWAY — Making a sustainable future possible

Architectural Certification
Name: ....
Signature: .... Date: ....

Job Title: Bromelton Energy and Resource Centre
Lot 1 RP45234
Beaudesert-Boonah Road
Bromelton, Queensland

Scale at A1: 1:1500

Discipline: Architecture

ARUP
Turrbal and Jagera/Yuggera Country
Level 26, 123 Albert Street
Brisbane City Qld 4000
Australia

CONSULT AUSTRALIA
Member Firm
Arup Pty Ltd
ABN 18 000 966 165

Drawing Title: DANGEROUS GOODS SITE PLAN

Drawing Status: ISSUE FOR APPROVAL

Job No	Drawing No	Issue
293683-00	BERC-ARUP-BNE-ARAR-DRG-001207	R01

Do not scale

Appendix D

Site-Specific Risk Assessment – Water Quality

ARUP

Cleanaway Operations Pty Ltd

Bromelton Energy and Resource Centre

Site-Specific Risk Assessment –Water Quality

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

Rev A | 2 July 2026

Job number 293683-00

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ARUP

Document Verification

Project title	Bromelton Energy and Resource Centre
Document title	Site-Specific Risk Assessment –Water Quality
Job number	293683-00
Document ref	BERC-ARU-BNE-WRA-RPT-0001
File reference	

Revision	**Date**	**Filename**	BERC-ARU-BNE-WRA-RPT-0001		
A	July 2026	**Description**	Issue for Approval		
			Prepared by	**Checked by**	**Approved by**
		Name	Charlie Bibb	Ben Smith RPEQ 32157	Ben Smith RPEQ 32157
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		Name			
		Signature			
		Filename			
		Description			
			Prepared by	**Checked by**	**Approved by**
		Name			
		Signature			

Issue Document Verification with Document ✓

Contents

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Executive Summary

The purpose of this report is to identify and assess the site-specific risks to local drinking water quality associated with the storage of Dangerous Goods at the Bromelton Energy and Resource Centre (BERC/the Project), in response to AO 28.4 of the Seqwater Development Guidelines.

Cleanaway Operations Pty Ltd is developing an energy from waste (EfW) facility in Queensland known as the BERC. Cleanaway is an Australian waste management, recycling, and industrial services company. The Project will be located within the Special Industry Precinct of the Bromelton State Development Area (SDA), west of Beaudesert.

The BERC site is located within the Logan River basin, with surface drainage split by two primary ridgelines into three catchments that discharge via Allen Creek (7 km northeast), a rail-corridor culvert to farmland east of the site, and Swan Creek (4 km east), all of which enter the Logan River, which is a designated drinking water source area. The dangerous goods inventory considered in this assessment is listed in Section 4, and incudes diesel, aqueous ammonia, sodium hydroxide, hydrochloric acid, activated carbon, propane/acetylene, hydraulic/lubricating oils, and non-dangerous goods such as incinerator bottom ash (IBA) and air pollution control residue (APCr).

This risk assessment identifies three credible hazard scenarios that have potential to impact local drinking water quality. These identified hazard scenarios are assessed in accordance with the risk assessment criteria and methodology provided in Section 3.2.3 of the Australia Drinking Water Guidelines, supplemented by the risk assessment processes detailed in ISO 31000. Three credible hazard scenarios are identified with a plausible pathway to the tributaries supplying drinking water:

- Loss of containment from a dangerous goods storage under standard weather conditions;
- Loss of containment from a dangerous goods storage coinciding with a heavy rainfall or flood event capable of mobilising released material off-site; and
- Firewater runoff contaminated by dangerous goods during a fire on site.

Each scenario is initially assessed as Low risk and then considered in the context of the actual controls embedded in the Front-End Engineering Design (FEED) design, which are detailed in Section 5.

Through consideration of site context and controls, all three hazard scenarios are not considered to pose a credible risk to drinking water quality. This is reflective of the robust control framework developed for the BERC, and the separation distance between the operational components of the BERC site and the relevant off-site waterways.

This assessment demonstrates compliance with AO28.4 of the Seqwater Development Guidelines and therefore achieves Performance Outcome PO28(b) of the Seqwater Development Guideline 2024 by confirming dangerous goods at BERC will be stored and handled in a manner that minimises the potential for release to drinking water source areas during a potential contamination event.

