Applicability of Extractive Waste Regulations and description of how the obligations of these Regulations are met

The BRDA is a Category A facility under the Extractive Waste Directive (2006/21/EC), and the Waste Management (Management of Waste from the Extractive Industries) Regulations, which implements the Directive in Irish legislation due to its scale and location adjacent to a special area of conservation. This classification ensures that the design and operation of the BRDA provides the highest level of environmental protection.

In accordance with BAT and in the absence of a National or EN Standard, AAL have adopted design criteria as published by the Canadian Dam Association (CDA): CDA Application of Dam Safety Guidelines to Mining Dams (2014). In addition, consideration is also given to the Global Tailings Standard on Tailings Management (2020).

The Bauxite Residue Disposal Area (BRDA) is a dedicated storage facility owned, developed and operated by AAL for the permanent disposal of specific bauxite and process residues generated within the alumina refinery.

The BRDA consists of the Phase 1 BRDA and the new Phase 2 BRDA. The Phase 1 BRDA (area ca. 104 ha.) is confined to Aughinish Island. It was commissioned in 1983 as a 70 hectare storage facility and employed screened glacial till as the base liner. It was extended from 70 to 104 hectares in 1996 and the 34 hectare extension was equipped with a synthetic liner. The Phase 2 extension (area ca. 80 ha) is directly south of the Phase 1 and extends across Poulaweala Creek and onto the mainland (the townlands of Island Mac Teige and Glenbane West). It was commissioned in 2011 and is composite lined throughout. Phase 1 and Phase 2 are both active storage areas and are being merged into a single unit.

The BRDA has been designed to ensure the long-term stability of the bauxite residues – principally red mud. The bauxite residue is retained by a perimeter stack wall constructed of rockfill, which is raised systematically in 2m lifts or stages. There is also a flood tidal defence berm between the BRDA and the Shannon Estuary foreshore that protects the BRDA from wave and tidal erosion. AAL is responsible for the maintenance of this structure.

The existing BRDA planning permission is to a maximum perimeter raise (Stage 10) of elevation 24 m AMSL resulting in a maximum central elevation of 32 m AMSL. This will provide storage to the year c.2030 at current production rates and bauxite grade. Refer to Section 1.1 of this application for detail of the proposed raise of the BRDA.

Summary details for the BRDA are tabulated below, as reported in the 2020 Annual Environment Report.

Total area	168.5 hectares
Total quantity of waste deposited in 2020	1,566,785 tonnes
Total accumulated quantity of waste	35,961,173 tonnes

The composition of the waste disposed of in the BRDA is summarised in the table below. Of the waste that is treated and disposed of in the BRDA, only the saltcake stream is classified as hazardous.

Waste Stream	LoW	2020 Tonnes
Farmed bauxite residue	01 03 09	1,419,920
Saltcake	01 03 07	15,312
Sand	01 03 99	107,378
Process Waste	01 03 99	18,073
Lime grits	01 03 99	6,030
Fluestack residue	16 11 04	72

The provisions of the Extractive Waste Directive and the Irish Regulations, as they relate to the management of waste, are applied by AAL as follows:

A. The BRDA site is licenced by the EPA under the IE licence P0035-07. This obliges AAL to design, construct, operate, maintain and ultimately close and remediate the site in such a manner as to minimise risk to stability of the waste structure and to prevent pollution of air, soil, surface water or groundwater.

B. Under the Regulations, operators such as AAL are required to develop a waste management plan for the minimisation, treatment, recovery and disposal of extractive waste, taking into account the principle of sustainable development. The Regulations require that the waste management plan encourages the recovery of waste by means of recycling, reusing or reclaiming such waste, where this is environmentally sound. It also acknowledged that certain waste may be disposed of, in which case the plan should ensure the short- and long-term safe disposal of the particular waste. AAL has developed an Extractive Waste Management Plan (EWMP) which has been reviewed by and accepted by the EPA.

The objectives of the EWMP are the minimisation, appropriate treatment and safe disposal of extractive waste taking into account the principle of sustainable development. To meet these objectives:

- only high quality bauxite with low residue factor is processed
- the highest feasible alumina extraction efficiency is targeted to minimise waste generated
- the most efficient mud washing system is employed to minimise residual caustic in the mud
- once disposed the mud is farmed intensively to maximise compaction and minimise residual caustic
- the deposited mud is drained and compacted in situ to ensure that the greatest stability is achieved in the shortest time
- extensive residue stability, air quality, surface water quality and groundwater monitoring programme is undertaken as required by the site IE licence. In the highly unlikely event of the monitoring programme detecting a problem with waste stability or with a threat of localised contamination, the BRDA incident procedures provide for immediate notification to the EPA.
- All design, construction and monitoring data is available for inspection at the site.
- In parallel to this AAL contributes to a number of major EU studies on potential opportunities to use all or part of red mud

C. The Extractive Waste Management Plan including all monitoring data is reviewed annually and this is reported to EPA via the Installation Annual Environmental Report

D. The BRDA site is inspected by the EPA on at least an annual basis and generally more frequently than that.

E. The AAL site has an existing safety management system which is certified to Advanced Level 8 of the International Safety Rating System (I.S.R.S). This contains a Major Accident Prevention Policy and an Internal Emergency Plan which apply to the entire facility at Aughinish, both the alumina refinery and the BRDA. These have previously been submitted to the Agency.

F. AAL has consulted with Limerick County Council as the Principal Response Agency to publish an 'External Emergency Plan for a BRDA Containment Failure'. In developing this External Emergency Plan, the public were engaged in consultation. Financial provision is in place for the BRDA facility (and refinery), as agreed with the Agency

G. Closure and aftercare costs and procedures for the BRDA facility (and refinery) have been agreed with the Agency, as documented in the CRAMP submitted to the Agency in 2018. An update of the CRAMP has been submitted with this licence review application.

Classification of bauxite residue

All extractive wastes disposed in the BRDA are required to be classified as to their hazard potential.

The principal waste, bauxite residue, undergoes numerous stages of washing and filtration prior to discharge to the Bauxite Residue Disposal Area (BRDA). At AAL a process of enhanced atmospheric carbonation termed "bauxite residue farming" has been developed to minimise the pH of deposited bauxite residue to the BRDA. Bauxite Residue farming reduces the residue pH below 11.5. Farmed bauxite residue is the terminology applied by AAL to describe bauxite residue which has undergone a process of partial neutralisation.

AAL have completed a detailed assessment of AAL farmed bauxite residue employing the current EU legislation as specified by the EU Waste Framework Directive (2008/98/EC), the Hazardous Waste Directive (2000/532/EC) and the Extractive Waste Directive (2006/21/EC).

Summation of the Hazard statement codes for each compound present in farmed bauxite residue shows no threshold is exceeded for any of the hazard properties (HP). Therefore, farmed bauxite residue is non-hazardous. The non-hazardous waste code '01 03 09 red mud from alumina production other than the wastes mentioned in 01 03 10', is assigned to AAL farmed bauxite residue under 2014/955/EU Updated List of wastes.

The other wastes deposited are also classified as non-hazardous with the exception of saltcake. This saltcake (01 03 07) is stored in a separate lined 'Hazardous Waste Cell' within the BRDA. Refer to section 1.1 of this application for details of the proposed raise of the saltcake cell. The proposed wet air oxidation process to be installed in 2022 and commissioned in 2023 will avoid the generation of saltcake.