The project shall continue to manage risks through design, construction, commissioning, and operation of the site, and risk management shall continue to consider the potential for impacts to the waterways.

1. Introduction

1.1 Purpose of Assessment

The purpose of this report is to identify and assess the site-specific risks to local drinking water quality associated with the storage of Dangerous Goods at the Bromelton Energy and Resource Centre (BERC), in response to AO28.4 of the Seqwater Development Guidelines.

AO28.4 states *the storage of dangerous goods, hazardous substances or environmentally hazardous materials (other than petroleum products) in aggregate quantities greater than 1000L or 1000kg is not undertaken unless a site-specific risk assessment presents minimal risk to drinking water quality*.

The assessment focuses on identifying credible hazard scenarios that may result in degradation of raw water quality in downstream or connected drinking water supplies. It is intentionally scoped to hazards arising from the storage, handling, and processing of dangerous goods, per AO28.4, and the pathways by which contaminants may reach receiving waters (for example, runoff, drainage, and flood mobilisation).

The assessment does not attempt to replicate a full operational risk assessment or DWQMP-style analysis. It is a planning-level assessment, proportionate to the requirement of AO28.4.

There are no prescribed methodology or risk criteria in the Development Guidelines. Accordingly, this assessment adopts the hazard and impact framing of the Australian Drinking Water Guidelines (ADWG), Section 3.2.3 hazard identification and risk assessment, together with a qualitative likelihood/consequence approach informed by ISO 31000, consistent with ADWG risk assessment principles.

1.2 Site Context

BERC is an Energy from Waste (EfW) facility 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.

Site dimensions are approximately 510 m to the northern boundary (road frontage), 965 m to the eastern boundary (adjacent rail corridor), 880 m to the southern boundary (adjacent private land) and 1,060 m to the western boundary in two parts being 535 m and 525 m (adjacent private land).

1.3 Methodology

This assessment follows the core steps of ISO 31000 while incorporating direction from Section 3.2.3 *Hazard Identification and Risk Assessment* of the Australian Drinking Water Guidelines.

1. Define the approach and risk criteria to be used for hazard identification and the risk assessment.
2. Define the critical receptor as the drinking water supply and provide functional context.
3. Identify and document potential hazards on site that may impact the drinking water supply quality.
4. Identify controls and site designs that prevent or mitigate the potential impacts dangerous goods on the drinking water supply quality.
5. Assess the level of risk for each identified hazard or hazardous event considering causal pathways and controls.
6. Provide recommendations to reduce or eliminate credible hazards that pose a risk to the critical receptor, if any.

1.4 Design Standards

The storage of dangerous goods for the BERC project is designed to the following standards:

- AS 1940 The storage and handling of flammable and combustible liquids
- AS 3780 The storage and handling of corrosive substances
- AS/NZS 2022 Anhydrous Ammonia: Storage and Handling
- AS/NZS 1596 The storage and handling of LP Gas
- AS 2419.1 Fire hydrant installations
- AS 2118.1 Automatic fire sprinkler systems
- Work Health and Safety (WHS) Regulations 2011
- State Code 21: Hazardous Chemical Facilities
- Environmental Protection Act 1994 and Environmental Protection Regulation 2019

2. Risk Framework

The risk assessment follows a qualitative likelihood/consequence approach consistent with Section 3.2.3 *Hazard Identification and Risk Assessment* of the ADWG and is structured in line with the risk management process described in ISO 31000:2018.

The main objectives of undertaking risk analysis are to:

- Determine the appropriateness of existing controls to manage the identified priority risks.
- Prioritise risks for subsequent evaluation.
- Provide an improved understanding of the vulnerability of critical assets to the identified risks.

Through assessing identified threats on this basis, a level of information is provided such that risks can be prioritised in a way that aids in the assessment of tolerability. The risk score is calculated by determining the worst credible case consequence for each hazard scenario, then determining the likelihood of that consequence occurring.

A 5×5 risk matrix from the ADWG shown in Table 1 is used for this assessment. Given the planning-level nature of this assessment, ratings are qualitative and judgement-based rather than numerically derived. Statistical evidence may be provided to support judgements where it is deemed appropriate.

Likelihood reflects the probability of a release or condition arising, considering design controls, containment systems, and operational practices. Consequence reflects the potential impact on raw water quality through the introduction of chemical contaminants with potential to disrupt downstream treatment processes, and the extent of this impact.

Table 1: Qualitative risk analysis matrix: level of risk (ADWG Table 3.3)

	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Moderate	High	Very high	Very high	Very high
Likely	Moderate	High	High	Very high	Very high
Possible	Low	Moderate	High	Very high	Very high
Unlikely	Low	Low	Moderate	High	Very high
Rare	Low	Low	Moderate	High	High

Categories for this risk assessment range from Rare to Almost Certain for likelihood (Table 2) and Insignificant to Catastrophic for consequence (Table 3). An example description is provided for each.

Table 2: Qualitative measures of likelihood (ADWG Table 3.1)

Level	Descriptor	Example Description
A	Almost Certain	Is expected to occur in most circumstances
B	Likely	Will probably occur in most circumstances
C	Possible	Might occur or should occur at some time
D	Unlikely	Could occur at some time
E	Rare	May occur only in exceptional circumstances

Table 3: Qualitative measures of consequence or impact (ADWG Table 3.2)

Level	Descriptor	Example Description
1	Insignificant	Insignificant impact, little disruption to normal operation, low increase in normal operation costs
2	Minor	Minor impact for small population, some manageable operation disruption, some increase in operating costs
3	Moderate	Minor impact for large population, significant modification to normal operation but manageable, operation costs increased, increased monitoring
4	Major	Major impact for small population, systems significantly compromised and abnormal operation if at all, high level of monitoring required
5	Catastrophic	Major impact for large population, complete failure of systems

Risks are assessed against the actual facility design, including containment, drainage and operational controls. No attempt is made to assess hypothetical uncontrolled scenarios.

3. Receiving Waterways and Pathways

The BERC is 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 (Lot 1 on RP45234, Beaudesert Boonah Road).

The BERC site sits within the Logan River basin in Southeast Queensland. The site's surface drainage is split by two primary ridgelines into three distinct catchments (north, central, and south), all of which ultimately discharge to the Logan River via local tributaries:

- Catchment 1 (northern): flows north, via swales, farm dams and culverts under Beaudesert Boonah Road into Allen Creek, ultimately reaching the Logan River approximately 7 km north-east of the site.
- Catchment 2 (central, 2A and 2B): flows north-east through three cascading on-site farm dams and a natural overland flow path, conveyed beneath the Sydney–Brisbane rail corridor through an existing 1.8 m / 1.85 m brick arch culvert, discharging to land east of the railway.
- Catchments 3 and 4 (southern): shed overland into Swan Creek, located approximately 200 m south of the site boundary, then to the Logan River approximately 4 km east of the site.

The Bromelton site drains generally from north/west to south/east, but the topography is more complex than a single uniform fall. The site is steeply sloping pastoral land with several ridgelines and low points.

The site is currently pastoral land, grasses with low-density shrubs and trees, used historically for grazing and agriculture, with minor cattle infrastructure (a cattle crush and spray race in the north). The existing site contains no formal piped stormwater infrastructure. Three cascading farm dams along the central overland flow path provide a degree of natural attenuation and sediment removal. Because the land is largely undeveloped and uncompacted, it currently has a high pervious fraction, which the development is required not to materially worsen (the post-development 10-year ARI discharge must match the pre-development discharge).

Potential methods for contaminants to enter receiving waters include surface runoff and stormwater drainage from operational areas, mobilisation during high rainfall or flood events, discharge points, and deposition of airborne particulates followed by rainfall.

The location of these local waterways relative to the BERC site is provided in Figure 1, Section 4.1 of this report.

4. Hazard Identification

4.1 Site Storage Conditions

The following Dangerous Goods stored on site as listed as per the BERC Hazards and Risk Report *BERC-ARU-BNE-ENRI-RPT-0001_D*.

Table 4: Expected quantities and classifications of hazardous chemicals

Hazardous Chemicals	Use On-Site / By-Product	UN Number[1]	Class	Packing Group[2]	Quantity Held On-Site
Hydraulic oil	The use of mechanical equipment such as the grate, cranes and turbines in the facility requires the use of hydraulic and lubrication oil.	TBC	3	III	2t
Lubrication oil		TBC	3	III	2t
Activated carbon	Activated carbon is added to the flue gas to remove absorbing dioxins, furans, gaseous mercury and other impurities that may be present in the flue gas.	1362	4.2	III	$50m^3$
25% aqueous ammonia Solution (if used)	Used in the Selective Non-Catalytic Reduction (SNCR) process where ammonia is injected into the boiler to reduce nitrogen oxide emissions in the combustion process	1005	8	N/A	<120t
Propane/acetylene	Propane and/or Acetylene are used as fuels for welding as required during maintenance operations	1978/3374	2.1	N/A	<100kg
Sodium hydroxide	Used to adjust pH of process water	1823	8	II	1400kg
Hydrochloric acid	Used in water treatment regeneration.	1789	8	II	1400kg
APCr	APCr is collected as a solid residue from the flue gas treatment system, then stabilised in concrete for transport.	-[3]	-	-	350t[4]
Stabilised APCr (curing)					4,600t
Stabilised APCr (cured)					4,600t
Diesel	BERC uses diesel as the start-up fuel to ensure temperatures are high enough for safe and efficient waste combustion. Once the temperature can be sustained by the waste, diesel is no longer required. While diesel is not classified as a dangerous good, it can add to the fuel load in the event of a fire and shall be considered when assessing the site.	1202	-[5]	N/A	360kL

A site drawing marked up with the location and a description of the Dangerous Goods stored on site is provided in Figure 1.

[1] A UN number is a four-digit number that identifies hazardous chemicals, in order to classify and track chemicals in international trade.

[2] Packing groups are a number (I, II or III) assigned to specific dangerous goods: I being a substance presenting high danger to III being a substance presenting low danger.

[3] APCr does not have a specific UN Number or dangerous goods classification. Based on Safe Work Australia's guidance for mixture classification and the BREF, APCr does not meet the definition of toxic under the ADGC or the Queensland Work Health and Safety Regulation 2011.

[4] This quantity refers to the maximum amount of raw pre-treated APCr stored on-site prior to treatment.

[5] Diesel is a combustible liquid and is not classified as a dangerous good under the ADGC. It is considered as a potential hazard in this risk assessment.

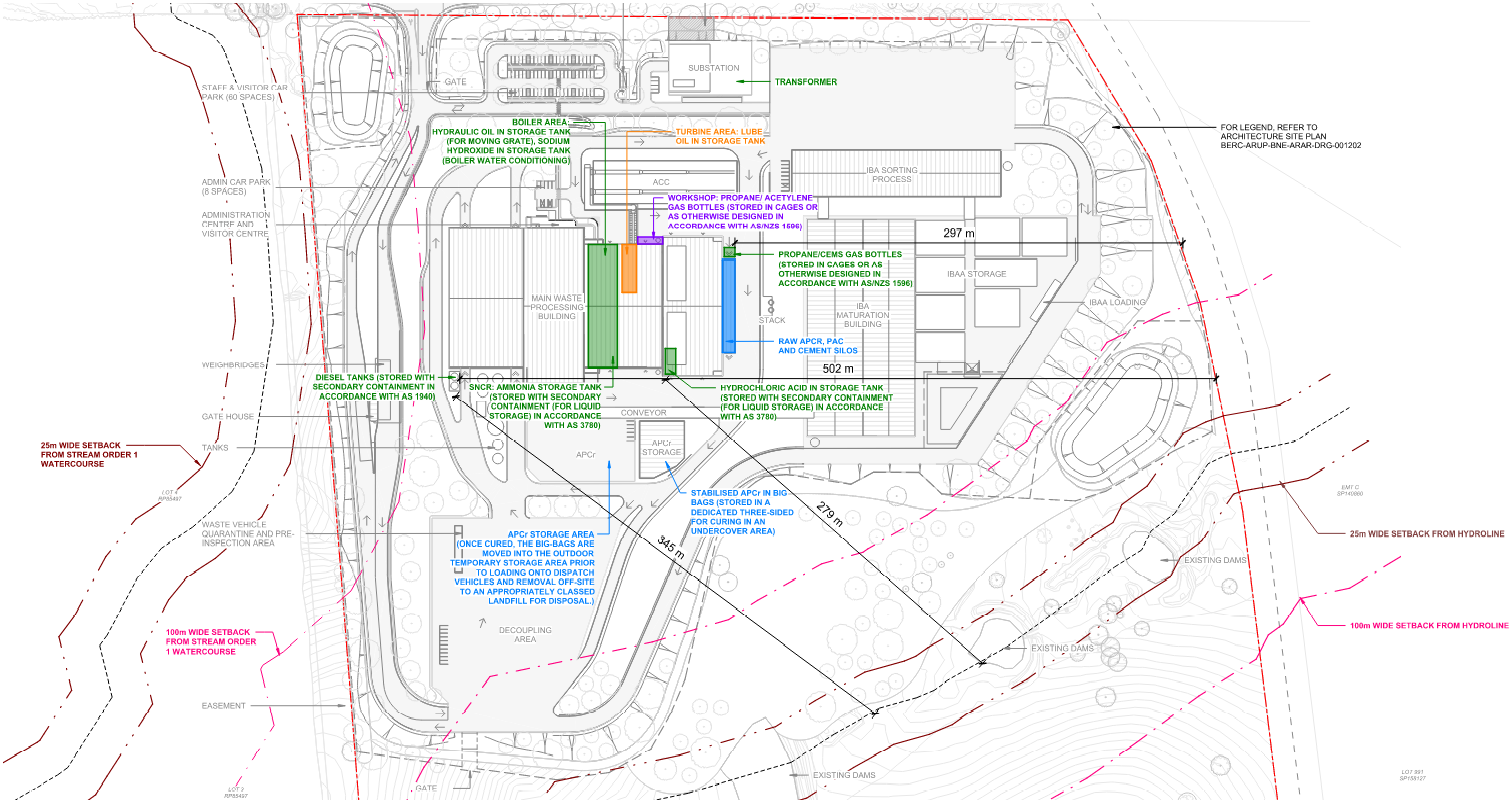

Figure 1: BERC Dangerous Goods Location Site Plan (Source: Arup)

4.2 Hazard Scenarios

Hazards are identified based on the nature of the BERC, with a focus on material and credible scenarios. The intent is to avoid speculative or highly improbable failure modes and instead focus on events that are reasonably foreseeable and have a plausible pathway to impact drinking water quality.

The ADWG defines a hazard as a biological, chemical, physical or radiological agent with the potential to cause harm, a hazardous event as the incident or situation that introduces or mobilises that hazard, and risk as the likelihood of the hazard causing harm in exposed populations within a specified timeframe, including the severity of the consequences. For the purposes of this assessment, hazards at this site are dangerous goods.

The following table summarises the identified hazard scenarios.

Hazard Scenario	Hazard Source	Potential Consequence
Loss of containment from a dangerous goods storage under standard weather conditions	Diesel, sodium hydroxide, hydrochloric acid, hydraulic oil, etc. involved in tank failure, transport incident, or localised spill during handling procedures.	Hazardous material is released into the waterways adjacent to the site.
Loss of containment from a dangerous goods storage on site under heavy rainfall conditions.	Diesel, sodium hydroxide, hydrochloric acid, hydraulic oil, etc. involved in tank failure, transport incident, or localised spill during handling procedures.	Extreme rainfall or flooding transports stored materials, from the site to the waterways.
Fire on site causes damage to dangerous goods storage and firewater runoff is contaminated.	Diesel, sodium hydroxide, hydrochloric acid, hydraulic oil, etc. captured and transported in firewater.	Firewater runoff may contain suspended solids and contaminants. A secondary pathway may arise from deposition of combustion by-products, followed by wash-off during rainfall.

All scenarios are based on dangerous goods breaching their containment system, traveling across the site, and reaching the tributaries which contribute to drinking water production. Released material may migrate across hardstand areas with the assistance of excess water flows and enter the site's stormwater drainage system. Contaminants may be transported through engineered drainage channels, detention basins, swales or discharge points before reaching the tributaries surrounding the site.

Dangerous Goods storage distances from the waterway hydro line are provided in Figure 1.

5. Controls

5.1 Diesel and oils

Diesel is stored outside in above-ground tanks adjacent to the main EfW building designed and bunded to AS 1940:2017, with the bund sized for ≥110% of the largest tank and an impervious, fire-resistant floor. Spill response kits shall be provided on site. Automatic leak detection is provided. Liquid level monitoring is provided.

An oil and water separator is included at the point of discharge from the HV substation area, noting that there is potential for accidental releases of oil or fuel from vehicles and machinery. Hydraulic/lube oil reservoirs sit within mechanical equipment (turbine, cranes, grate hydraulics). They are contained by integral drip trays, equipment-skid bunds, and the surrounding hardstand inside the EfW building, which drains to the contaminated-water retention system. The building floor in process areas is impermeable concrete acting as a tertiary bund, with all drainage routed to the contaminated-water sump rather than stormwater. Each transformer is provided with its own spill containment bund designed to AS 1940. Spill management plans will form part of the wider operational management plan to deal with rare, major incidents such as a damaged/faulty vehicle.

Both the Gross Pollutant Traps (GPT) units and bio-retention basins remove particulate and soluble contaminants such as hydrocarbons and heavy metals. Independent testing indicates an 80% removal efficiency of both heavy metals and hydrocarbons is achievable which could assist in treating run-off in the event of localised spills within the site roadway.

5.2 Aqueous ammonia

Aqueous ammonia (if used) is located outside in the tank farm in a separated bund. Water sprays around the bunded area absorb any vapour release. Tank level monitoring prevents overflow. Ammonia storage tank is provided with secondary containment for liquid storage. The bund is sized for the worst-case tank inventory.

5.3 Propane/acetylene

Propane/acetylene gas bottles are stored as small portable cylinders in a ventilated, caged cylinder compound designed in accordance with AS/NZS 1596.

5.4 Activated carbon

Spillage of carbon fines is contained within sealed transfer systems and the flue-gas treatment building hardstand, which drains to the contaminated-water network.

5.5 Air pollution control residue (APCr)

The process of treatment of APCr is outlined below

Step 1: APCr collected in silos and mixed with cement

APCr is collected via fully enclosed conveyor systems and stored in sealed silos, preventing exposure to the external environment. APCr is then pneumatically conveyed from the silos to the stabilisation area within the EfW building, maintaining fully enclosed handling throughout the transfer process. During stabilisation, APCr is transferred to an enclosed mixer where water is introduced in a controlled manner, typically by spray nozzles or controlled dosing, to wet the residue before or during binder (e.g. cement) addition, in a batch process. The slurry is then poured directly into closable, waterproof big-bags. These bags are kept in place for one-hour until they are self-supporting.

Step 2: Curing in a three-sided building

The closed big-bags are transferred from the EfW building to a dedicated three-sided APCr storage building 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.

Step 3: Storage prior to disposal

Once cured, the big-bags are moved into the outdoors temporary storage area prior to loading onto dispatch vehicles and removal off-site to an appropriately classed landfill for disposal.

5.6 Incinerator Bottom Ash (IBA) and Incinerator Bottom Ash Aggregate (IBAA)

Step 1: IBA produced and transported to the maturation building

IBA will be quenched at the bottom of the grate with water to cool it, after which it will be transported via the IBA conveyor to the IBA treatment area.

Step 2: IBA matured undercover

IBA will be stored in windrow stockpiles under cover in a three-sided building (IBA maturation building) for approximately 6 weeks (at the design waste ash content of 25% as received), with occasional turning and use of dust suppression sprays utilising recovered water from the lined retention pond during the maturation process.

The IBA 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. 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.

Step 3: IBA processed

After maturation, IBA will be transferred to the enclosed IBA Sorting Process area to recover recyclable ferrous and non-ferrous metals and to produce IBAA product for sale.

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 air extraction and filtration.

Step 4: IBAA temporarily stored

The IBAA product is then temporarily stockpiled outdoors in the IBAA storage area prior to dispatch to customers or project sites via a dispatch campaign, incorporating wind breaks, dust suppression sprays and wheel wash facilities.

It is important to note that the IBAA area is serviced by a segregated, lined stormwater retention basin with an upstream gross pollutant trap (GPT) and recovered water storage tanks. Water captured within this system is contained on site and will not be discharged to the external environment. If storage capacity is approached, water will be transported off site to a licensed facility.

5.7 Hydrochloric acid and sodium hydroxide

Stored in dedicated dosing/storage compounds and designed to AS 3780:2008. Each chemical is kept in a separate bund (due to incompatibility) with chemical-resistant linings, fume capture, and emergency wash facilities consistent with typical water-treatment dosing design.

5.8 Stormwater drainage design

The site drainage strategy is to collect, treat, attenuate, and discharge runoff that mimics pre-development discharge points and rates. The civil design includes a stormwater management strategy comprising water collection and re-use, pit and pipe network and downstream bio-retention and on-site detention basins. The pit and pipe network and on-site detention basins have been sized for the 10-year ARI event. Two on-site detention basins have been provided to manage stormwater flows. The design basis for the storage volume is determined by matching post development flows to the pre-development condition for the 10-year ARI event.

Stormwater designs are in accordance with Queensland Urban Drainage Manual (QUDM) and Australian Rainfall and Runoff (2019), as prescribed within Bromelton State Development Area Development Scheme (2017).

The design includes two on-site detention basins which have been sized such that post development stormwater discharge rates match the pre-development condition in accordance with the requirements of QUDM. A piped stormwater system will convey flows via an inlet Gross Pollutant Trap into the bio-retention basin. In smaller rainfall events, stormwater will have an extended detention time within the bio-retention basin for treatment. In larger events, those over and above the 1-year ARI event, stormwater flows will overtop the bio-retention basin and be contained in the detention portion of the basin.

A cut-off drain is installed at the base of all batter slopes to intercept surface runoff and route it within the site to the formal discharge points. Northern basin (Catchment 1) discharges into the existing swale along the western boundary which conveys flow under Beaudesert Boonah Road via the existing twin 2.125 × 0.9 m box culverts, north to Allen Creek. Eastern basin (Catchment 2) discharges into the existing overland flow path downstream of the three farm dams, which then passes under the rail corridor via the 1.85 m arch culvert.

All process area floors inside the EfW building drain to the contaminated-water sump as opposed to stormwater. Potentially contaminated materials within the waste mix delivered to site will be covered on delivery and will not be unloaded, transferred or stored externally, minimising the possibility for these materials to leach into the stormwater system which is serving roofs and hardstands.

An oil and water separator operates in the stormwater drainage connection from the HV substation area in the event of a spillage or equipment failure.

The water quality of stormwater discharged from the site will be monitored by the contractor to ensure water quality objectives are met.

Further Stormwater design information is detailed in the Stormwater Management Plan and Flood Risk Assessment *BERC-ARU-BNE-SWMP-RPT-0001_C*.

6. Risk Rating

The hazards identified in Section 4 are assessed against the Risk Framework Criteria provided in Section 2 to determine their likelihood, consequence, and corresponding risk level. The outcomes of this assessment are provided in Table 5.

Table 5: Risk Assessment Outcomes

Hazard	Initial Likelihood	Initial Consequence	Initial Risk Level	Critical Control Summary	Current Risk Level
Loss of containment from dangerous goods storage during standard weather conditions	Rare	Insignificant	Low	• Bunding / secondary containment • Automatic Leak Detection • Tank Level Monitoring • Spill response Standard Operating Procedures (SOPs) • Separation Distances • Contaminated water sump • Oil-water separator • Bio-retention basin • Gross pollutant traps • Emergency Plan • Isolation valves • Stormwater drainage design • Rainwater capture and re-use • Water quality monitoring • 2x Retention basins	Not credible
Loss of containment from dangerous goods storage during heavy rainfall	Rare	Minor	Low		Not credible
Firewater runoff contaminated by dangerous goods during a fire on site.	Rare	Insignificant	Low		Not credible

All hazard scenarios are considered Rare in respect to their likelihood as per the definition under the ADWG: "*May occur only in exceptional circumstances*". Loss of containment events for those dangerous goods stored in small and medium sized atmospheric tanks on site via a leak or rupture are infrequent, commonly cited conservatively as 1 in 1000-year events for minor leaks of small storage containers[6].

All identified hazards are assigned an initial Risk Level of Low. With the implementation of the controls listed in Section 5 already incorporated into the design, the risk of an impact on drinking water quality is reduced to not credible. The combination of preventative controls (i.e. controls to prevent a loss of containment), separation distances and mitigative controls (primarily spill containment and stormwater management) reduces the potential for any impact to the drinking water catchment to below credible levels.

Justification for the outcomes of this risk assessment in Table 5 is provided in Table 6 below.

Table 6: Individual Risk Assessment Rating Commentary

Hazard	Reasoning
Loss of containment from dangerous goods storage during standard weather conditions	The consequence of a loss of containment event for any dangerous goods storage is mitigated by the provision of bunding to capture any material. This hazardous material is contained to the immediate area, and a cleanup process is initiated as per SOPs and emergency planning. With the controls in place, there is no pathway for dangerous goods to escape the site boundary and reach off-site waterways. Most dangerous goods storage handstands are vertically segregated from the roadways and stormwater drains.
Loss of containment from dangerous	The consequence of a loss of containment event for any dangerous goods storage is mitigated by the provision of bunding to capture lost material. This hazardous material is contained to the immediate area, and a cleanup process is initiated as per SOPs and emergency planning. A significant heavy rainfall

[6] HSE - Failure Rate and Event Data for use within Risk Assessments (28/06/2012)

Hazard	Reasoning
goods storage during heavy rainfall	event that occurs during a loss of containment event could create a pathway for hazardous material to be captured in the water flow and overflow the stormwater drainage system, reaching the off-site waterways. However, the probability of a rainfall event of this magnitude occurring is extremely low (100-year) and the probability that this would occur during the already rare event of a loss of containment further contributes to the outcome of this assessment. The Stormwater Management Plan and Flood Risk Assessment notes that the key buildings, such as the EfW and APCr storage building are set above RL 88 m AHD, some 8 m higher than the detention basins located near the northern and eastern boundaries of the site. Design levels shed water away from the buildings towards the stormwater system and subsequently to the detention basins. It is therefore considered that the buildings within BERC have minimal risk of flooding. In addition the design conditions 1% AEP + CC (SSP2-4.5) peak flood depth results show that the critical site elements are located outside the peak 1% AEP + CC (SSP2-4.5) peak flood extents.
Firewater runoff contaminated by dangerous goods during a fire on site.	A fire at the BERC site is a credible hazard scenario for which mitigation requires dosing with firewater. Firewater runoff is generated in this process which can capture any exposed dangerous goods which storages are compromised by the fire. Firewater generated during an incident is captured, isolated from the stormwater network, tested, and either treated on-site or transported off-site to a licensed facility. Contaminated firewater is not actively discharged to the local waterways. Isolation valves are provided to the site drainage system to prevent contaminated water from leaving the stormwater network.

7. Conclusion

Following the review of risks to local drinking water quality from dangerous goods stored at the BERC site, three hazard scenarios are identified as credible. All scenarios are assessed as **Low** initial risk under the ADWG criteria. With consideration of the site design and controls in place, the risk is reduced to not credible. This is reflective of the robust control framework developed for the BERC to store and handle Dangerous Goods, and the separation distances between Dangerous Goods storage areas and the off-site waterways supplementing drinking water production. No additional controls beyond those already embedded in the FEED design are recommended at this stage.

The determination that all three hazard scenarios have no credible risk to drinking water is underpinned by a control philosophy that ensures no single point of failure can create a credible pathway between the on-site dangerous goods inventory and the Logan River catchment that supplies drinking water. Both primary and secondary containment is provided in all dangerous goods storages on site, mitigating the causal pathway for dangerous goods impacting drinking water quality. Beyond the engineered controls, the site layout reduces the credibility of any off-site impact pathway.

The findings of this assessment are consistent with the broader BERC-ARU-BNE-ENRI-RPT-0001_D Hazards and Risk Report, which identifies 59 credible hazard scenarios across the facility. Of those, only three have potential off-site consequences, being IBA runoff release and flow off site, traffic collisions, and truck queueing around exit.

The BERC development satisfies AO28.4 of the Seqwater Development Guidelines by demonstrating through this site-specific risk assessment that the aggregate storage of Dangerous Goods greater than 1,000 L or 1,000 kg presents minimal risk to drinking water quality, and achieves Performance Outcome PO28(b) of the Seqwater Development Guideline 2024; that the development "*is designed so dangerous goods, hazardous substances or environmentally hazardous materials are stored and handled in a manner that minimises the potential for the release of hazardous materials and chemicals to drinking water source areas during a potential contamination event*".

The Cleanaway Bromelton Energy from Waste project shall continue to manage risks through design, construction, commissioning, and operation, and that risk management shall continue to consider the potential for impacts to the off-site waterways.